SUPPLEMENTAL
REMEDIAL INVESTIGATION WORK PLAN

Maralco Site
7730 South 202nd Street, Kent, WA

Agreed Order No. DE 22343
Facility Site Identification No. 2067
Cleanup Site Identification No. 5055

January 27, 2025

Prepared for:

BRIDGE

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REMEDIAL INVESTIGATION WORK PLAN

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Prepared by:

CRETE CONSULTING, INC.

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Acronyms and Abbreviations

Aerotech	Aerotech Environmental, Inc.
AO	Agreed Order
bgs	below ground surface
BHD	baghouse dust
Bridge	7730 202nd Street, LLC
BTEX	benzene, toluene, ethylbenzene, and xylenes
CRETE	CRETE Consulting Incorporated
COC	constituent of concern
COI	constituent of interest
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSM	conceptual site model
CUL	cleanup level
DRO	diesel-range organics
IHS	Indictor Hazardous Substance
IAWP	Interim Action Work Plan
Ecology	Washington Department of Ecology
EDR	Environmental Data Resources, Inc.'s
EPA	United States Environmental Protection Agency
EMR	Environmental Management Resources
Enviros	Enviros, Inc.
FBI	Friedman & Bruya, Inc
ft	foot (or feet)
GRO	gasoline-range organics
KBI	Kawecki-Berylco, Inc.
KCC	Kent City Code
µg/L	micrograms per liter
mg/kg	milligram per kilogram
mS/cm	milliSiemens/centimeter
MTCA	Model Toxics Control Act
MKE	Morrison-Knudsen Environmental Services, Inc./Morrison-Knudsen Corporation
ORO	oil-range organics
PAH	Polycyclic Aromatic Hydrocarbons
PCUL	Preliminary Cleanup Level
Property	Maralco Former Secondary Aluminum Smelter Property
PRGs	Project Remediation Goals
QAPP	Quality Assurance Project Plan
RI/FS	Remedial Investigation/Feasibility Study
RCI	Reactivity, Corrosivity, Ignitability
RIWP	Remedial Investigation Work Plan

SL	Screening level
SVOC	Semi Volatile Organic Compounds
SRIWP	Supplemental Remedial Investigation Work Plan (Agency Review Draft)
TCLP	Toxicity Characteristic Leachate Procedure
TEE	Terrestrial Ecological Evaluation
TPH	total petroleum hydrocarbons
URS	URS Corporation
UST	underground storage tank
VCP	Voluntary Cleanup Program
VOC	Volatile Organic Compounds
WAC	Washington Administrative Code

Professional Certification

Supplemental Remedial Investigation Work Plan

Maralco Site
7730 South 202nd Street
Kent, WA 98032

King County Parcel Number 6315000300

Ecology Facility Site ID No. 2067
Ecology Cleanup Site ID No. 5055

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1 Introduction

This Supplemental Remedial Investigation Work Plan (SRIWP) describes investigation activities to be conducted as part of efforts to develop a Remedial Investigation/Feasibility Study (RI/FS) report for the Maralco Site in Kent, Washington (Site, see Figure 1). SRIWP elements will be performed consistent with the requirements of the Washington State Model Toxics Control Act Cleanup Regulation (MTCA; Chapter 173-340 of the Washington Administrative Code [WAC]). This SRIWP was prepared for 7730 202nd Street, LLC (Bridge) for review by the Washington State Department of Ecology (Ecology) under Agreed Order No. DE22343 (AO). The Site was most recently enrolled in the Voluntary Cleanup Program (VCP; NW3339) and had previously been enrolled in the VCP (NW2356) by Brown Dog Investments LLC. VCP NW3339 was terminated on January 18, 2024, upon the effective date of the AO.

The Site as defined under MTCA and the AO is where a hazardous substance, other than a consumer product in consumer use, has been deposited, stored, disposed of, or placed, or otherwise come to be located [WAC 173-340-200 “Facility” (b)]. The Site is generally located at or in the vicinity of 7730 South 202nd Street in Kent, Washington (Property) and includes contaminated areas within the Property boundary (King County Parcel No. 631500-0300) and beyond the Property to the north. The extent of the Property is indicated on Figure 2.

Ecology has been engaged at the Site (Cleanup Site ID 5055) since 1987. Numerous investigations and two interim actions were performed at the Site between 1987 and 2017. This information was compiled in Phase I and Phase II Environmental Site Assessment Reports (Stantec 2015 and 2017) prepared on behalf of the City of Kent and the previous majority lienholder of the Property (Brown Dog Investments LLC). Since that time, the following reports were prepared by Aerotech Environmental Consulting, Inc. (Aerotech) for the former Property owner, the John P. Lyon & Gloria Lyon Irrevocable Trust:

- Stockpile Survey and Assessment – May 31, 2017
- Groundwater Well Survey – June 7, 2017
- Groundwater Monitoring Well Installation Report – August 15, 2017
- Site Summary Report prepared by Aerotech for GVA Kidder Mathews – October 31, 2017.

These reports were provided to Ecology as part of the RIWP (CRETE 2022) completed under the VCP.

Crete Consulting Incorporated (CRETE) has been working with Bridge since March 2021 to assess environmental conditions at the Site, including performance of additional site characterization. In the summer and fall of 2023, Bridge completed an interim action to remove and dispose of more than 35,000 tons of waste material including black dross, washed oxides, and bag house dust at an off-site permitted landfill. That removal action (herein referred to as the Phase 1 Interim Action) was performed in accordance with the

Interim Action Work Plan (IAWP; CRETE 2023b). The Phase 1 Interim Action is summarized in Section 2.5.3 and documented in the February 6, 2024 completion report (CRETE 2024a).

Bridge is currently completing a second interim action to remove remaining waste and contaminated soil (Phase 2 Interim Action). This removal action is being performed in accordance with the Public Review Draft Interim Action Work Plan Phase 2 Removal Action (Phase 2 IAWP, CRETE 2024b). The Phase 2 Interim Action will be documented in an Interim Action Completion Report and the results will be summarized in the RI/FS report. Ecology allowed initiation of the Phase 2 Interim Action prior to completing public review and finalization of the Phase 2 IAWP under certain conditions and understandings. Those conditions were noted in Ecology's letter dated September 24, 2024 (Ecology 2024a).

Soil, groundwater, sediment, and confirmation dross stockpile sampling results are summarized in this SRIWP. Copies of recent analytical data collected to support this work are included in Appendix A. Copies of monitoring well construction logs are included in Appendix B.

After finalization and approval of this SRIWP, Bridge will implement the field investigation and continue to work with Ecology to develop the RI/FS and draft Cleanup Action Plan in accordance with Section VII and Exhibit C of the AO.

2 Project Background

2.1 Property Location and Description

The Site is located in the Green River Valley in Kent, Washington. The Bridge-owned portion of the Site (the "Property") covers 12.05-acres and is zoned for Heavy Industrial (I3) use. The Property included a 45,000 square foot building near the western boundary that had been largely abandoned since 1986. A house/office that appeared to have been abandoned since 1986 was also present near the northern boundary. Both the building and the house were demolished in Summer 2024. The Property boundary is indicated on Figure 1. The lateral extent of the Site will ultimately be defined with the pending completion of the RI.

The Property is bordered to the west by rail lines owned by Burlington Northern Santa Fe (BNSF), to the north by vegetation and South 202nd Street, to the east by 80th Avenue South and a cold storage warehouse facility, and to the south by commercial and industrial facilities.

The Property includes stormwater drainage ditches and an associated wetland. Christopher Ditch is located in the eastern portion of the Property. This ditch is considered a Minor Stream per Kent City Code (KCC). A wetland site assessment was completed in November 2020 (Soundview 2022). The assessment identified Category III and Category IV Wetlands, under the KCC, along portions of the ditch on and off the Property (Wetlands A through D). Wetland A, which is classified as Category III, is located on-Property and was estimated to be 34,360 square feet (Figure 2). Wetland A receives seasonal outflow from Wetland D, which is a Category IV wetland located off-Property to the northeast. Wetland C, also classified as Category III, is located off-Property in the South 202nd Street right-of-way, north-adjacent to the Property, and receives seasonal outflow from Wetland A. As part of development activities, the on-Property stormwater ditches will be realigned as shown on Figure 8. Stormwater drainage is discussed in more detail in Section 3.1.1.

2.2 Property History and Past Land Use

The history of the Property was determined using information from the Environmental Data Resources, Inc.'s (EDR's) state and federal environmental database searches, King County Assessor's Property Characteristics Report, Polk records, historical aerial photographs, Sanborn maps, USGS topographic maps, and the Washington State Department of Ecology (Ecology) central records.

The Property was agricultural land until the late 1970s. Maralco Aluminum (Maralco) operated a secondary aluminum smelter at the Property beginning in 1980. The smelter produced aluminum ingots using the molten salt process from recycled aluminum cans, Kawecki-Berylco, Inc. (KBI) dross, and scrap metal. The wastes created from this process included black dross (or "salt cake") which was a mixture of salt, aluminum oxide, and impurities from the molten salt smelting process. During the later part of operations, salt was recovered from the black dross in what was referred to as a "salt saver" process, where the dross was mixed with water in three concrete holding ponds to extract and remove salts from the metal oxides. The metal oxide residues from this process were disposed onsite in an unlined "oxide lagoon". Berms formed of black dross surrounded the lagoon area (MKE 1991a).

During the first year of operations, the black dross was hauled off the Property for disposal. After 1981, the black dross was stored onsite in a consolidated stockpile located on the south and east sides of the building (Figure 2). Waste material, which included washed aluminum oxide, black dross (including oversized screenings and furnace skimming), KBI dross, and bag house dust contained within the bag house filters and bins, was also stockpiled inside the building. The stockpiled waste remained onsite from 1986 through the fall of 2023, when the Phase 1 Interim Action was performed (see Section 2.5.3).

2.3 Planned Land Use

Redevelopment of the Property will include the following:

- Demolition of all existing structures (completed in Summer 2024)
- Construction of an approximate 178,700 square foot warehouse building with concrete and asphalt loading dock, roads, and parking area. It is estimated that 70% of the Property will be impervious once the project is completed.
- Portions of the on-Property stormwater ditches (and wetland buffers) will be filled and a new wetland will be created in the northeastern portion of the Property.
- Installation of new stormwater collection systems and new utility connections. Stormwater collected on the redeveloped Property will be routed to stormwater detention vaults with discharge to the manhole located in the South 202nd Street cul-de-sac. Off-Property stormwater from the south and northeast will be routed to the new wetland. Stormwater will overflow from the wetland to the new Christopher Ditch alignment along the north edge of the Property. The new ditch alignment will connect to the existing culvert that passes beneath the South 202nd Street cul-de-sac and discharges to the South 202nd Street ROW ditch.

All redevelopment activities are subject to local permitting requirements and approval by the City of Kent and other agencies with permitting jurisdiction. Permitting for property redevelopment is occurring contemporaneously with the interim actions and ongoing investigation of the Site.

The proposed new building layout, planned stormwater modifications, parking, and the wetland modifications are shown on Figure 8. The footprint of the new warehouse and asphalt parking will completely cover the former building area, the outdoor dross pile area, and portions of the on-Property drainage ditches. Redevelopment activities will be conducted on the Property (within the Property boundaries).

2.4 Previous Field Investigations

Several previous investigations have been completed at the Site. Figure 9 provides a sample location map for these previous field investigations. Table 1 provides monitoring well construction details and field investigation results are summarized on Tables 2 through 13. For discussion purposes, screening levels (SLs) referenced in the following investigation summaries are based on the January 8, 2025 Preliminary Cleanup Level (PCUL) workbook prepared by Ecology for groundwater discharge to fresh surface water. SLs for the RI are further discussed in Section 4.

2.4.1 Ecology & Environment Site Assessment, 1987

E&E completed a site assessment in the summer of 1987 (E&E 1987). According to E&E, Maralco had analyzed samples of black dross, baghouse dust, and aluminum oxide using the Extraction Procedure Toxicity (EP-Tox) method and acute fish toxicity testing in February and July of 1986. The sample results indicated the materials did not exceed the then current EP-Tox hazardous waste criteria; however, the surface water sample mortality for acute fish toxicity testing was 100%. Four soil samples were collected from the ditches (B1 through B4). Samples B3 (on-Property) and B4 (off-Property), collected from the upstream eastern portion of the ditch system, had no detected compounds above screening levels (Tables 8 and 9). Sample B1, located in the downstream off-Property portion of the ditch, had detections of three compounds (arsenic, copper, and zinc) above screening levels (Table 9). Sample location B2 was collected from the unnamed ditch adjacent to the black dross pile. The analytical results indicated that metals contained in the black dross (antimony, arsenic, beryllium, cadmium, chromium, copper, lead, nickel and zinc) were present in the drainage ditch. Six of the detected metals (cadmium, chromium, copper, lead, nickel, and zinc) had elevated concentrations (Table 8). To evaluate whether the ditch soil would designate as a hazardous waste, the sample was also submitted for EP-Tox analysis. The results indicated that the sample did not meet the criteria of a hazardous waste.

2.4.2 MKE Phase I Remedial Investigation, 1990

Morrison-Knudsen Environmental Services, Inc. ("MKE") performed remedial investigation activities at the Site between May and November 1990 (MKE 1991a). Groundwater, soil, sediment, surface water, and black dross samples were collected as part of this investigation. Assessment activities included the characterization of the exterior dross piles; installation, development, and sampling of four monitoring wells (MW-1 through MW-4); collection and analysis of samples from seven ditch/drainage locations (SW-1 through SW-4 and SW-6 through SW-8); and collection and analysis of shallow soil samples from 16 hand auger locations (HB-1 through HB-16).

Surface soil impacts were detected in the northeast portion of the Property, in the vicinity of the former house/office structure. These locations are represented by HB-1, HB-2, HB-3, and HB-5 (Table 2, Figures 9 and 10). HB-1, HB-2, and HB-3 were reported to have been taken from a former dross stockpile area and indicated that residual contamination remained in the upper foot (MKE 1991a). There is no documentation indicating that the impacted soil at HB-1, HB-2, HB-3, and HB-5 was ever removed.

Testing of the dross samples for leachable metals indicated that the material was not a characteristic hazardous waste. Elevated groundwater concentrations were noted for various metals (aluminum, arsenic, barium, copper, iron, lead, mercury, and selenium). The surface water and ditch sample results revealed that dross was entering on-Property drainage ditches and that surface water was transporting the material off-Property. The report indicates that in 1987 Ecology placed plastic barricades around the dross stockpile to prevent run-off from entering the drainage ditches; however, by 1989 the barricades were no longer in place (MKE 1991a).

2.4.3 Enviros UST Decommissioning & Site Assessment, 1995

On behalf of Ecology, Enviros, Inc. decommissioned a 35,000-gallon diesel underground storage tank (UST) located in the parking lot at the northwest portion of the Property in July of 1995 (Figure 9; Enviros 1995). A former fuel dispenser was noted at the west end of the UST. Approximately 150 cubic yards (cy) of contaminated soil was removed from the excavation and stockpiled on visqueen. The report indicates that the UST was observed to be in generally good condition with the exception of three pin-holes located near the west end of the UST. Confirmation soil samples were collected from the sidewalls of the excavation (UST PE-1 through UST PE-4) at a depth of 8 to 10 feet below ground surface (ft bgs) and the bottom of the excavation (UST PE-5) at a depth of 17 ft bgs. The analytical results indicated the presence of diesel-range organics (DRO) in soil from only the south (UST PE-1) and west (UST PE-2) sidewalls (6,300 milligrams/kilogram [mg/kg] and 96 mg/kg respectively), with only the sample collected from the south sidewall exceeding the soil screening level of 2,000 mg/kg. DRO was also detected in stockpiled soils from the excavation (SP-1 through SP-3) at concentrations ranging from 1,200 mg/kg to 2,100 mg/kg. Sample results are shown on Table 5. According to the report, Ecology approved returning stockpiled soil to the excavation following completion of UST removal activities (Enviros 1995).

2.4.4 URS Black Dross Pile Characterization, 2000

In July 2000, URS Corporation performed black dross pile characterization activities (URS 2000). The work included collection and analysis of one discrete black dross sample and four composite black dross samples. The samples were collected east of the building with a hand auger from a depth of five feet or less except for one sample that was collected at a depth of 9.5 feet. Testing included evaluation of toxicity using the Toxicity Characteristic Leaching Procedure (TCLP) and fish bioassay test methods. Results indicated that the black dross was not a characteristic hazardous waste nor was it a State of Washington Dangerous Waste (URS 2000).

2.4.5 EMR Former UST Investigation, 2003

In January 2003, Environmental Management Resources, Inc. (EMR) conducted additional site characterization activities in the former UST area. The following information is from the

Stantec Phase 1 Environmental Site Assessment Report (Stantec 2015). Sampling activities were documented in the draft cleanup action plan prepared by URS (URS 2004). Relevant information described in this report is as follows:

- Two 1.5-inch copper pipes extended from the UST area to the southeast toward the main building suggesting that diesel may have been used to fuel one or more of the furnaces within the building. These pipes were only removed to the edge of the UST excavation, where pipe left in place was capped.
- Soil and groundwater samples were collected from two borings: SB-1 located in the center of the former UST cavity and SB-2 located along the southern edge of the former UST cavity. Soil samples indicated no evidence of petroleum exceeding SLs at depths of 5 and 15 ft bgs. However, the groundwater sample collected from boring SB-1 at a depth of approximately 8 ft bgs contained an elevated concentration of DRO at 450,000 micrograms per liter (µg/L). While the water concentration exceeded the groundwater SL, the sample was collected through the hollow stem auger using a disposable bailer in a manner that was not consistent with standard groundwater sampling protocols (EMR 2003a). The sample results are included in Table 5.

2.4.6 EMR Remedial Investigation/Feasibility Study, 2003

EMR conducted a draft RI/FS in 2003 (EMR 2003b). The RI work performed by EMR included the installation, development, and sampling of one new monitoring well (MW-5); sampling of three of the four existing monitoring wells (MW-2 through MW-4); and collection of 8 soil samples underlying the dross pile from five soil borings (DP-1 through DP-5). Depth to groundwater measurements collected by EMR and others indicated that groundwater occurs at a depth of approximately 5 ft bgs, and that groundwater flow is generally to the north-northwest. Aluminum, arsenic, barium, lead, chloride and fluoride were found at elevated concentrations in groundwater (Table 11). The soil samples collected from DP-1 through DP-5 below the dross pile were screened for lead, arsenic, chromium, and mercury using x-ray fluorescence and selected samples were submitted to the laboratory for aluminum, arsenic, and cadmium analysis. All results were less than their respective SLs (Table 2).

The draft FS results indicated Alternative 3 - On-Site Containment as the recommended alternative. This alternative included excavation of contaminated sediments, blocking of drainage onto the Property from the southern adjacent property, grading of the undeveloped areas, placement of a geocomposite and bottom liner over the graded areas, grading the dross and excavated sediments to a mounded surface over the bottom liner, and then installing a concrete cap at the Site (EMR 2003b). This cleanup alternative was never implemented. .

2.4.7 URS Warehouse Waste Inventory, 2004

URS Corporation (URS) completed an inventory of stockpiled particulate matter collected in baghouses located in the southwest corner of the building in November 2004 (URS 2004).

Seven cribbed stockpiles were noted. The total estimated volume of material in these stockpiles was 1,100 cubic yards. Also noted by URS were five 55-gallon drums of waste located in the southeast corner of the building. Further characterization of these wastes was recommended by URS.

2.4.8 URS Draft Dross Sampling & Waste Determination, 2005

URS performed extensive sampling and analysis of the outdoor black dross stockpile in October 2005 (URS 2006). Based on data collected in 1987 and 1990, the dross stockpile book-designated as a state-only dangerous waste per the Dangerous Waste Regulations (WAC 173-303). Samples were analyzed for total and TCLP metals concentrations and ignitability, corrosivity, and reactivity. Fish and/or rat bioassays were also performed on the most contaminated dross samples. Based on these data, the outdoor stockpile of black dross did not designate as a dangerous waste. Ecology concurred with this determination and issued a memorandum (Ecology 2007) documenting that the outdoor black dross stockpile could be disposed in a permitted RCRA Subtitle D landfill.

2.4.9 Stantec Limited Phase II ESA, 2016

Stantec Consulting Services Inc. (Stantec) performed a Limited Phase II Environmental Site Assessment (ESA) at the former Maralco Aluminum Property in October and November 2016 (Stantec 2017). The work included collection and analysis of soil and water samples from six direct-push borings (B-1 through B-6), sampling two locations along the unnamed ditch (SS-1 and SS-2), groundwater sampling from one existing monitoring well (MW-2), and collection and analysis of a composited waste characterization sample of the black dross. The results of the Limited Phase II ESA indicated that metals, chloride, fluoride, and benzo(a)pyrene exceeded screening levels in groundwater, surface water and ditch sediment at the Property. A summary of Stantec's conclusions and recommendations are provided below.

- Mercury was detected at concentrations greater than the natural background levels for the Puget Sound Basin in soil at the Property. The likely source of these contaminants was the black dross stockpiled onsite. The stockpile material was covered as part of an interim action in 1991; however, the cover had not been maintained over time and the majority of the stockpile was exposed to surface water runoff and wind dispersion. Stantec noted that interim actions to mitigate erosion of this material could include placing and securing a visqueen cover over the stockpiled material and erecting new barricades (e.g., silt fences or similar) to prevent the black dross from entering the onsite drainage ditches.
- Based on the data from borings B-1 through B-3, petroleum hydrocarbon impacted soil was not identified in the former UST excavation area at depths of 4 to 6 ft bgs and 16 to 17 ft bgs. No samples were collected from depths consistent with historical exceedances in this area (8 to 10 ft bgs); however, further evaluation of soil in this area of the Property was not recommended.
- Only one of the five existing monitoring wells (MW-2) was sampled during this investigation. Stantec recommended replacement of monitoring wells MW-3, MW-

4, and MW-5, obtaining applicable permits to gain access to MW-1, and performing additional well monitoring activities to adequately delineate the horizontal and vertical extent of contaminants in groundwater.

- Surface water in the ditches and pond at the Property has been impacted with aluminum, cadmium, lead and chloride. Similarly, surface sediment in the ditches has been impacted with cadmium, chromium, and silver and elevated levels of chloride. Stantec noted that these contaminants may be migrating off-site via surface water or sediment transport in the drainage ditches and recommended sampling surface water and ditch samples from the upgradient portion of the ditch along the southern property boundary and at a downgradient location near the northern Property boundary prior to discharge off-site to evaluate their transport. It was also noted that subsurface ditch sampling may also be necessary to fully delineate contamination associated with the drainage ditches.
- Internal testing by two disposal companies reported that the black dross was suitable for disposal at a Subtitle D landfill. Stantec recommended that the wastes inside the building be characterized to evaluate disposal options.
- Lastly, the report noted that the federal wetland delineation manual, state wetland rating system and City of Kent code had been revised since the original wetland delineation and that, therefore, the wetland boundaries should be verified and the wetland report updated.

2.4.10 Aerotech Stockpile Assessment, 2017

In May 2017, Aerotech Environmental Consulting, Inc. (Aerotech) collected 32 discrete samples from the waste stockpiles and surveyed the Site with an aerial drone to estimate the quantity of material stockpiled and the density of the black dross for the purpose of determining disposal costs (Aerotech 2017a). Aerotech contracted Azure Green Consultants to conduct the Aerial Drone Survey of the Site on May 8, 2017. Azure Green Consultants provided an estimate of 25,177 cubic yards for the outdoor stockpile.

The black dross density estimates ranged from 0.76 to 1.14 tons per cubic yard. Several factors likely caused the variability of density. They included but were not limited to:

- varying moisture and water content;
- the approximate measure of 5-gallons of the material;
- variability in the content of the sample (i.e. concrete and or cobbles);
- and varying measurement output from the scale.

To accurately estimate the cost of disposing the stockpile present at the Site, Aerotech recommended utilizing the entire range of the data when predicting the cost of removing the dross stockpile from the Site.

2.4.11 Aerotech Well Installation & Monitoring, 2017

In July 2017, Aerotech completed four direct-push soil borings as groundwater monitoring wells (MW3A, MW4A, MW5A and MW6) to evaluate potential off-Property migration of groundwater contaminants (Aerotech 2017b). Monitoring well MW3A, MW4A and MW5A were replacement locations of previously destroyed or missing locations MW-3 through MW-5.

Soil samples were collected and analyzed from MW3A, MW4A, and MW6. The results indicated no elevated concentrations of aluminum, lead, total chromium, cadmium, arsenic, mercury, barium, silver or selenium were present in any of the soil samples (Table 3).

Groundwater samples were collected and analyzed from all four of the new monitoring wells. The results indicated elevated concentrations of fluoride in MW3A and MW6, elevated concentrations of chloride in MW4A and MW6, and elevated concentrations of arsenic and aluminum in MW5A.

The elevated concentrations at MW3A, MW4A, and MW6 along the northwest and western Property boundary appear to be associated with the dross stockpile. Based on the investigation results, it appeared that groundwater with concentrations above regulatory standards is migrating off-Property toward the north and northwest.

2.4.12 CRETE Investigation Work, 2021 to 2023

CRETE has been assessing environmental conditions at the Site since March 2021. Data has been collected to confirm prior data and address data gaps, which were summarized in the Remedial Investigation Work Plan (RIWP) and associated RIWP addendum submitted to Ecology under VCP NW3339 (CRETE 2022, CRETE 2023a). The RIWP was submitted to Ecology on March 16, 2022 and an addendum was submitted on June 23, 2023. Since 2021, CRETE has performed the following independent investigation activities:

- Direct push soil and groundwater sampling, including assessment of soil conditions below the outdoor black dross pile (samples DPT-1 through DPT-22)
- Reassessment of the outdoor black dross pile volume
- Assessment of former diesel source area and extent of metals contamination (SB-UST-01 through SB-UST-03)
- Installation of monitoring wells (MW-5R, MW-7, and MW-8; installed August 23, 2022)
- Groundwater well sampling (MW-1, MW-2, MW3A, MW-4, MW4A, MW5A, MW-5R, MW6, MW-7, MW-8)
- On and off-Property ditch sampling (Sed-02 through Sed-08, KCDD-S and KCDD-N)
- Indoor stockpile measurement and sampling
- Sampling of the stormwater pond (Sed-01).

Site investigation locations are identified on Figure 9, including historical sampling locations, and data are provided in Tables 3 through 12.

2.4.13 CRETE Investigation Work, 2024

During the summer of 2024, additional soil sampling was performed to investigate items that were uncovered during site clearing and demolition activities and to confirm the presence of contamination in areas that were previously inaccessible.

During site clearing, empty drums were discovered adjacent to a fence in the vicinity of the former residence/office in the northern portion of the Property. Drum labels indicated diesel fuel had been stored in the drums. Soil samples (DA-1 through DA-5) collected on July 25, 2024 indicated contamination was present above the PCULs, primarily metals and carcinogenic and non-carcinogenic polycyclic aromatic hydrocarbons. Sample locations are shown on Figure 9 and data are summarized on Tables 3 and 4.

During demolition of the building, former concrete lined holding ponds were removed. These holding ponds were located between the former dross pile (removed during the Phase 1 Interim Action) and the former building. Washed oxides were discovered within and beneath the ponds. Samples collected on July 25, 2024 (HP-GS-01 through HP-GS-03) confirmed that metals were present in soil at concentrations above the PCULs. Sample locations are shown on Figure 9 and data are summarized on Table 3.

Additional samples were also collected in the vicinity of the previous borings HB-5 and HB-1, HB-2, and HB-3 where known former dross piles existed (MKE 1991a). Additional samples were collected to help confirm past soil results since the area was inaccessible prior to site clearing. Samples Area2A-1 and -2 and Area2B-1 and -2 were collected on July 25, 2024 and indicated that metals were present above PCULs. Sample locations are shown on Figure 9 and data are summarized on Table 3.

2.5 Previous Remedial Actions

2.5.1 1991 Interim Action

In September and October 1991, interim remedial activities were performed at the Site by MKE on behalf of Ecology. The interim actions consisted of four activities: (1) fencing the property, (2) improving the stormwater collection pond, (3) rerouting of roof drains, and (4) grading and covering the dross piles in the plant area(MKE 1991b). The following details were provided:

- The fence and gates were installed around the perimeter of the Property (except the house on the northern side of the Property) to limit access. Warning signs were installed along the fence.
- The stormwater collection pond northwest of the building was improved; approximately two (2) feet of soil were removed from the pond. The depth of excavation was determined based on visual observation of dross-like materials in the bottom of the pond and previous surface soil analytical results from samples

collected at the Property by Morrison Knudsen. Post-excavation confirmation samples were not collected. Materials excavated from the pond were drummed and stored on the Property until their subsequent removal and disposal. The completion report documents that 246 55-gallon drums were filled (MKE 1991b).

- The roof drains of the building were re-routed to prevent stormwater from draining onto the dross piles.
- The outdoor dross pile was graded to prevent ponding of stormwater and to direct water toward Christerpher Ditch and the piles were covered with 5-mil plastic tarping (Griffolyn TX-1200, 3-ply material guaranteed to have a 2 year life [MKE 1991b]).

2.5.2 1995 Underground Storage Tank Removal

In June 1995, a 35,000-gallon diesel UST was removed from the northwest corner of the parking lot (Figure 9). Visual observations and soil and groundwater analytical results indicated that there had been an historical release from the UST system. Work was completed by Enviros, Inc. on behalf of Ecology and is documented in the report *Underground Storage Tank Decommissioning at the Maralco Aluminum Site* (Enviros 1995), as summarized below:

- The report documents the removal of a 35,000-gallon diesel UST.
- Visual inspection of the UST following its removal indicated it was generally in good condition, but did have three pin-holes near its west end.
- Diesel was not detected in soil samples collected from the base, north sidewall, and east sidewall of the excavation.
- Diesel was detected at concentrations of 96 mg/kg and 6,300 mg/kg in the west and south sidewalls, respectively.
- Diesel concentrations in three soil stockpile samples ranged from 1,200 mg/kg to 2,100 mg/kg.
- Following UST removal, all stockpiled soils were returned to the UST excavation.

2.5.3 2023 Dross Stockpile Interim Action Removal

From August 16 through November 29, 2023, approximately 35,000 tons of waste material, located outside in a large stockpile and also located in smaller stockpiles stored inside the building, were removed by City Transfer Inc. and disposed of at Waste Management's Subtitle D Columbia Ridge landfill, located in Arlington, Oregon. Waste included black dross, washed oxides, and bag house dust. Figure 10 shows the interim action footprint for the outdoor stockpile. Waste stockpiled inside the building (stored on the concrete slab floor) is not shown on Figure 10 but is included in the approximately 35,000 tons removed from the Site. This Phase 1 Interim Action was performed in accordance with the Phase 1 IAWP (CRETE 2023b) under Ecology's VCP (NW3339) and is documented in the February 2024 completion report (CRETE 2024a).

The Phase 1 Interim Action included the removal and disposal of the following wastes:

- Outdoor stockpile
    - Primarily black dross with a smaller amount of aluminum oxide at the northern tip of the pile.
- Indoor stockpiles
    - Washed aluminum oxide;
    - Black dross, including oversized screenings and furnace skimming;
    - KBI dross;
    - Bag house dust contained within the bag house filters and bins.

In accordance with the Phase 1 IAWP (CRETE 2023b), surface soil samples were collected between August and November 2023 following removal of the outdoor dross stockpile (Figure 10). Grab soil samples were collected from 50-foot by 50-foot grid cells, with a randomly assigned sample location within each grid cell (i.e., labeled as CS-1 through CS-52). Soil samples were analyzed for the following metals:

- aluminum, antimony, arsenic, cadmium, chromium, cobalt, copper, barium, iron, nickel, lead, manganese, mercury, silver, selenium, and zinc.

MTCA Method B Direct Contact levels were generally used as soil remediation levels (RELs)[1] to indicate that the dross waste had been removed. Indoor debris piles were located on concrete or in bins, thus samples were not collected from beneath the indoor debris piles. The concrete floor in the building was swept to remove residual waste.

Performance soil samples were collected from 52 locations throughout the removal footprint area; sample locations are shown on Figure 10. The removal footprint was based on the location of the piled dross and did not extend into the on-Property ditches. Compliance with the RELs for all metals, except arsenic, was determined on a point-by-point basis (i.e., direct comparison of concentration to REL). The results showed that all final[2] confirmation samples were below RELs for those metals.

Compliance with the REL for arsenic was evaluated based on statistical analysis, in general accordance with the MTCA three-part rule defined in WAC 173-340-740(7)[3], whereby:

1. The 95% upper confidence limit (UCL) on the sample mean may not exceed the soil REL.
2. No sample may exceed two times the REL, except where modifications are allowed.

[1] MTCA Method A table values were used for lead and mercury, which do not have Method B direct contact levels. The REL for arsenic was adjusted up to natural background, and the REL for chromium was based on natural background because total chromium does not have Method B direct contact levels.

[2] Soil samples from areas that required additional excavation (grid cells 30 and 31, samples CS-30, CS-31 and CS-31B) are not included as final confirmation samples. Excavated samples are shown on Table 6 for reference.

[3] The three-part rule is defined for meeting statistical compliance with a cleanup level. Note that RELs are not cleanup levels as defined in MTCA (WAC 173-340-200).

3. Less than 10% of the samples may exceed the REL, except where modifications are allowed.

Analysis demonstrated that the 95% UCL was less than the REL and that less than 10% of the sample set exceeded the REL, but that two samples (CS-30C and CS-31C) failed the exceedance factor part of the rule (item 2). Results from these samples locations were more than 2 times the REL. Although the arsenic REL was based on natural background (Ecology 1994), no modifications to the standard MTCA three-part statistical analysis were used for the Phase 1 IAWP data set[4]. The sampling results are presented in Table 6.

Samples were collected from both inside and outside of the removal footprint from grid cells 14 and 19. Table 6 shows the results of the samples collected from within the footprint (CS-14C and CS-19C) were below MTCA Method B Direct Contact levels and from outside the footprint (CS-14 and CS-19) were above MTCA Method B Direct Contact levels. Samples collected outside of the footprint (CS-14C and CS-19C) represent sample locations within the unnamed ditch. During final property stabilization activities, the contractor encountered buried dross under the north end of the former dross pile. This material remains on Site in the vicinity of confirmation sample CS-1.

2.5.4 2024 Interim Action Phase 2 Removal

The Phase 2 Interim Action was initiated on September 30, 2024 to remove any remaining waste and contaminated soil from the property. This work is currently ongoing and is being performed in accordance with the Phase 2 IAWP (CRETE 2024b). Analytical data collected during the Phase 2 Interim Action are not available for this SRIWP and will be incorporated into the RI/FS report.

[4] Modifications may be made to the exceedance factor and/or the percentage of samples exceeding when the cleanup level is based on natural background.

3 Existing Conditions

3.1 Current Conditions

3.1.1 Stormwater Drainage

The Property is located within a regional stormwater drainage system that is managed by King County Drainage District #1 (KCDD#1). This system conveys stormwater via a series of ditches. There are two stormwater ditches that transect the Property: an unnamed ditch that conveys stormwater from south of the Property and Christopher Ditch that conveys stormwater from north and east of the Property (Figure 2). Christopher Ditch connects with the unnamed ditch in the middle of the Property and conveys stormwater off the Property to the northwest via an underground culvert located near the north Property boundary (Figure 2). The on-Property ditch was lined and re-routed in 1987 to reduce the potential for off-Property migration of dross eroded from the outdoor stockpile (MKE 1991).

The culvert first discharges to the South 202nd Street right-of-way (ROW) ditch (Wetland C). The ROW ditch discharges via a culvert under the BNSF property, daylights briefly, then passes underneath 77th Avenue South where it connects to the KCDD#1 B86 Ditch. The stormwater then passes through a KCDD#1 wetland and several other ditches prior to discharge to Lower Mill Creek approximately ¾-mile downstream from the Property (Figure 3).

There is a former stormwater pond (shown on Figure 2) located near the northwest corner of the Property. The pond collected stormwater from the building roof and the paved area in the northwest corner of the Property. Two feet of contaminated soil were removed from bottom of the pond as part of an Ecology interim action in 1991 (See Section 2.5.1). A buried culvert connected the pond to the South 202nd Street ROW ditch (Figure 2); however, the culvert could not be located during recent investigation activities.

3.1.2 Drinking Water

Drinking water for the Site area is supplied by the City of Kent. The City of Kent obtains the drinking water from upland springs and wells on the Kent East Hill and from wells located in the Green River Valley. The City of Kent also purchases water from the City of Tacoma, which is sourced from the Green River watershed. None of these water supply sources are located within a 1-mile radius of the Property. The Property is also located outside the 10-year time of travel wellhead protection area of all water supply wells.

3.1.3 Regional Geology

The Site is located in the lower Green River Valley, which runs north from Auburn to Renton. The valley is located within the Puget Sound Lowland. The physiography of this area has been dominated by the advance and retreat of continental glaciers during the Vashon Glaciation in the Pleistocene Epoch. The Vashon stade was the last glacial retreat and advance, which began to recede approximately 10,000 years before present (Stantec 2017).

Advance of the glaciers into western Washington carved out the Kent Valley while depositing outwash chiefly comprised of sand and gravel and dense compacted glacial till. Retreat of the glaciers left the valley as a deep marine embayment. The Green, White, and Cedar Rivers deposited a thick accumulation of fluvial sediments, which were eroded from the glacial drift uplands into the valley. The remaining sediments consist of coarse sand and gravel near the mouth of the rivers at Auburn and Renton, and become finer toward the Kent area.

3.1.4 Site Geology

Data collected during environmental subsurface investigation activities at the Site indicate native unconsolidated sediments observed from the ground surface to the maximum depth explored (approximately 20 ft bgs). Shallow fill areas extend from the railroad spur across the building footprint and to the western boundary of Christopher Ditch. The fill is of varying thickness and is generally a brown gravelly sand with fine to coarse grained sand and subround to round gravel. Native soil is primarily silty fine sand with some interbeds of fine and medium sand, ranging from brown to gray to black. There are interspersed organic-rich pockets of decomposing woody and peaty debris. Site geology is illustrated in cross-sections provided as Figures 4 and 5.

A dark gray silty clay layer has been identified along the western and northern end of the Site between DPT-17 and MW-4 in the northwest portion and extending to south to MW6 and MW3A down to about 11.5 ft bgs. It is unclear how continuous this clay is across the central expanse of the Site, but it extends to as far east as B-5 along the western perimeter of the former dross pile but not to MW-5R. A gray clay layer is also present along the eastern boundary of the Site, as identified at MW-1 and MW-2 ranging from 6.5 to 17 ft bgs.

3.1.5 Groundwater

The water table occurs at a depth of approximately 3 to 7.5 feet bgs in the wet season. During the dry season, the water table is measured at 5 to 9.5 ft bgs. Previous reports indicate that groundwater migration is to the north-northwest. Local groundwater on the Property is likely influenced by the surface hydrology, including the ditches that cross the Property and culverts that drain surface water from adjacent upgradient sites, including from the Knight Transportation and Walman Optical properties to the south and the properties east of 80th Avenue.

Figures 6 and 7 illustrate dry season and wet season groundwater flow conditions. In the dry season (Figure 6), groundwater is below the bottom of the local ditches and groundwater flow is generally to the north although a groundwater mound at MW6 was observed during this gauging event. In the wet season (Figure 7), groundwater flow is generally to the north, but a groundwater depression is noted in the south-central portion of the Property. This groundwater depression appears to be due to groundwater discharging to the southern half of the unnamed ditch. The ditches primarily serve to recharge groundwater as surface water ponds in the ditches in the central portion of the Property. Regionally, groundwater flow is to the northwest towards the Green River, located approximately 1 mile to the northwest of the Property.

3.2 Existing Data Summary

This section presents a summary of the findings from previous field efforts. Soil, groundwater and surface water results are compared to screening levels (SLs) based on Ecology's January 8, 2025 PCUL workbook for sites with groundwater discharging to fresh surface water.

3.2.1 Soil

Soil data collected since 1987 are compiled and presented in Tables 2 through 9 and investigation and post-excavation sample locations are shown on Figure 9. The following text provides additional discussion of the sampling work performed in 2021 to 2024.

In 2021, direct push probes DPT-1 and DPT-2 were advanced to assess petroleum impacts associated with the former diesel UST and associated piping. These borings as well as the Phase II work (soil borings B-1 through B-3, Stantec 2017) provide additional information on the extent of possible TPH in this area. However, the 2021 and 2017 soil borings appear to have been collected from above and below the 1995 soil boring depth (UST PE-1 6300 mg/kg at 8'-10' bgs), summarized on Tables 4 and 5. Additionally, a water sample collected in 2003 (SB-1) indicated TPH concentrations above screening levels. This sample was collected with a bailer from accumulated water in the open hollow stem auger, not from a traditional temporary sampling point or collected at a discrete interval.

DPT-2 was advanced in a previously uninvestigated location associated with diesel piping that remains in-place and an in-ground vault (purpose unknown; Figure 9). Diesel was detected in soil at this location but at a concentration below the SL for diesel. However, the reconnaissance groundwater sample collected from this location contained a diesel concentration greater than the screening level (see Section 3.2.2).

Direct push probes DPT-3 through DPT-13 were advanced in 2021 through the black dross pile in order to better estimate the dross volume and to assess the extent to which the dross pile may have impacted the underlying soil. Select samples collected from 1 to 2 feet below the black dross pile were analyzed for metals (DPT-5, DPT-6, DPT-8, DPT-9, DPT-11, DPT-12 and DPT-13; Table 7) to assess the extent of contamination below the dross pile. This information was used to define the Phase 1 Interim Action removal footprint. Based on the updated topographic survey data following the Phase 1 Interim Action, it was determined that a concentration exceeding the SL for arsenic remained in one sample located at DPT-9. Arsenic was detected at 7.51 mg/kg, which was slightly above the SL of 7.3 mg/kg. The result is shown on Figure 10 and summarized in Table 7.

In accordance with the RIWP that was submitted under the VCP (CRETE 2022), additional direct push probes (DPT-14 through DPT-22) were advanced and new monitoring wells (MW-5R, MW-7, and MW-8) were installed in August 2022 to further assess soil and groundwater conditions throughout the Property and areas off of the Property. Results are shown on Tables 3 and 4. Arsenic was detected above the SL in soil samples from MW-7 and MW-8. No other compounds were detected above the SLs.

Table 4 indicates that soil samples collected in 2016 for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and polycyclic aromatic hydrocarbons (PAHs) were below the SLs with the exception of the following: benzene was detected slightly above the SL in five of the samples, and benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, fluoranthene, and pyrene were detected slightly above the SLs in one of the samples collected in 2016. None of the soil samples collected in 2021 and 2022 were analyzed for VOCs, SVOCs, or PAHs. Table 4 indicates that all other the soil samples collected in July 2024 from the drum area did not contain detectable VOCs, but contained concentrations of carcinogenic and non-carcinogenic PAHs above the applicable SLs.

In accordance with the Phase 1 IAWP (CRETE 2023b), surface soil samples were collected between August and November 2023 following removal of the outdoor dross stockpile. Post-excavation grab soil samples were collected from 50-foot by 50-foot grid cells, with a randomly assigned sample location within each grid cell. The samples were analyzed for metals. Sample results are summarized on Table 6 and locations are shown on Figure 10. Post-excavation sample results indicated that several locations exceeded the SL for aluminum, arsenic, cadmium, cobalt, copper, iron, and zinc (Table 6 and Figure 10). Samples collected outside of the Phase 1 Interim Action removal footprint (CS-14 and CS-19) also exceeded the lowest SL for antimony, chromium, lead, nickel, and silver (Table 6).

Data collected during the Phase 1 Interim Action indicated that various metals exceed SLs within the Phase 1 Interim Action footprint. Figure 10 shows the samples that exceed the SLs based on soil leaching to groundwater from saturated soil protective of fresh surface water receptors. The remaining onsite soils exceeding one or more SLs within the Phase 1 Interim Action footprint will be removed during the Phase 2 Interim Action. The Phase 2 Interim Action includes performance soil sampling to confirm compliance with the SLs within the remedial excavations.

In July 2024 CRETE collected additional soil data from areas that became accessible after demolition and site clearing activities. Data collected confirmed soil contamination in the vicinity of the previous site borings HB-5 and HB-1, HB-2, and HB-3 where known former dross piles existed (MKE 1991a). Samples Area2A-1 and -2 and Area2B-1 and -2 were collected on July 25, 2024 and indicated that metals were present above PCULs, shown on Figure 10 and summarized on Table 3. Soil samples collected from an area of empty drums (soil samples DA-1 through DA-5) collected on July 25, 2024 indicated that contamination was present above PCULs, primarily metals and carcinogenic and non-carcinogenic polycyclic aromatic hydrocarbons. Sample locations are shown on Figure 10 and data are summarized on Tables 3 and 4. Soil samples collected from the former concrete-lined holding ponds (Area 7, (HP-GS-01 through HP-GS-03) confirmed that soil contamination was present above the PCULs. Sample locations are shown on Figure 10 and data are summarized on Table 3.

Ditches

Since Ecology has determined that the ditch material is soil rather than sediment (Ecology 2024b), samples collected from ditches are referred to as soil in this SRIWP. Previous reports and sample IDs often refer to these samples as sediment.

Samples have been collected from the on-Property ditches and stormwater pond, and off-Property samples have been collected from the 202nd stormwater ditch and the King County Drainage District #1 downstream wetland. Figures 10 and 12 show the on-Property and off-Property features and ditch sample locations, respectively. Tables 8 and 9 summarize the on-Property and off-Property ditch sampling results, respectively.

Property redevelopment will include re-routing the on-Property ditch system, including filling the existing ditches and stormwater pond and creating a new wetland in the eastern portion of the Property (Figure 3). The majority of the existing on-Property ditch and stormwater pond locations will be beneath the future building and pavement.

Table 8 includes data collected in 1987, 1990, 2016, and 2021. Table 6 includes two soil samples collected in 2023that were collected in or near the ditch during the Phase 1 Interim Action. The estimated extent of the on-Property ditches with impacts exceeding the SLs is illustrated in Figure 10.

Samples collected from the off-Property ditch is illustrated in Figure 12 and the data are presented in Table 9. The off-Property ditch will not be altered by redevelopment. The estimated extent of impacts in the off-Property ditch exceeding the screening levels is illustrated in Figure 12. Contaminated soil in the ditch will be removed during the Phase 2 Interim Action which is currently underway.

3.2.2 Groundwater

Four wells (MW-1 through MW-4) were installed in 1990 and one additional well (MW-5) was installed in 2003. In 2017, three wells (MW3A, MW4A, and MW5A) were installed as replacement wells for broken or missing wells and MW6 was installed. Monitoring well locations are shown on Figure 11. Appendix B includes well construction logs and Table 1 provides a summary of well construction information. Groundwater analytical data are provided in Table 11 and field parameter measurements for the September 2022 monitoring event are provided in Table 12.

More recently monitoring wells MW3A, MW4A, MW5A, and MW6 were located and sampled on June 3, 2021. The area around MW-2 was densely overgrown with blackberries and could not be accessed. MW-4, previously documented as missing (Aerotech 2017), was located but could not be accessed because the above ground monument was locked. The monument at MW5A was broken off but the well riser could still be accessed.

In accordance with the RIWP that was submitted to Ecology under the VCP (CRETE 2022), new monitoring wells MW-5R, MW-7, and MW-8 were installed on September 13 and 14, 2022. MW-1 and MW-2 were redeveloped prior to sampling based on accumulated silt measured at the bottom of the wells. All of the active wells (MW-1, MW-2, MW3A, MW-4, MW-5R, MW6, MW-7, and MW-8) were sampled in September 2022. MW4A was found to be broken during this sampling event. Groundwater sampling field parameters collected during the September 2022 monitoring event are provided in Table 12.

Reconnaissance groundwater samples were used to supplement the monitoring well data. Metals and ion samples were collected from DPT-1 and DPT-2 on May 24, 2021 and from DPT-14 through DPT-22 and SB-UST-01 through SB-UST-03 on August 29 through 31, 2022. The samples from DPT-18 through DPT-22 were collected off-property, west of the BNSF rail lines (Table 10).

Figure 11 illustrates the estimated extent of groundwater that exceeds the SLs.

Fluoride exceeds the SL in areas downgradient (northwest) of the dross pile except for the far northwest corner (MW4A and DPT-1). Fluoride may extend off the Property to the west and the north in the vicinity of DPT-14 and MW-7.

Chloride exceeds the SL in areas limited to the northwest corner of the Property. Chloride may extend off the Property to the north near MW-4, MW4A, and MW-7, and it is assumed these exceedances for chloride extend from under the black dross pile.

The apparent impacts of salts leaching from the dross can also be observed in the groundwater sampling field parameter for specific conductance (microSiemens/centimeter or µS/cm). MW-4, MW5R, MW6, and MW-7 have measurements that are slightly elevated relative to unaffected wells MW-1 and MW-2 while specific conductance at MW-8 is more elevated, likely due to its proximity the former outdoor dross stockpile.

Arsenic, barium, cobalt, iron, selenium, and zinc are the only dissolved phase metals that exceeded a SL during the 2022 sampling. Arsenic and iron exceeded a SL in multiple wells while barium, cobalt, selenium, and zinc only exceeded a SL in one well (MW-8).

For data collected since 2016, total metals results exceeded SLs for aluminum, arsenic, barium, chromium, cobalt, copper, lead, mercury, manganese and selenium in at least one location on the property. Total metals results exceeded SLs for arsenic, chromium, copper, and lead in at least one location off of the property. These prior sample results are considered of a lower data quality and likely not fully representative of current Site conditions. Not only have the dross and waste piles been removed, these prior results for total metals are likely biased high due to turbidity in the samples.

A reconnaissance groundwater sample (DPT-17) was collected in 2022 from the approximate location of B-1-GW (Figure 11). Location DPT-17 was reanalyzed for carcinogenic polycyclic aromatic hydrocarbons (cPAHs) based on the historical results from B-1-GW. cPAHs were not detected at a concentration above the laboratory reporting limits (Table 10).

In 2021, CRETE collected reconnaissance groundwater samples from push probe locations DPT-1 and DPT-2. Diesel was identified at DPT-2 at concentrations exceeding the SL and the benzene reporting limit exceeded the SL. On August 28, 2022, groundwater samples were collected from direct push probe locations SB-UST-01, -02, and -03 to define the extent of diesel in groundwater. Based on the most recent Ecology Silica Gel Guidance (Ecology 2023), locations DPT-1 and SB-UST-02 would also exceed the SL based on the presence of non-petroleum polar organics that exceed 500 µg/L.

3.2.3 Surface Water

Surface water samples were collected at the Site in 1987, 1990, 1991, and 2016 (indicated on Figure 9, Note 4). These samples were collected from on-Property stormwater ditches adjacent to the dross pile (SW-3/3R, SW-4/4R, SW-6/6R, SW-10, SW-11), the stormwater pond (SW-7/7R), and the off-Property ditch adjacent to the S. 202nd Street right-of-way (A1, SW-8/8R). Figure 9 shows the on-Property and off-Property features and sample locations, respectively. Table 13 summarizes the surface water sampling data. These data reflect the impact of dross on surface water quality prior to removal of dross from the stormwater pond in 1991 and the removal of the dross stockpile in 2023 (Phase 1 Interim Action). General stormwater pollution from the greater Christopher Ditch drainage area (outside of the Site footprint, shown on Figure 3) also impacts surface water quality in the ditches.

4 Screening Levels and Constituents of Interest

4.1 Soil Screening Levels

Soil SLs were developed in this SRIWP to select constituents of interest (COIs) and define their extents in soil at the Site. Soil SLs are based on Ecology's January 8, 2025 PCUL workbook for sites with groundwater discharging to fresh surface water. For this Site, it also includes PCULs based on protection of terrestrial ecological receptors since more than 1.5 acres of contiguous undeveloped land are present on the Property and there is a designated wetland area that will be managed[5].

Ecology determined that material present in the on-Property ditches is soil, not sediment, based on the definition of sediment in the Sediment Management Standards (WAC 173-204-505[22]) and because the ditches do not support benthic habitat. However, drainage from the wetland mitigation area flows through stormwater drainage ditches and wetlands and ultimately discharges to Lower Mill Creek. As a result, the PCULs also take into consideration the soil erosion to sediment pathway.

The RI soil SLs are the most stringent cleanup values associated with the following potential exposure pathways:

- Direct contact with soil COIs
- Soil COIs leaching to groundwater for drinking water use
- Soil COIs leaching to groundwater migrating to fresh surface water
- Soil COIs leaching to groundwater migrating to fresh surface water and partitioning to sediment
- Soil erosion to downstream sediment
- Site-specific terrestrial ecological exposures for plants, soil biota, and wildlife

PCULs that are lower than the associated natural background concentration for a COI will be adjusted up to the natural background concentration in accordance with MTCA (WAC 173-340-740[5][c]. A copy of the PCULs workbook table for soil COIs is provided in Appendix C.

4.2 Groundwater Screening Levels

Groundwater SLs (Table 14) are based on the January 8, 2025 Preliminary Cleanup Level (PCUL) workbook for groundwater discharge to fresh surface water. They are based on the most stringent cleanup values that are protective of drinking water, surface water, sediment, and vapor intrusion exposure pathways. Where relevant, the SLs have been adjusted upward

[5] Ecological indicator soil concentrations from MTCA Table 749-3 were used in the development of the soil SLs. These values apply to site-specific terrestrial ecological evaluations (TEEs). The Maralco Site does not meet the requirements for conducting a simplified TEE due to the designated wetland area on the Property (WAC 173-340-7491[2][a][i]).

based on PQLs. As with soil, the data collected during the RI will be used to confirm or narrow the groundwater COI list to the proposed groundwater constituents of concern (COCs) and/or indicator hazardous substances (IHSs). A copy of the PCULs workbook table for groundwater COIs is provided in Appendix C.

4.3 Surface Water

Surface water SLs are based on PCULs for protection of fresh surface water using MTCA Method B criteria and incorporating the most stringent value available for the multiple aquatic life and human health regulatory criteria (Table 14).

4.4 COIs

COIs are substances that have been detected on the Site at a concentration exceeding an SL and which may be present as a result of past operations or activities. Proposed COCs will be identified in the RI/FS. Final COCs and IHSs will be established in the Cleanup Action Plan.

The following COIs have been identified based on at least one detection over an SL (Appendix C) or based on Ecology's request to include this constituent as a COI:

Soil:

- Metals – aluminum, antimony, arsenic, cobalt, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, silver, vanadium, and zinc.
- Non-Metals – DRO, ORO, benzene, toluene, total xylenes, cyanide, cPAHs, bis(2-ethylhexyl)phthalate, di-n-octyl phthalate, fluoranthene, fluorene, naphthalene, 2-methylnaphthalene, 4-methylphenol, and pyrene. Di-n-butylphthalate and phenol have been added for the stormwater pond area based on soil sample results from SW-7.

Groundwater:

- Metals – aluminum, antimony, arsenic, barium, cobalt, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, silver, vanadium, and zinc.
- Non-Metals – chloride, fluoride, DRO, ORO, cPAHs, 1-methylnaphthalene, fluoranthene, pyrene, and benzene.

Surface Water:

- Metals – aluminum, antimony, arsenic, barium, cadmium, cobalt, copper, iron, lead, manganese, mercury, nickel, silver, thallium, and zinc.
- Non-Metals – chloride and cyanide.

Selenium is not carried forward as a COI in soil or groundwater since it has not been detected in dross samples (Appendix C) and analytical quantification of selenium is sensitive to and biased high in the presence of chloride. The only two exceedances of the selenium in soil SL at B-4-15 and B-6-15 had elevated chloride concentrations of 309 and 183 mg/kg (Table 4), respectively, well above the normal range of soil chloride concentrations of less than 10 mg/kg to 22 mg/kg. The only selenium exceedances in groundwater are from MW-3 in

January 2003 (total selenium concentration) which had a chloride result of 9,100 mg/L, and from MW-8 in September 2022 (dissolved selenium concentration) which had a chloride result of 3,960 mg/L. The scarcity of elevated selenium results and the correlation with elevated chloride strongly indicate that the elevated selenium concentrations are the result of analytical bias.

5 Conceptual Site Model and Data Gaps

This section presents a brief conceptual site model (CSM) based on currently available information and identifies data gaps for the Site. The field sampling planned to address the data gaps is discussed in Section 6.

5.1 Sources

The primary source of COIs at the Property is the former outdoor black dross pile. The majority of the outdoor black dross pile was removed during the Phase 1 Interim Action conducted in 2023. Limited areas that remained, along with impacted soil below the dross pile, were removed during the Phase 2 Interim Action conducted in September and October 2024. Contamination from the dross has been observed in the groundwater monitoring wells (Figure 11). Concentrations are highest in monitoring wells MW5A (located to the north and west and immediately downgradient of the former dross pile) and MW-8 (located to the south immediately adjacent to the former dross pile).

A secondary source of COIs at the Property are the drainage ditches. The Property is trisected by drainage ditches, portions of which run adjacent to the former dross stockpile. Prior to the Phase 1 Interim Action, surface water runoff and erosion transported dross from the stockpile into the adjacent ditches, which was then transported downstream in the ditch with salts potentially dissolving into the surface water. Stormwater in the drainage ditch is conveyed off of the Property toward the west and eventually discharges to Lower Mill Creek. Contaminated soil has been observed in the on-Property ditches and the off-Property ROW ditch. Soil was removed from the on-Property drainage ditches in September and October 2024 during the Phase 2 Interim Action removal. The on-Property ditches will be filled during redevelopment and do not present a continued source of soil migration off property (Figure 8). Redeveloped surfaces include a wetland and swale, these areas will be planted and stabilized and will be constructed after confirmation data confirms that contaminated soil has been removed.

Another source of COIs, primarily related to petroleum, is from a release of diesel fuel from the former UST system on the Property. As stated in Section 2.5.2, in July of 1995 a 35,000-gallon diesel UST located in the parking lot at the northwest portion of the Property (Figure 9) was decommissioned. Visual observations and soil and groundwater analytical results indicated that there had been an historical release from the UST system. In 2021, direct push probes DPT-1 and DPT-2 were advanced to assess petroleum impacts associated with the former diesel UST and associated piping. Diesel was detected in soil at this location but at a concentration below the SL (Section 3.2.1). DRO and ORO (with and without silica gel cleanup) are present in groundwater samples collected in the vicinity of the former UST (DPT-1, DPT-2, and SB-UST-02; Figure 15).

5.2 Nature and Extent of Contaminants

This section summarizes the nature and extent of contamination at the Site.

5.2.1 Extent of Soil Impacts

Soil impacts are associated with the presence and related erosion of the outdoor black dross waste pile. With removal of the large outdoor waste pile and the indoor waste piles (Phase 1 Interim Action), remaining soil contamination was grouped into seven areas of concern (Area 1 through Area 7). These seven areas are part of the Phase 2 Interim Action as shown on Figures 13 and 14.

DRO soil impacts associated with the former UST removal may also be present on site, in the vicinity of the former removal.

Figure 10 shows the representative soil samples remaining above SLs prior to implementation of the Phase 2 Interim Action.

5.2.2 Extent of Groundwater Impacts

As detailed in Section 2.4, numerous past investigations have been completed at the Site and during that work groundwater samples from monitoring wells and temporary groundwater grab samples from direct push boring locations have been collected at the Property. Groundwater data for direct push and monitoring well samples are summarized in Tables 10 and 11, respectively. The estimated extent of groundwater contamination is shown on Figure 11.

Groundwater data collected prior to the Phase 1 Interim Action, between 1990 and 2022 had shown SL exceedances for DRO and ORO, chloride, fluoride, total metals (aluminum, arsenic, barium, cadmium, chromium [2016 direct push data only], cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, and zinc), and dissolved metals (arsenic, barium, cobalt, manganese, selenium, and zinc). SL exceedances for benzo(a)pyrene, total cPAH, and 1-methylnaphthalene were also detected in reconnaissance groundwater samples in 2016 (B-1-GW and B-3-GW; Table 10) in the area of the former UST. A reconnaissance groundwater sample (DPT-17) was collected in 2022 from the approximate location of B-1-GW (Figure 11). Location DPT-17 was reanalyzed for cPAHs based on the historical results from B-1-GW. cPAHs were not detected at a concentration above the laboratory reporting limits (Table 10). As noted, these data were representative of site conditions with the Dross piles still in place, prior to the Phase I Interim Action in 2023.

DRO exceedances and ORO exceedances (with and without silica gel cleanup) are present in the paved area north of the former building, based on reconnaissance grab groundwater samples collected from borings DPT-1, DPT-2, and SB-UST-02. DRO and ORO at DPT-2 are likely associated with the diesel line between the former UST and the building. Per the recent Ecology silica gel guidance, location DPT-1 (downgradient of the former UST) and SB-UST-02 (downgradient of DPT-2) would also exceed levels based on the presence of polar organics (Ecology 2023).

Chloride, fluoride, and metals impacts are associated with leaching from the former black dross stockpile and associated operations such as the salt saver and the former oxide lagoon. Elevated specific conductance is also noted in groundwater downgradient of the stockpile due to leaching of the salts (Table 12).

Groundwater impacts extend downgradient from the former black dross pile with arsenic, iron, fluoride, and chloride likely extending off-Property to the north and west. A low-level arsenic exceedance (8.93 µg/L versus 8 µg/L SL) was measured at DPT-19 across the BNSF property. However, it is not clear that this location is associated with impacts at Maralco.

5.2.3 Surface Water Impacts

Surface water impacts measured in 1987, 1990, 1991, and 2016 are also associated with the former dross stockpile. Chloride and various metals were measured in surface water from the ditches adjacent to the former stockpile and the stormwater pond. Exceedances were also measured in the right-of-way ditch but at lower concentrations and for fewer compounds. As stated above (Section 3.2.3) these data reflect the impact of dross on surface water quality prior to removal of dross from the stormwater pond in 1991 and the removal of the dross stockpile in 2023 (Phase 1 Interim Action). General stormwater pollution from the greater Christopher Ditch drainage area (upstream of the Site; Figure 3) also impacts surface water quality in the ditches.

Property development plans include altering Christopher Ditch and filling the on-Property ditch (Figure 8). The former stormwater pond (shown on Figure 2) located near the northwest corner of the Property will be filled and will be covered with pavement.

Additional data is needed to assess surface water quality following source removal (completed during the Phase 1 Interim Action and current Phase 2 Interim Action) and changes to the on-Property stormwater management.

5.3 Potential Transport Mechanisms

Contaminant release mechanisms refer to the manner in which contaminants are released from the primary source. Primary release mechanisms are associated with former dross pile, on-Property ditches, and the former UST area. All of these sources have been removed (see Section 5.1). Urban and industrial sources outside the property could also have resulted in releases to sediment, soil, groundwater, or stormwater within or adjacent to the Property boundaries.

Potential historical and current transport mechanisms include the following:

- Leaching from historical waste – The impacts observed at the Site are associated with the accumulation and storage of operational wastes. Those wastes were largely uncovered and would have been subject to leaching due to precipitation and vertical migration of dissolved-contaminants to soil and groundwater. The historical dross piles and associated waste have been removed from the Property during the interim actions. This is no longer a potential transport mechanism for the Site.
- Soil leaching to groundwater – The impacts to groundwater are coincident with the former location of dross piles and associated soil impacts indicating that leaching to groundwater is a transport mechanism. As stated above, the source material has been removed and associated soil located beneath the waste has also been removed (See Section 5.1). This transport mechanism may not be relevant following the interim actions but will be further evaluated during the RI.
- Groundwater transport and potential discharge to surface water - Groundwater impacts have the potential to migrate to surface water through the drainage ditch which ultimately flows into Lower Mill Creek and then to the Green River. This transport mechanism will be further evaluated during the RI.
- Surface Water Runoff – Surface water runoff can contain both suspended solids and dissolved-phase constituents. Historically contaminants entered surface water via erosion or runoff from the former dross piles. All dross piles and contaminated soil have been removed from the property and a new stormwater collection system will be installed during property development activities, including removal and realignment of the ditches. Figure 8 shows the new post Interim Action and redevelopment stormwater flow paths. All surface water flowing from on-Property paved surfaces and the building roof will be collected and treated prior to discharge in accordance with the applicable development permits. The treatment tanks will be installed below the parking lot (See Figure 8) with treated water discharge to the right-of-way ditch located within South 202nd Street. The on-Property wetland will predominantly collect stormwater generated on other properties that drain onto the Maralco Property from the northeast and south. Other than direct accumulation of rainfall and runoff from its immediate surrounding land surface on the Property, the wetland serves primarily as a retention basis for off-Property sources that Bridge does not control. All surface water that flows into the wetland from adjacent properties/street collection points or precipitation that falls onto the wetland or swales will flow through the wetland and swale and discharge to the right-of-way ditch. That point of discharge is separate from the discharge for the on-Property stormwater runoff generated from the building and paved areas and there is no commingling of those stormwaters on-Property

5.4 Potential Receptors and Exposure Pathways

Potential exposure scenarios are described qualitatively below. Subsequent quantitative analysis may be included in the RI.

Ecological and human receptors could be directly or indirectly exposed to contaminants in soil and surface water as follows:

- Ecological – Organisms using the wetland and ditch soil or surface water for habitat, including plants, soil and sediment biota, fish, and wildlife (birds and mammals).
    - Direct exposure to soil –Direct contact (including incidental or intentional ingestion, dermal absorption, and root uptake) could occur in areas where soil or dross has previously been deposited within the ditch or wetlands. The interim actions have addressed, or are currently addressing, all on-property impacts to soil at concentrations that could pose an ecological risk.
    - Direct exposure to surface water – Direct contact (including incidental or intentional ingestion and absorption across skin or gills) could occur in areas where contaminants in soil or dross have dissolved into surface water or have been transported to surface water via groundwater and in downstream areas.
    - Direct exposure to sediment – Direct contact (including incidental or intentional ingestion, dermal absorption, and root uptake) could occur in downstream areas if contaminants originating at the Site have been transported as far as Lower Mill Creek.
- Human – People accessing the ditches or wetland, workers in the ditches, and on-Property construction workers.
    - Direct contact with soil – Direct contact (incidental ingestion and dermal absorption) could occur in areas where soil is uncapped, including the ditch and wetland, or where soil could become exposed during construction that removes buildings or pavement.
    - Direct contact with groundwater – Direct contact (incidental ingestion and dermal absorption) could occur in areas where groundwater becomes exposed during construction.
    - Direct contact with surface water and sediment – If contaminants originating at the Site are transported to Lower Mill Creek, direct contact (incidental ingestion and dermal absorption) could occur while fishing.
    - Ingestion of fish – If contaminants originating at the Site are transported to Lower Mill Creek, they could be taken up by fish, which could be ingested by people fishing recreationally or for subsistence.

Groundwater at the Property is not currently being used for drinking water and its use as such in the future is very unlikely. Drinking water for the Property and the surrounding area is supplied by the City of Kent. The City of Kent obtains its water from the water supply wells throughout the city limits. The closest well is upgradient of the Site and drilled 100 feet below ground surface, in alluvial materials (Washington State Well Report Survey, accessed on 2/3/2022). Regardless, groundwater SLs include the drinking water pathway because the groundwater is classified as potable under MTCA (WAC 173-340-720[2]). SLs based on potable groundwater are protective of workers contacting groundwater during a construction project.

5.5 Data Gaps and Proposed Sampling Locations

The Phase 1 and Phase 2 Interim Actions have removed, or will remove, the majority of impacts to soil. The primary data gaps that remain are related to soil, groundwater, and surface water quality at the Site following the completion of the interim actions. Other data gaps include soil and groundwater quality beneath the former facility building and dross stockpile, the UST area, and the wetland.

The following specific data gaps have been identified for evaluation during the RI:

- **Groundwater Quality at Phase 2 Interim Action Areas 2a and 2b:** Performance samples collected in these areas during Interim Action Phase 2 removal are expected to confirm the removal of surface soils above SLs. Compliance with PCULs will be demonstrated in the completion reporting associated with the Phase 2 work. To address possible groundwater impacts from surface soil leaching to groundwater, two direct push groundwater sampling locations (DPT-23 and DPT-24; Figure 15) will be installed downgradient of these areas. If metals or salt ions are detected above SLs in groundwater, a monitoring well will be installed near that location.
- **Current Soil Conditions and Groundwater Quality Near Former UST:** The reconnaissance groundwater sample collected at DPT-2 identified SL exceedances for DRO from near the former UST area. Direct push soil and groundwater samples are proposed within the footprint of the former UST, shown on Figure 15. A monitoring well will be installed within 10 feet and downgradient from DPT-2 (MW-9; shown Figure 15).
- **Groundwater Conditions at Damaged or Decommissioned Monitoring Wells:** MW3A, MW4A and MW6 were decommissioned on July 22, 2024 because locations conflicted with development activities. MW-4, MW-5R, and MW-8 were inadvertently damaged during redevelopment activities in September and October 2024. A new well will be installed 50 to 100 feet east of MW-4A (MW-10, Figure 15). MW-3R, MW-4R, MW-5R2, MW-6R, and MW-8R will be installed as replacement wells to MW3A, MW-4, MW-5R MW6, and MW-8, respectively (shown on Figure 15).
- **Chromium in Groundwater:** Chromium in groundwater appears to be associated with leaching from the outdoor dross pile. The SL for chromium varies depending on the valance state of the chromium present. A groundwater sample from MW-5R will be analyzed for trivalent and hexavalent chromium to determine the appropriate groundwater SL.
- **Extent of Salt Ions and Metals in Groundwater Off Property:** Direct push and monitoring well data indicate that chloride, fluoride, and arsenic impacted groundwater may extend off-Property to the west and north. Direct push sampling is proposed for the Puget Pipe property to the north to assess groundwater conditions to the north. A monitoring well will be installed if concentrations are detected above SLs. Direct push samples were previously collected along 77th

Avenue S, west of the property and the BNSF property. Impacts from Maralco did not appear to be present, but two monitoring wells (MW-11 and MW-12; shown on Figure 15) will be installed to confirm downgradient groundwater quality.

- **Soil and Groundwater Quality Beneath Former Building:** Due to the presence of the former building, limited investigation activities occurred in this portion of the property. Two direct push boreholes will be advanced beneath the former building. One borehole will be advanced immediately downgradient of historical smelting activities and a second location will be advanced about 100 feet north of the first location or anywhere where potential contamination is observed (DPT-28 and DPT-29; Figure 15). Additional locations may be advanced, in coordination with Ecology, depending on the analytical results or if suspected contamination is observed in other areas beneath the former building.
- **Groundwater Quality Beneath Former Dross Pile:** Extensive soil data is available beneath the former dross pile (Tables 6 and 7) but limited groundwater data is available beneath the former dross pile. To assess groundwater quality beneath the former dross pile, three evenly spaced direct push boreholes will be advanced to collect groundwater samples (DPT-30 through DPT-32; Figure 15).
- **Surface Water Quality Following Interim Actions:** Additional data is needed to assess surface water quality following source removal (completed during the Phase 1 Interim Action and current Phase 2 Interim Action) and changes to the on-Property stormwater management. A staff gauge will be installed in the drainage swale at the upgradient end of the culvert that discharges from the Property to the S 202nd Street ditch (Figure 15). This location will also serve as a monitoring station to confirm that metals and salt ions associated with past Maralco operations are no longer impacting surface water. This data will be collected following source removal (Phase 1 and 2 Interim Action removals). Once property development is complete, stormwater that is collected and treated from paved surfaces and the warehouse roof will be subject to the requirements of the Industrial Stormwater General Permit. Since this system won’t be operational until following the RI and it is subject to its’ own permitting requirements, discharge from the water quality vault is not proposed during the RI. Due to the timing Municipal stormwater that enters the property and may impact the quality of on-property stormwater will also be analyzed at two locations:
    - Entering from the southwest adjacent property
    - Entering from the ditch at 80th Avenue S
    - There are two other locations where stormwater enters the property from catch basins in S 202nd Street. These locations are not proposed for monitoring due to the limited catchment addressed and the low anticipated flows. These locations may be sampled, if needed.

6 Supplemental RI Field Sampling Plan

Based on data gaps identified in Section 5.5, additional data collection is proposed in this SRIWP. Additional environmental sample locations are shown on Figure 15 and summarized on Table 15. Specific sampling protocols are described in the QAPP (Appendix D) and health and safety protocols are included in the project Health and Safety Plan (Appendix E).

All work will be conducted consistent with the Project's Cultural and Archaeological Resources Monitoring & Unanticipated Discovery Plan (TRC 2023).

6.1 Monitoring Well Abandonment and Installation

6.1.1 Monitoring Well Abandonment

Existing Site monitoring wells were decommissioned on July 22, 2024 (MW3A, MW4A, and MW6) and December 20, 2024 (MW-5R). Wells were decommissioned in accordance with the Ecology's Water Well Construction Act (1971), RCW 18.104 (WAC 173-160-460). MW-4 inadvertently pulled out during development activities and the area was backfilled during property development activities. The top of MW-8 was snapped off during development activities, but the well remains in the ground. The remainder of the well will be decommissioned in accordance with RCW 18.104 (WAC 173-160-460).

6.1.2 Monitoring Well Installation

Monitoring well locations are shown on Figure 15 and the well sampling program is summarized on Table 15. Wells will be installed in accordance with Washington Administrative Code (WAC) 173-160 using standard hollow-stem auger drilling methods. Well installation will be performed by a Washington-licensed well driller under the supervision of a licensed geologist or professional engineer. A 10-ft well screen will be installed to intersect the water table. All proposed monitoring wells will be constructed of 2-inch diameter PVC with 0.010-inch slotted screen and will have flush mount surface completions. The screen interval at each well is expected to be installed with the top at a depth of approximately 5 ft bgs and the bottom at a depth of approximately 15 ft bgs, based on historical water level measurements at the Site (see Table 12). Well locations, screen lengths and intervals, and surface completions may be modified based on field observations at the time of drilling. Soil conditions encountered during drilling and well details will be documented on boring logs and well completion diagrams.

Following installation, the top-of-casing elevation and horizontal coordinates of each well will be surveyed by a professional land surveyor as detailed in the QAPP (Appendix D).

6.2 Soil Sampling and Analysis

Proposed soil sample locations are shown on Figure 15 and summarized on Table 15. For subsurface soil sample collection, a Washington-licensed driller will complete direct push borings or a hollow stem auger drilling. Drill rigs tools (augers and push probe) will be decontaminated before each use. Drill cuttings and decontamination water will be drummed for appropriate disposal. Surface soil samples will be collected using disposable sampling spoons, with new spoons used at each sample location and depth.

For direct push borings, soil cores will be removed from the subsurface in 5-ft sleeves. Each sleeve will be cut open on a table and positioned with the upper end at the same side of the table each time. A photograph of the open sleeve placed next to a tape measure will be taken of each 5-foot sleeve. Percent recovery for the sleeve as a whole, and for any specific portions of the sleeve that differ from the general recovery will be recorded on a field form/boring log. As soon as feasible after the core sleeve is opened, the photo-ionization detector will be scanned over the soil for a qualitative indication of soil quality. Any areas with measurement spikes will be evaluated more closely.

For hollow stem auger drilling, split spoons samples will be collected every 2.5 feet using a 2-inch diameter split-spoon sampler. Samples will be handled and conditions documented in a manner substantially similar to that described above for direct push borings .

Subsurface and surface soil will be visually classified, and the following information will be recorded:

- Depth of visual observations and sample collection, with sample ID
- Physical soil description (soil type and color, stratification per ASTM 2488)
- Other distinguishing characteristics or features, such as debris or concrete
- If odors are noted, a photo-ionization detector reading will be recorded by placing soil in a plastic bag, shaking it, and inserting the probe into the bag; indigo-blue dye test kits may also be used for soils exhibiting gasoline- or diesel-like odors.
- Qualitative moisture content (dry, damp, moist, wet, saturated).

Gloves will be changed between samples. Soil samples will be collected using disposable sampling spoons, with new spoons used at each sample location and depth.

Sample containers will be provided by the analytical laboratory and will be appropriate in size and type for the intended analyses. Sample containers will be clearly labeled with sample ID, collection date and time, and project name, and then placed in an iced cooler for delivery to the laboratory within 24 hours of sample collection. Chain of custody will be maintained. The sample ID is the boring name (including initials for the subarea) and the depth below ground surface.

Sample depths and quantity of samples may be adjusted in the field based on observations of contamination.

All of the soil samples will be analyzed by the laboratory for metals including aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc. Soil samples collected from the area of the former UST will also be analyzed for DRO and ORO, benzene, toluene, ethylbenzene, and total xylenes (BTEX), and select SVOCs including PAHs and cPAHs.

Specific sampling protocols and analytical methods are described in the QAPP (Appendix D).

6.3 Direct-Push Groundwater Sampling and Analysis

Groundwater samples, collected from direct push soil boring locations using the groundwater sample tooling, will be analyzed for the analytes indicated on Table 15. The sample tool screen will be placed to intercept the water table, and a peristaltic pump will be used to collect samples. Proposed sample locations are shown on Figure 15. Sampling steps will include:

- Collect water level information.
- Lower the new, clean polyethylene tubing into the well until the tubing intake is in the middle of the screened interval, or slightly above the middle of the screened interval. Secure the tubing to the top of the well and leave approximately 5 feet of tubing outside the well. Attach a 1-foot length of silicon tubing that is appropriate for a peristaltic pump to the polyethylene tubing.
- Attach the silicon tubing to the peristaltic pump. Purge (remove with pump) water from the well into a calibrated 5-gallon pail or similar and monitor flow rate.
- Purge at a rate of approximately 100-300 milliliters (0.03-0.09 gallons) per minute until turbidity has decreased. The goal is to create minimal screen velocities during purging such that fines, which may bias sampling results, are not captured. This goal may be difficult to achieve under some circumstances and may require adjustment based on site-specific conditions and professional judgment.
- Sampling may begin when turbidity has visually decreased. Field instruments are to be calibrated prior to use, according to the manufacturer’s instructions.
- Collect samples of water for laboratory analysis in a manner that minimizes volatilization of potential contaminants from the water into the air. Hands and clothing will be clean when handling sampling equipment and during sampling.
- Clean, disposable, latex, nitrile, or equivalent–material gloves will be worn when filling bottles for analyses. Gloves will be changed when dirty and between samples.
- All water samples will be collected from the pump discharge lines directly into the appropriate sample containers following.
- Dissolved metals samples will be field filtered using a single-use 0.45 micron filter. All samples for metals analysis (dissolved and total) will be placed in 500 milliliter poly bottles pre-preserved with nitric acid.
- All sample preparations for DRO and ORO analysis will be with and without silica gel cleanup.

Sample bottles will be provided by the analytical laboratory and will be appropriate in size, type, and preservation for the intended analyses. Sample containers will be clearly labeled with sample ID, collection date and time, and project name, and then placed in an iced cooler for delivery to the laboratory within 24 hours of sample collection. Chain of custody will be maintained.

All of the water samples from the direct-push borings will be analyzed by the laboratory for total and dissolved metals including aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc, and for chloride and fluoride. The water sample from the borings in the area of the former UST will also be analyzed for DRO and ORO, EPH/VPH, BTEX, and select SVOCs including PAHs and cPAHs.

Specific sampling protocols and analytical methods are described in the QAPP (Appendix D).

6.4 Monitoring Well Sampling and Analysis

Following well installation, the well will be developed by surging and bailing or pumping until turbidity has decreased and parameters stabilized (see Appendix D). At least three casing volumes should be purged during development. The well will be allowed to sit for a minimum of seven days prior to sampling to allow bentonite seals to set.

Groundwater sampling will include measurement of field parameters (turbidity, dissolved oxygen, specific conductance, temperature, pH, oxidation/reduction potential, and water drawn down) to evaluate stability of groundwater collected from wells. Groundwater sampling methods are detailed in the standard operating procedures included in the QAPP (Appendix D). Field water quality instruments will be calibrated at the beginning (prior to sampling) and middle of each day. Calibration data will be recorded on a field form or log book. Groundwater sampling analytes are indicated on Table 15 and proposed monitoring well locations are shown on Figure 15.

Sample bottles will be provided by the analytical laboratory and will be appropriate in size, type, and preservation for the intended analyses. Sample containers will be clearly labeled with sample ID, collection date and time, and project name, and then placed in an iced cooler for delivery to the laboratory within 24 hours of sample collection. Chain of custody will be maintained.

All of the groundwater samples from the wells will be analyzed by the laboratory for total and dissolved metals including aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc, and for chloride and fluoride. The water samples from monitoring wells MW-4R, MW-5R, MW-6R, MW-7, MW-9, and MW-10 will also be analyzed for DRO and ORO, BTEX, and select SVOCs including PAHs and cPAHs.

Groundwater will be sampled from the wells on a quarterly basis for one year (four quarterly events).

6.5 Surface Water Sampling and Analysis

Surface water samples will be collected during the wet season at three locations. Two samples will be collected directly from the drainage swale/ditch at: 1) the east side of 80th Ave S; and, 2) the staff gauge at the upgradient end of the culvert discharging from the Property to the S 202nd Street ditch. The third sample will be collected from the on-property manhole that receives stormwater from the property south of Maralco. Sampling will follow EPA Surface Water Sampling procedures outlined in EPA document ID LSASDPROC-201-R6, dated April 22, 2023. In general, samples will be collected directly into the sample container when the surface water source is accessible by wading or other means using a dipper device. The sampler will face upstream if there is a current and collect the sample without disturbing the bottom sediment.

For dissolved metals, samples will be initially collected in an unpreserved sample container. The sample will then be field filtered, using a peristaltic pump and a single-use 0.45 micron filter, into a preserved sample container for laboratory analysis.

Surface water samples will be analyzed by the laboratory for total and dissolved metals including aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc, and for chloride, fluoride, and cyanide.

Specific sampling protocols, analytical methods, and the container and preservative requirements are listed in the QAPP (Appendix D).

6.5.1 Management of Waste

Any investigation-derived waste (IDW), including waste/wastewater generated during decontamination of equipment, will be collected and managed in appropriate waste containers such as 55-gallon steel drums. All waste will be appropriately characterized in accordance with applicable regulations based on the laboratory analytical results and historical knowledge. IDW stored in drums, which will be clearly labeled and will remain at the site until the completion of the investigation, will be disposed of in accordance with applicable regulations.

7 Schedule and Reporting

Implementation of this SRIWP started in December 2024, with Ecology approval via email correspondence on December 19, 2024, to proceed with advancement of the proposed DPT locations. Initial work has and will include soil borings, soil sampling, grab groundwater sampling, surface water sampling and monitoring well installation. Following monitoring well installation, quarterly groundwater samples will be collected from existing and newly installed groundwater monitoring wells (Figure 17) with the first event expected to be conducted during first quarter of 2025. The quarterly groundwater monitoring events for this supplemental RI are tentatively planned to occur during February, May, August, and November of 2025. Summaries of the sampling conducted will be provided in the quarterly progress reports required under Section VII of the AO.

Details and results of the RI field activities will be presented in an RI report. A draft of the RI report is expected to be submitted to Ecology in the third quarter of 2025, prior to completing the final one or two quarters of groundwater monitoring. Results of the third and fourth quarter of groundwater monitoring will be incorporated into the final draft of the RI report for public review and comment. The RI report will be prepared in accordance with the AO and the reporting requirements listed in MTCA, WAC 173-340-350(5)(g). In conjunction with completing the RI, an FS will be prepared in accordance with the AO and the requirements listed in MTCA, WAC 173-340-351(6)(f).

The schedule of deliverables provided in Exhibit C of the AO notes that the RI and FS may be combined into one RI/FS Report if approved by Ecology. As such, Bridge is requesting Ecology's approval to prepare a combined RI/FS Report according to the following revised document submittal schedule:

- Agency Review Draft RI/FS Report to be submitted within 90 days following receipt of laboratory data[6]
- Public Review Draft RI/FS Report to be submitted within 45 calendar days following receipt of final Ecology comments on the Agency Review Draft RI/FS Report.

[6] This assumes laboratory data received for the first two or three quarterly groundwater monitoring events.

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SUPPLEMENTAL
REMEDIAL INVESTIGATION WORK PLAN

Maralco Site
7730 South 202nd Street, Kent, WA

Agreed Order No. DE 22343
Facility Site Identification No. 2067
Cleanup Site Identification No. 5055

January 23, 2025

Prepared for:

BRIDGE

SUPPLEMENTAL
REMEDIAL INVESTIGATION WORK PLAN

Maralco Site
7730 South 202nd Street, Kent, WA

January 23, 2025

Prepared by:

CRETE
CONSULTING, INC.

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Acronyms and Abbreviations

Aerotech	Aerotech Environmental, Inc.
AO	Agreed Order
bgs	below ground surface
BHD	baghouse dust
Bridge	7730 202nd Street, LLC
BTEX	benzene, toluene, ethylbenzene, and xylenes
CRETE	CRETE Consulting Incorporated
COC	constituent of concern
COI	constituent of interest
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSM	conceptual site model
CUL	cleanup level
DRO	diesel-range organics
IHS	Indictor Hazardous Substance
IAWP	Interim Action Work Plan
Ecology	Washington Department of Ecology
EDR	Environmental Data Resources, Inc.'s
EPA	United States Environmental Protection Agency
EMR	Environmental Management Resources
Enviros	Enviros, Inc.
FBI	Friedman & Bruya, Inc
ft	foot (or feet)
GRO	gasoline-range organics
KBI	Kawecki-Berylco, Inc.
KCC	Kent City Code
µg/L	micrograms per liter
mg/kg	milligram per kilogram
mS/cm	milliSiemens/centimeter
MTCA	Model Toxics Control Act
MKE	Morrison-Knudsen Environmental Services, Inc./Morrison-Knudsen Corporation
ORO	oil-range organics
PAH	Polycyclic Aromatic Hydrocarbons
PCUL	Preliminary Cleanup Level
Property	Maralco Former Secondary Aluminum Smelter Property
PRGs	Project Remediation Goals
QAPP	Quality Assurance Project Plan
RI/FS	Remedial Investigation/Feasibility Study
RCI	Reactivity, Corrosivity, Ignitability
RIWP	Remedial Investigation Work Plan

SL	Screening level
SVOC	Semi Volatile Organic Compounds
SRIWP	Supplemental Remedial Investigation Work Plan (Agency Review Draft)
TCLP	Toxicity Characteristic Leachate Procedure
TEE	Terrestrial Ecological Evaluation
TPH	total petroleum hydrocarbons
URS	URS Corporation
UST	underground storage tank
VCP	Voluntary Cleanup Program
VOC	Volatile Organic Compounds
WAC	Washington Administrative Code

Professional Certification

Supplemental Remedial Investigation Work Plan

Maralco Site
7730 South 202nd Street
Kent, WA 98032

King County Parcel Number 6315000300

Ecology Facility Site ID No. 2067
Ecology Cleanup Site ID No. 5055

<u>*Prepared By:*</u>
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<u>*Prepared For:*</u>
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10655 NE 4th Street
Suite 212
Bellevue, WA 98004

<u>Signature:</u> ____________________________
<u>Date:</u> January 23, 2025

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Grant Hainsworth, P.E.
Washington State PE Number: 33192
Expiration: 6/5/2025

Tables

Table 1 Existing Well Construction Details
Maralco Property - Kent, WA

Well ID	Construction Date	Well Tag ID	Well Diameter (inches)	Type	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Total Well Depth (ft bgs)	Top of PVC Elevation (ft NAVD88)	Northing NAD83 State Plane	Easting NAD83 State Plane	Status of Well
MW-1	9/25/1990	NA	2	flush mount	6	16	16	30.04	156152.9875	1293431.55	Intact
MW-2	9/25/1990	NA	2		6	16	16	30.70	156677.1449	1293717.508	Intact
MW3A	7/21/2017	BJP695	1		4	14	14	29.97	156272.5942	1292883.168	Decommissioned on 7/22/24
MW-4	9/24/1990	NA	2	stick-up	6	16	16	28.74	156691.5406	1292841.596	Damaged
MW4A	7/21/2017	BJP694	2	flush mount	6	16	16	NA	156739	1292903.182	Decommissioned on 7/22/24
MW-5	1/22/2003	see Note 1	2		5	16.5	16.5	NA	NA	NA	Decommissioned
MW5A	7/21/2017	BJP693	2		6	16	16	NA	NA	NA	Decommissioned on 8/30/24
MW-5R	9/1/2022	BNE750	2		5	20	20.2	29.92	156613.2742	1293183.097	Decommissioned on 12/20/24
MW6	7/21/2017	BJP696	1		5	15	15	29.65	156510.97	1292890.323	Decommissioned on 7/22/24
MW-7	9/1/2022	BNE751	2		5	20	20.2	29.90	156721.1256	1293150.993	Intact
MW-8	9/1/2022	BNE749	2		5	20	20.3	27.80	156139.5286	1293132.626	Damaged

Notes:

ft bgs - feet below ground surface

NA - not available

1. MW-5 was decommissioned prior to 2017, replaced with well MW5A.

Table 2 - Prior to 2016 Soil Data Summary
Maralco Site - Kent, WA

Analyte (mg/kg)				Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Copper	Lead	Magnesium	Manganese	Nickel	Thallium	Zinc	Mercury	Silver	Selenium	Cyanide	VOCs	PAHs
PCUL - Soil Protective of SW Vadose (fresh water, mg/kg)				33,000	5.2	7.3	250	3.2	0.77	48	36	24	NC	1,100	48	0.004	85	0.07	0.61	0.78	0.02	varies	varies
PCUL - Soil Protective of SW Saturated (fresh water, mg/kg)				33,000	5.2	7.3	250	3.2	0.77	72	36	24	NC	1,100	48	0.004	85	0.07	0.61	0.78	0.02	varies	varies
HB-1	1.5-2	05/09/90	vadose	12,800	0.2 N	1	33	NA	0.2 U	12.4 N	24.1	1.7	2,500	141	9	0.2 NU	27.9	0.04 U	0.3 U	0.5 NU	NA	NA	NA
HB-2	1.5-2	05/09/90	vadose	19,700	0.2N	1.9	50.6	NA	0.2U	26.3 N	91.8	6.2	3,540	209	12	0.2 NU	67.8	0.05 U	0.2 U	0.6 NU	NA	NA	NA
HB-3	1.5-2	05/09/90	vadose	13,000	0.1 N	1.6	39.1	NA	0.2U	12.4 N	35.2	2.3	2,510	151	9	0.2 NU	34.3	0.04 U	0.3 U	0.6 NU	NA	NA	NA
HB-4	0-1	09/11/90	vadose	5,920	NA	NA	30.5	NA	NA	62.6J	14.7B	3.2J	2,000	137	NA	NA	23.2	NA	NA	NA	0.25	NA	NA
HB-4	2-3	09/11/90	vadose	5,280	NA	NA	26.7	NA	NA	90.8J	14.6B	2U	1,870	91	NA	NA	17.4	NA	NA	NA	0.21 U	NA	NA
HB-5	1-2	09/11/90	vadose	5,380	NA	NA	28.5	NA	NA	68.2J	14.7B	2.7J	1,860	114	NA	NA	23.9	NA	NA	NA	0.29	NA	NA
HB-6	0-1	09/11/90	vadose	8,250	NA	NA	42.3	NA	NA	41.5J	18B	9.9J	2,250	175	NA	NA	29.5	NA	NA	NA	0.22	NA	NA
HB-6	2-3	09/11/90	vadose	7,530	NA	NA	41.9	NA	NA	17.5J	19.4B	2J	2,390	157	NA	NA	20.6	NA	NA	NA	0.22 U	NA	NA
HB-11	2.5-4	09/10/90	vadose	4,930	NA	NA	12.3	NA	NA	107J	25.6B	2U	1,640	62.2	NA	NA	18	NA	NA	NA	0.33	NA	NA
HB-14	0-1	09/12/90	vadose	9,130	NA	NA	54.8	NA	NA	26.6J	20.3B	16	2,480	223	NA	NA	45.1	NA	NA	NA	0.22	NA	NA
HB-14	2-3.3	09/12/90	vadose	5,080	NA	NA	26.9	NA	NA	54.2J	22.6B	2.5J	1,420	90.6	NA	NA	16.9	NA	NA	NA	0.21 U	NA	NA
HB-14 (Duplicate)	2-3	09/12/90	vadose	5,710	NA	NA	30.2	NA	NA	11.8J	11.4B	3.4J	1,970	107	NA	NA	18.8	NA	NA	NA	0.21 U	NA	NA
HB-15	0-0.5	09/11/90	vadose	8,240	NA	NA	43.2	NA	NA	20.1J	26.5B	8.1J	2,570	183	NA	NA	32.7	NA	NA	NA	0.3	NA	NA
HB-15	2-3	09/11/90	vadose	7,290	NA	NA	38	NA	NA	35.6J	21.6B	5.1J	2,250	134	NA	NA	36.3	NA	NA	NA	0.18 U	NA	NA
HB-16	0-1	09/12/90	vadose	9,810	NA	NA	56.1	NA	NA	28.2J	21B	15.3	2,540	269	NA	NA	39.2	NA	NA	NA	0.21	NA	NA
HB-16	2-3	09/12/90	vadose	5,880	NA	NA	27	NA	NA	80.6J	14.7B	2U	1,910	113	NA	NA	19.1	NA	NA	NA	0.18 U	NA	NA
MW-1	3.0-4.0	09/25/90	vadose	13,700	NA	NA	55.8 N	NA	NA	15.4 N	21.3 N	2.97	3,040	157 N	NA	NA	27.3 N	NA	NA	NA	0.21 U	see Note 1	see Note 2
MW-1	6.0-7.5	09/25/90	saturated	14,000	NA	NA	56.6 N	NA	NA	20.9 N	22.6 N	2.8	3,270	180 N	NA	NA	30.0 N	NA	NA	NA	0.27 U	see Note 1	see Note 2
MW-1	12.0-13.5	09/25/90	saturated	14,700	NA	NA	64.4 N	NA	NA	17.8 N	28.5 N	3.04	3,100	128 N	NA	NA	31.5 N	NA	NA	NA	0.25 U	see Note 1	see Note 2
MW-1	15.0-16.5	09/25/90	saturated	9,390	NA	NA	36.4 N	NA	NA	14.0 N	17.7 N	1.85	2,210	95.2 N	NA	NA	25.1	NA	NA	NA	0.25 U	see Note 1	see Note 2
MW-2	2.0-3.0	09/25/90	vadose	10,800	NA	NA	43.2 N	NA	NA	21.5 N	16.6 N	2.03	2,480	161 N	NA	NA	2.0 N	NA	NA	NA	0.21 U	see Note 1	see Note 2
MW-2	6.4-7.5	09/25/90	vadose	10,300	NA	NA	40.0 N	NA	NA	16.8	14.5 N	1.83	2,130	105	NA	NA	23.2 N	NA	NA	NA	0.22 U	see Note 1	see Note 2
MW-2	10.-12.0	09/25/90	saturated	8,590	NA	NA	37.3 N	NA	NA	17.9 N	15.3 N	1.94	2,010	135 N	NA	NA	23.7 N	NA	NA	NA	0.25 U	see Note 1	see Note 2
MW-2	15.5-16.5	09/25/90	saturated	22,900	NA	NA	88.2 N	NA	NA	24.3 N	54.1 N	4.26	5,180	396 N	NA	NA	38.5 N	NA	NA	NA	0.25 U	see Note 1	see Note 2
MW-3	3.0-4.5	09/24/90	vadose	13,500	NA	NA	45.7 N	NA	NA	38.4 N	18.3 N	2.03	2,070	148 N	NA	NA	22.9 N	NA	NA	NA	0.25 U	see Note 1	see Note 2
MW-3 (Duplicate)	3.0-4.5	09/24/90	vadose	13,400	NA	NA	51.9 N	NA	NA	27.7 N	21.4 N	2.29	2,060	172 N	NA	NA	25.4 N	NA	NA	NA	0.25 U	see Note 1	see Note 2
MW-3	6.5-7.5	09/24/90	saturated	31,800	NA	NA	124 N	NA	NA	29.4 N	38.6 N	5.88	5,950	222	NA	NA	53.8 N	NA	NA	NA	0.24 U	see Note 1	see Note 2
MW-3	12.5-13.5	09/24/90	saturated	17,100	NA	NA	65.3 N	NA	NA	30.0 N	20.3 N	2.47	3,110	177 N	NA	NA	31.4 N	NA	NA	NA	0.24 U	see Note 1	see Note 2
MW-3	15.0-16.5	09/24/90	saturated	15,300	NA	NA	70.2 N	NA	NA	24.3 N	25.0 N	3.09	3,530	204 N	NA	NA	34.3 N	NA	NA	NA	0.23 U	see Note 1	see Note 2
MW-4	1.5-3.0	09/24/90	vadose	17,100	NA	NA	40.7 N	NA	NA	26.6	22.6 N	2.67	2,870	122 N	NA	NA	29.3 N	NA	NA	NA	0.27 U	see Note 1	see Note 2
MW-4	4.5-6.0	09/24/90	vadose	18,200	NA	NA	62.7 N	NA	NA	27.9 N	20.6 N	2.48	3,010	131 N	NA	NA	32.6 N	NA	NA	NA	0.23 U	see Note 1	see Note 2
MW-4	9.0-10.5	09/24/90	vadose	21,800	NA	NA	86.1 N	NA	NA	34.3 N	34.5 N	3.92	5,430	250 N	NA	NA	40.7 N	NA	NA	NA	0.73	see Note 1	see Note 2
MW-4	12.0-13.5	09/24/90	vadose	9,770	NA	NA	25.8 N	NA	NA	55.5 N	10.7 N	1.23	1,590	106 N	NA	NA	22.4 N	NA	NA	NA	0.23 U	see Note 1	see Note 2
MW-5	5 ft bgs	01/22/03	vadose	NA	NA	NA	NA	NA	NA	NA	NA	18*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5	10 ft bgs	01/22/03	saturated	NA	NA	NA	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5	15 ft bgs	01/22/03	saturated	NA	NA	NA	NA	NA	NA	NA	NA	13.9*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DP-2	3 ft bgs	02/04/03	vadose	1,400	NA	5 U	NA	NA	1 U	NA	NA	ND*	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
DP-3	3 ft bgs	02/04/03	vadose	2,000	NA	5 U	NA	NA	1 U	NA	NA	ND*	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
DP-4	3 ft bgs	02/04/03	vadose	2,300	NA	5 U	NA	NA	1 U	NA	NA	ND*	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
DP-5	1 ft bgs	02/04/03	vadose	NA	NA	ND*	NA	NA	NA	ND*	NA	ND*	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
DP-5	2.5 ft bgs	02/04/03	vadose	1,400	NA	5 U	NA	NA	1 U	NA	NA	ND*	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
Data Associated with Dross Samples or in Areas of Past Removals																							
HB-1	0-0.5	05/09/90	vadose	138,000	1.79 N	3	133	NA	0.7	83 N	713	55	21,800	1,220	24	0.2 NU	442	0.04 U	0.4 U	0.6 NU	NA	NA	NA
HB-2	0-0.5	05/09/90	vadose	150,000	5.4N	6.2 U	123	NA	1.5	167 N	17,100	160	23,500	1,530	71	0.2 NU	2,660	0.04 U	1.8 B	0.6 NU	NA	NA	NA
HB-3	0-0.5	05/09/90	vadose	165,000	8.0 N	6.6	125	NA	1	228 N	1,480	128	33,800	2,340	59	0.3 NU	1,030	0.06 U	0.7	0.7 NU	NA	NA	NA
HB-5	0-0.2	09/11/90	vadose	153,000	NA	NA	69.5	NA	NA	72.5J	708	77.9	10,800	1,320	NA	NA	476	NA	NA	NA	0.65	NA	NA
HB-7 (Removed)	0.5-1.3	09/11/90	vadose	99,000	NA	NA	115	NA	NA	111J	1220	275	15,800	693	NA	NA	999	NA	NA	NA	1.32	NA	NA
DP-1 (Removed)	1 ft bgs	02/04/03	vadose	3,000	NA	5 U	NA	NA	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DP-2 (Removed)	1 ft bgs	02/04/03	vadose	NA	NA	ND*	NA	NA	NA	ND*	NA	ND*	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
DP-3 (Removed)	1 ft bgs	02/04/03	vadose	NA	NA	ND*	NA	NA	NA	ND*	NA	ND*	NA	NA	NA	NA	NA	ND*	NA	NA	NA	NA	NA
HB-11 (Removed)	0-0.75	09/10/90	vadose	55,000	NA	NA	81.2	NA	NA	66J	1,490	100	11,500	488	NA	NA	336	NA	NA	NA	0.55	NA	NA
HB-12 (Removed)	1-1.5	09/10/90	vadose	179,000	NA	NA	80	NA	NA	165J	1,760	128	17,900	2,390	NA	NA	1,240	NA	NA	NA	0.71	NA	NA
HB-13 (Removed)	1.5-2.5	09/10/90	vadose	198,000	NA	NA	125	NA	NA	2.36J	3,040	209	32,400	1,090	NA	NA	2,700	NA	NA	NA	1.04	NA	NA

Notes:

Bold - analytes detected

All results ae in mg/kg - milligrams per kilogram

Reported concentration exceeds the Vadose Zone PCUL (includes saturated zone for compounds with the same SL for vadose and saturated)

Reported concentration exceeds the Saturated PCUL

NC - no criterion

U - not detected above listed laboratory reporting limits

ND - not detected (detection limits not reported)

ft bgs - feet below ground surface

PCUL - Preliminary Cleanup Level

NA - not analyzed

N - Laboratory Instrument Recovery not within control limits

B - compound detected in blank (sample value is less than 10 times that value)

J - estimated value

*Analyzed by X-ray fluorescence (XRF)

Note 1: Volatile Organic Compounds (VOCs) were analyzed are reported in the Morrison-Knudsen Environmental Services, Draft Phase I Remedial Investigation Report, Maralco Site. Kent, WA. All results were ND except for 2-butanone at MW-2 and MW-3 (21J ug/kg max)) and acetone which was flagged as a tentatively identified compound (TIC) in all samples. Samples were also analyzed for calcium, potassium, and sodium

Note 2: Polycyclic aromatic hydrocarbons (PAHs) were analyzed and reported in the Morrison-Knudsen Environmental Services, Draft Phase I Remedial Investigation Report/ All results were ND except for perylene which was flagged as TIC in all samples analyzed.

Table 3 - Metal Soil Data Detected Compounds Summary (Outside of Dross Pile Footprint)
Maralco Site - Kent, WA

		Aluminum	Iron	Barium	Antimony	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Nickel	Silver	Zinc	Mercury	Selenium
PCUL - Soil Protective of SW Vadose (fresh water, mg/kg)		**33,000**	**36,000**	**250**	**5.2**	**7.3**	**0.77**	**48**	**11**	**36**	**24**	**48**	**0.61**	**85**	**0.07**	**0.78**
PCUL - Soil Protective of SW Saturated (fresh water, mg/kg)		**33,000**	**36,000**	**255**	**5.2**	**7.3**	**0.77**	**72**	**11**	**36**	**24**	**48**	**0.61**	**85**	**0.07**	**0.78**
Sample ID and Sample Depth (ft bgs)	**Date**															
MW3A (5')	7/21/17	**7,800**	NA	5 U	NA	**1.1**	1 U	**1.2**	NA	NA	1 U	NA	NA	NA	0.5 U	2 U
MW4A (6.5')	7/21/17	**5,600**	NA	5 U	NA	1 U	1 U	1 U	NA	NA	1 U	NA	NA	NA	0.5 U	2 U
MW6 (6.5')	7/21/17	**9,700**	NA	5 U	NA	**1.6**	1 U	**4**	NA	NA	**1.6**	NA	NA	NA	0.5 U	2 U
DPT-14 5-7.5'	8/29/22	**4,340**	**7,910**	NA	1 U	**2.63**	1 U	**6.57**	**2.25**	**7.43**	**1.99**	**5.05**	1 U	**16.9**	NA	NA
DPT-14 10-11.5'	8/29/22	**6,980**	**11,500**	NA	1 U	1 U	1 U	**5.99**	**2.18**	**7.27**	**1.10**	**4.36**	1 U	**15.6**	NA	NA
DPT-15 5-6.5'	8/29/22	**4,720**	**8,700**	NA	1 U	**2.05**	1 U	**9.15**	**2.63**	**10.1**	**1.17**	**5.25**	1 U	**16.5**	NA	NA
DPT-15 8.5-10'	8/29/22	**2,640**	**2,960**	NA	1 U	**5.09**	1 U	**6.52**	**7.14**	**15.2**	**2.14**	**8.96**	1 U	**22.6**	NA	NA
DPT-16 6.5-8'	8/30/22	**3,380**	**841**	NA	1 U	**1.17**	1 U	**8.37**	**2.69**	**7.00**	**1.10**	**4.91**	1 U	**15.1**	NA	NA
DPT-16 10-11.5'	8/30/22	**5,260**	**9,480**	NA	1 U	**1.51**	1 U	**5.49**	**2.95**	**7.92**	**1.37**	**5.12**	1 U	**14.2**	NA	NA
DPT-17 5.5-8'	8/30/22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-18 5-7.2'	8/30/22	**5,010**	**6,490**	NA	1 U	**2.48**	1 U	**10.0**	**3.64**	**13.0**	**4.04**	**9.26**	1 U	**23.7**	NA	NA
DPT-18 14-15'	8/31/22	**5,130**	**6,520**	NA	1 U	**1.26**	1 U	**7.89**	**3.52**	**10.8**	**1.63**	**5.85**	1 U	**18.5**	NA	NA
DPT-19 6-8'	8/31/22	**16,900**	**16,900**	NA	1 U	**3.32**	1 U	**11.8**	**6.42**	**24.2**	**3.73**	**11.1**	1 U	**38.1**	NA	NA
DPT-19 12.5-15'	8/31/22	**7,410**	**8,030**	NA	1 U	**2.09**	1 U	**10.0**	**4.34**	**16.6**	**2.84**	**8.24**	1 U	**23.3**	NA	NA
DPT-20 6.5-7.5'	8/31/22	**13,200**	**16,600**	NA	1 U	**4.13**	1 U	**12.3**	**5.73**	**23.5**	**4.22**	**11.2**	1 U	**33.8**	NA	NA
DPT-20 13.5-15'	8/31/22	**7,930**	**10,500**	NA	1 U	**2.33**	1 U	**11.8**	**4.54**	**19.5**	**2.55**	**12.8**	1 U	**24.5**	NA	NA
DPT-21 6-10'	8/31/22	**4,990**	**8,150**	NA	1 U	**1.84**	1 U	**10.2**	**3.19**	**11.0**	**2.79**	**6.01**	1 U	**54.1**	NA	NA
DPT-21 11.5-14'	8/31/22	**5390**	**8220**	NA	1 U	1 U	1 U	**8.02**	**3.21**	**10.1**	**1.46**	**6.25**	1 U	**18.7**	NA	NA
DUP01-220831		**3690**	**5520**		1 U	**1.14**	1U	**8.51**	**3.37**	**11.7**	**1.56**	**6.63**	1 U	**20.0**		
DPT-22 3.5-5'	8/31/22	**10,400**	**15,000**	NA	1 U	**6.91**	1 U	**12.9**	**4.94**	**22.3**	**21.7**	**12.3**	1 U	**37.0**	NA	NA
DPT-22 5-7'	8/31/22	**9,160**	**8,310**	NA	1 U	**1.64**	1 U	**10.3**	**3.66**	**20.0**	**2.54**	**7.87**	1 U	**23.6**	NA	NA
DPT-22 11-13.2'	8/31/22	**4,390**	**9,290**	NA	1 U	**3.23**	1 U	**8.39**	**3.70**	**8.74**	**1.19**	**7.24**	1 U	**17.3**	NA	NA
SB-UST-01 5-6'	8/29/22	**6,720**	**8,660**	NA	1 U	**2.05**	1 U	**9.82**	**2.99**	**12.0**	**1.80**	**6.18**	1 U	**17.2**	NA	NA
SB-UST-02 5-6'	8/29/22	**7,250**	**9,870**	NA	1 U	**2.18**	1 U	**10.7**	**4.29**	**13.6**	**2.16**	**7.98**	1 U	**20.8**	NA	NA
SB-UST-02 15-16'	8/29/22	**6,690**	**8,940**	NA	1 U	**2.83**	1 U	**9.27**	**4.51**	**19.7**	**2.66**	**8.48**	1 U	**25.7**	NA	NA
SB-UST-03 1-2'	8/29/22	**5,370**	**7,800**	NA	1 U	**7.81**	1 U	**8.57**	**4.35**	**16.7**	**13.5**	**10.1**	1 U	**28.2**	NA	NA
MW-5R 5.5-7'	8/30/22	**5,000**	**13,700**	NA	1 U	**1.52**	1 U	**6.98**	**2.15**	**7.60**	**1.09**	**4.49**	1 U	**14.2**	NA	NA
MW-5R 11-12'	8/30/22	**7,760**	**7,260**	NA	1 U	**1.93**	1 U	**8.50**	**3.18**	**14.1**	**1.96**	**6.41**	1 U	**20.4**	NA	NA
MW-7 5-7'	8/30/22	**6,920**	**22,200**	NA	1 U	**12.2**	1 U	**9.13**	**3.93**	**15.9**	**14.7**	**8.80**	1 U	**34.5**	NA	NA
MW-7 13.5-15'	8/30/22	**8,820**	**27,400**	NA	1 U	**5.27**	1 U	**8.01**	**7.01**	**23.2**	**2.62**	**9.61**	1 U	**31.6**	NA	NA
MW-8 4-5'	8/30/22	**5,340**	**7,000**	NA	1 U	**10.7**	1 U	**6.95**	**3.09**	**19.0**	**21.5**	**5.77**	1 U	**45.2**	NA	NA
MW-8 12-13'	8/30/22	**8,160**	**9,090**	NA	1 U	**2.99**	1 U	**8.61**	**4.33**	**16.5**	**2.07**	**8.46**	1 U	**22.8**	NA	NA
B-4-7	10/27/16	**9,370 O1 V**	NA	**39.6**	NA	2.34 U	**0.115 J**	**13**	NA	NA	**2.37**	NA	1.17 U	NA	**0.023 J**	2.34 U
B-4-9	10/27/16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-4-15	10/27/16	**12,200**	NA	**55.7**	NA	**2.73**	**0.128 J**	**14.5**	NA	NA	**3.26**	NA	1.37 U	NA	**0.0288**	**1.41 J**
B-5-8	10/27/16	**5,730**	NA	**19.1**	NA	**3.46**	**0.0759 J**	**8.32**	NA	NA	**2.14**	NA	1.05 U	NA	0.0211 U	2.11 U
B-5-10	10/27/16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-5-15	10/27/16	**8,840**	NA	**42.1**	NA	2.77 U	0.692 U	**11.4**	NA	NA	**2.57**	NA	1.38 U	NA	**0.0281**	2.77 U
B-6-7.5	10/27/16	**16,600**	NA	**70.2**	NA	**2.47 J**	**0.153 J**	**18**	NA	NA	**4.35**	NA	1.31 U	NA	**0.141**	2.62 U
B-6-9.5	10/27/16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-6-15	10/27/16	**19,800**	NA	**52.2**	NA	**2.88 J**	**0.234 J**	**20.1**	NA	NA	**6**	NA	1.45 U	NA	**0.0163 J**	**1.11 J**
DA-1 (0.5)	7/25/24	**9,650**	**10,600**	NA	**0.32**	**4.4**	**0.33**	**8.9**	**4.3**	**15**	**34**	**7.4**	0.2 U	**40**	**0.063**	0.2 UJ
DA-2 (0.5)	7/25/24	**11,700**	**14,100**	NA	**0.81**	**13**	**0.85**	**9.4**	**4.2**	**23**	**49**	**8.3**	0.2 U	**78**	**0.10**	0.2 UJ
DA-3 (0.5)	7/25/24	**9,940**	**11,800**	NA	**0.77**	**12**	**0.54**	**8.2**	**3.9**	**18**	**37**	**7.6**	0.2 U	**65**	**0.10**	0.2 UJ
DA-4 (0.5)	7/25/24	**10,400**	**12,100**	NA	**0.40**	**5.1**	**0.52**	**8.4**	**4.0**	**22**	**39**	**6.9**	0.2 U	**59**	**0.064**	0.2 UJ
DA-5 (0.5)	7/25/24	**10,400**	**24,800**	NA	**0.40**	**5.0**	**0.68**	**7.7**	**4.5**	**23**	**21**	**8.4**	0.2 U	**210**	**0.11**	0.2 UJ
AREA2A-1 (0.5)	7/25/24	**6,870**	**9,180**	NA	**2.2**	**6.1**	**0.52**	**6.6**	**3.4**	**16**	**25**	**8.5**	0.2 U	**54**	**0.073**	**0.26**
AREA2A-2 (0.5)	7/25/24	**8,980**	**12,400**	NA	**0.53**	**6.4**	**0.39**	**8.8**	**3.7**	**19**	**28**	**7.7**	0.2 U	**50**	**0.082**	0.2 U
AREA2B-1 (0.5)	7/25/24	**11,400**	**9,540**	NA	**0.26**	**3.2**	0.2 U	**7.1**	**3.5**	**15**	**6.2**	**5.6**	0.2 U	**28**	**0.029**	0.2 UJ
AREA2B-2 (0.5)	7/25/24	**12,400**	**10,400**	NA	**0.42**	**4.5**	0.2 U	**9.2**	**3.6**	**260**	**11**	**6.0**	0.2 U	**120**	**0.18**	0.2 UJ
HP-GS-01 (0.5)	7/25/24	**27,200**	**9,380**	NA	**7.2**	**11**	**0.84**	**25**	**4.0**	**210**	**23**	**14**	0.2 U	**180**	**0.078**	0.2 U
HP-GS-02 (0.5)	7/25/24	**94,000**	**3,870**	NA	**2.8**	**5.7**	**0.26**	**15**	**4.5**	**58**	**10**	**14**	0.2 U	**55**	**0.053**	**0.23**
HP-GS-03 (washed oxides, 0.5)	7/25/24	**20,100**	**15,700**	NA	**13**	**2.5**	**4.1**	**110**	**1.9**	**1,300**	**120**	**42**	**0.57**	**1,000**	**0.20**	0.6 UJ

NOTES:

Bold - analyte detected
All results ae in mg/kg - milligrams per kilogram
U - not detected at listed reporting limit
J - estimated value
O1 - Analyte failed the method required serial dilution test and/or subsequent post-spike criteria. This indicates matrix interference.
ft bgs - feet below ground surface
Reported concentration exceeds the Vadose Zone PCUL (includes saturated zone for compounds with the same SL for vadose and saturated)
Reported concentration exceeds the Saturated PCUL
Only detected compounds are shown.

PCUL - Preliminary Cleanup Level
V - Sample concentration is too high to evaluate accurate spike recoveries.
ND - not detected
NA - not analyzed

Table 4 Non Metal Soil Data Summary - Detected Compounds Summary (Outside of Dross Pile)
Maralco Site - Kent, WA

Sample ID	Sample depth (ft bgs)	Sample Zone	Dated Collected	NWTPH-Gx	TPH-DRO	TPH-ORO	Chloride	Fluoride	Nitrate	Ammonia Nitrogen	Benzene	Toluene	Benzo(A)Anthracene*	Benzo(A)Pyrene*	Benzo(B)Fluoranthene*	Benzo(K)Fluoranthene*	Chrysene*	Dibenz(A,H)Anthracene*	Indeno(1,2,3-Cd)Pyrene*	Total cPAH TEQ	Benzo(G,H,I)Perylene	Anthracene	Acenaphthene	Acenaphthylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	1-Methylnaphthalene	2-Methylnaphthalene
PCUL - Soil Protective of SW Vadose (fresh water, mg/kg)				30	2000	2000	NC	144	128000	NC	0.00015	0.37	0.000057	0.000016	0.000096	0.009	0.002	0.000029	0.00031	0.0042	0.005	2.4	3.06	na	0.001	1.58	0.24	NC	0.001	0.082	0.09
PCUL - Soil Protective of SW Saturated (fresh water, mg/kg)				30	2000	2000	NC	144	128000	NC	0.00015	0.023	0.000057	0.000016	0.000096	0.0009	0.002	0.000029	0.00031	0.0042	NC	2.4	0.156	na	0.001	0.08	0.24	NC	0.001	0.0042	0.09
B-1-5	5	vadose	10/27/16	NA	4.4 U	11 U	NA	NA	NA	NA	NA	NA	0.0066 U	0.0066 U	0.0066 U	0.0066 U	0.0066 U	0.0066 U	0.0066 U	ND	0.0066 U	0.0066 U	0.0066 U	0.0066 U	0.0066 U	0.0066 U	0.022 U	0.0066 U	0.0066 U	0.022 U	0.022 U
B-1-17	17	saturated	10/27/16	0.1 U	5.38 U	13.5 U	NA	NA	NA	NA	**0.000522**	0.005 U	0.00808 U	0.00808 U	0.00808 U	0.00808 U	0.00808 U	0.00808 U	0.00808 U	ND	0.00808 U	0.00808 U	0.00808 U	0.00808 U	0.00808 U	0.00808 U	**0.00473 J**	**0.000954 J**	0.00808 U	0.0269 U	0.0269 U
B-2-4	4	vadose	10/27/16	NA	4.61 U	11.5 U	NA	NA	NA	NA	NA	NA	0.00692 U	0.00692 U	0.00692 U	0.00692 U	0.00692 U	0.00692 U	0.00692 U	ND	0.00692 U	0.00692 U	0.00692 U	0.00692 U	0.00692 U	0.00692 U	0.0231 U	**0.00132 J**	0.00692 U	0.0231 U	0.0231 U
B-2-16.5	16.5	saturated	10/27/16	NA	5.04 U	12.6 U	NA	NA	NA	NA	NA	NA	0.00756 U	0.00756 U	0.00756 U	0.00756 U	0.00756 U	0.00756 U	0.00756 U	ND	0.00756 U	0.00756 U	0.00756 U	0.00756 U	0.00756 U	0.00756 U	0.0252 U	0.00756 U	0.00756 U	0.0252 U	0.0252 U
B-3-6	6	vadose	10/27/16	NA	45.1 U	113 U	NA	NA	NA	NA	NA	NA	**0.000687 J**	**0.000855 J**	**0.00114 J**	0.00676 U	**0.00153 J**	0.00676 U	**0.000801 J**	**0.001**	**0.00184 J**	0.00676 U	0.00676 U	0.00676 U	**0.00111 J**	0.00676 U	0.0225 U	**0.00198 J**	**0.00159 J**	0.0225 U	**0.00249 J**
B-3-16	16	saturated	10/27/16	0.1 U	5.5 U	13.8 U	NA	NA	NA	NA	**0.000205 J**	0.005 U	0.00826 U	0.00826 U	0.00826 U	0.00826 U	0.00826 U	0.00826 U	0.00826 U	ND	0.00826 U	0.00826 U	0.00826 U	0.00826 U	0.00826 U	0.00826 U	0.0275 U	0.00826 U	0.00826 U	0.0275 U	0.0275 U
B-4-7	7	vadose	10/27/16	NA	NA	NA	**44.4**	**5.03**	**2.25**	**15.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-4-9	9	saturated	10/27/16	0.1 U	NA	NA	NA	NA	NA	NA	**0.00132**	**0.000476 B J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-4-15	15	saturated	10/27/16	NA	NA	NA	**309**	**2.75**	1.37 U	**5.92 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-5-8	8	saturated	10/27/16	NA	NA	NA	**41.4**	**31.8**	**0.954 J**	5.27U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-5-10	10	saturated	10/27/16	0.1 U	NA	NA	NA	NA	NA	NA	**0.000604**	**0.000557 BJ**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-5-15	15	saturated	10/27/16	NA	NA	NA	**4,280**	**0.544 J P1**	1.38 U	**33.1**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-6-7.5	7.5	saturated	10/27/16	NA	NA	NA	**212**	**7.72**	1.31 U	**27.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-6-9.5	9.5	saturated	10/27/16	0.1 U	NA	NA	NA	NA	NA	NA	**0.00014 J**	0.005 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-6-15	15	saturated	10/27/16	NA	NA	NA	**183**	**35.9**	1.45 U	**9.72 J6**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-1 5-6’	5-6'	vadose	5/24/21	5 U	50 U	250 U	NA	NA	NA	NA	0.02 U	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-2 6-7.5’	6-7.5'	saturated	5/24/21	5 U	**1,100**	250 U	NA	NA	NA	NA	0.02 U	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-14	5-7.5'	vadose	8/29/22	NA	NA	NA	10 U	5 U	NA	**162**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-14	10-11.5'	saturated	8/29/22	NA	NA	NA	10 U	5 U	NA	**82.0**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-15	5-6.5'	vadose	8/29/22	NA	NA	NA	10 U	5 U	NA	**135**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-15	8.5-10'	saturated	8/29/22	NA	NA	NA	**19**	5 U	NA	**123**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-16	6.5-8'	saturated	8/30/22	NA	NA	NA	**12**	5 U	NA	**156**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-16	10-11.5'	saturated	8/30/22	NA	NA	NA	10 U	5 U	NA	**74.6**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-18	5-7.2'	saturated	8/30/22	NA	NA	NA	10 U	5U	NA	**165**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-18	14-15'	saturated	8/31/22	NA	NA	NA	10 U	5 U	NA	**94.5**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-19	6-8'	saturated	8/31/22	NA	NA	NA	**12**	5 U	NA	**156**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-19	12.5-15'	saturated	8/31/22	NA	NA	NA	10 U	5 U	NA	**136**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-20	6.5-7.5'	saturated	8/31/22	NA	NA	NA	**12**	5 U	NA	**301**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-20	13.5-15'	saturated	8/31/22	NA	NA	NA	10 U	5 U	NA	**399**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-21	6-10'	saturated	8/31/22	NA	NA	NA	**13**	5 U	NA	**161**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-21/ DUP01-220831	11.5-14'	saturated	8/31/22	NA	NA	NA	10 U 10 U	5 U 5 U	NA	**94.1** **156**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-22	3.5-5'	vadose	8/31/22	NA	NA	NA	**12**	5 U	NA	**129**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-22	5-7'	saturated	8/31/22	NA	NA	NA	**12**	5 U	NA	**155**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-22	11-13.2'	saturated	8/31/22	NA	NA	NA	**10**	5 U	NA	**193**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5R	5.5-7'	vadose	8/30/22	NA	NA	NA	10 U	41	NA	**286**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5R	11-12'	saturated	8/30/22	NA	NA	NA	**22**	5 U	NA	**285**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-7	5-7'	vadose	8/30/22	NA	NA	NA	10 U	5 U	NA	**103**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-7	13.5-15'	saturated	8/30/22	NA	NA	NA	**950**	5 U	NA	**99.0**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-8	4-5'	saturated	8/30/22	NA	NA	NA	**80**	5 U	NA	**189**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-8	12-13'	saturated	8/30/22	NA	NA	NA	**1,600**	5 U	NA	**197**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DA-1	0 - 0.5	vadose	7/25/24	50 U	50 U	250 U	NA	NA	NA	NA	0.02 U	0.02 U	0.005 U	**0.0067**	**0.011**	0.005 U	**0.0095**	0.005 U	**0.0063**	**0.008525**	**0.0068**	0.005 U	0.005 U	0.005 U	**0.014**	0.005 U	0.005 U	**0.0091**	**0.011**	0.005 U	0.005 U
DA-2	0 - 0.5	vadose	7/25/24	50 U	50 U	250 U	NA	NA	NA	NA	0.02 U	0.02 U	**0.0057**	**0.0089**	**0.015**	0.005 U	**0.014**	0.005 U	**0.0097**	**0.01151**	**0.011**	0.005 U	0.005 U	0.005 U	**0.018**	0.005 U	0.005 U	**0.01**	**0.015**	0.005 U	**0.0063**
DA-3	0 - 0.5	vadose	7/25/24	50 U	50 U	250 U	NA	NA	NA	NA	0.02 U	0.02 U	**0.0057**	**0.0076**	**0.016**	0.005 U	**0.016**	0.005 U	**0.01**	**0.01036**	**0.011**	0.005 U	0.005 U	0.005 U	**0.018**	0.005 U	**0.011**	**0.011**	**0.015**	**0.0075**	**0.011**
DA-4	0 - 0.5	vadose	7/25/24	50 U	50 U	250 U	NA	NA	NA	NA	0.02 U	0.02 U	0.005 U	**0.0056**	**0.01**	0.005 U	**0.012**	0.005 U	0.005 U	**0.00672**	**0.0077**	0.005 U	0.005 U	0.005 U	**0.016**	0.005 U	0.0071	**0.0094**	**0.012**	0.005 U	**0.006**
DA-5	0 - 0.5	vadose	7/25/24	50 U	50 U	250 U	NA	NA	NA	NA	0.02 U	0.02 U	**0.0059**	**0.01**	**0.015**	0.005 U	**0.016**	0.005 U	**0.011**	**0.01276**	**0.011**	0.005 U	0.005 U	0.005 U	**0.021**	0.005 U	0.005 U	**0.011**	**0.019**	0.005 U	0.005 U

Notes:
All units in mg/kg - milligrams per kilogram
cPAH - carcinogenic polycyclic aromatic hydrocarbons
Total cPAH is the sum of detected values based on the toxic equivalency factor (TEQ) per WAC 173- 340-708(8)(e)
P1: Relative % Difference value not applicable for sample concentrations less than 5 times the reporting limit
BOLD - constituent detected
ft bgs - feet below ground surface
NA - not analyzed
ND - cPAH compounds were not detected. Total cPAH reported as not detected.
NC - no PCUL screening level

U - Constituent not detected at associated reporting level.
J - The identification of the analyte is acceptable; the reported value is an estimate.
B - Analyte found in the associated blank.
J6 - Sample matrix interfered with the ability to make any accurate determination; spiked value is low.
ft bgs - feet below ground surface
Only detected compounds are shown.
PCUL - Preliminary Cleanup Level
TPH-DRO - diesel-range organics
TPH-OPO - oil-range organics

Reported concentration exceeds the Vadose Zone PCUL (includes saturated zone for compounds with the same SL for vadose and saturated)
Reported concentration exceeds the Saturated PCUL
Data collected in the vicinity of the USTs is included on Table 5

Table 5 - Soil and Groundwater Data Summary UST Area
Maralco Site - Kent, WA

Sample ID	Sample depth (ft bgs)	Sample Type	Dated Collected	TPH-DRO - Soil (mg/kg)	TPH-DRO - Groundwater (ug/L)	TPH-DRO w/SCG - Groundwater (ug/L)
			PCUL Screening Level	260/2000	500	500
SB-UST-01 5-6'	5-6'	Soil	8/29/2022	50 U	NA	NA
SB-UST-02 5-6'	5-6'	Soil	8/29/2022	50 U	NA	NA
SB-UST-02 15-16'	15-16'	Soil	8/29/2022	50 U	NA	NA
SB-UST-03 1-2'	1-2'	Soil	8/29/2022	50 U	NA	NA
UST PE-1	8-10 ft bgs	Soil	6/29/1995	**6,300**	NA	NA
UST PE-2	8-10 ft bgs	Soil	6/29/1995	**96**	NA	NA
UST PE-3	8-10 ft bgs	Soil	6/29/1995	25 U	NA	NA
UST PE-4	8-10 ft bgs	Soil	6/29/1995	25 U	NA	NA
UST PE-5	~17 ft bgs	Soil	6/29/1995	25 U	NA	NA
SP-1	stockpile	Soil	6/29/1995	**1,800**	NA	NA
SP-2	stockpile	Soil	6/29/1995	**2,100**	NA	NA
SP-3	stockpile	Soil	6/29/1995	**1,200**	NA	NA
SB-1	5 ft bgs	Soil	1/22/2003	**1,100**	NA	NA
SB-1	15 ft bgs	Soil	1/22/2003	**1,800**	NA	NA
SB-2	5 ft bgs	Soil	1/22/2003	25 U	NA	NA
SB-UST-01	8-12 ft bgs	Water	8/29/22	NA	**91x**	50 U
SB-UST-02	8-12 ft bgs	Water	8/29/22	NA	**880x**	50 U
SB-UST-03	8-12 ft bgs	Water	8/29/22	NA	**290x**	50 U
SB-1 WATER	See Note 1	Water	1/22/2003	NA	**450,000**	NA

NOTES:

Bold - analyte detected

Reported concentration exceeds the screening level

mg/kg - milligrams per kilogram

ug/L - micrograms per liter

ft bgs - feet below ground surface

PCUL - Preliminary Cleanup Level

NA - not analyzed, not applicable

U - not detected above reporting limit

UST - underground storage tank

SGC - with silica gel cleanup

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

TPH-DRO - total petroleum hydrocarbons diesel-range organics

Note 1 - SB-1 Water groundwater sample was collected through the hollow stem auger with a bailer. Interval is not known since it was not collected through a typical temporary well grab sample methods (EMR 2003a).

Table 6 - Phase 1 IAWP Performance Soil Sample Analytical Data Summary
Maralco Site- Kent, WA

Sample ID	Sample Area	Grid Cell	Sample Date	Aluminum	Antimony	Arsenic	Barium	Cadmium	Total Chromium	Cobalt	Copper	Iron	Lead	Mercury	Manganese	Nickel	Selenium	Silver	Zinc
MTCA Method B Direct Contact or Method A Remediation Level (mg/kg)				**80,000**	**32**	**7.3**	**16,000**	**80**	**48.2**	**24**	**3,200**	**56,000**	**250**	**2**	**1,150**	**1,600**	**400**	**400**	**24,000**
PCUL - Soil Protective of SW Vadose (fresh water, mg/kg)				**33,000**	**5.2**	**7.3**	**250**	**0.77**	**48**	**11**	**36**	**36,000**	**24**	**0.07**	**1,100**	**48**	**0.78**	**0.61**	**85**
PCUL - Soil Protective of SW Saturated (fresh water, mg/kg)				**33,000**	**5.2**	**7.3**	**250**	**0.77**	**72**	**11**	**36**	**36,000**	**24**	**0.07**	**1,100**	**48**	**0.78**	**0.61**	**85**
CS-01	0.5-1 ft bd	CS-01	10/17/23	**27,100**	**1.78**	**3.37**	**52.3**	1 U	**27.2**	**4.97**	**127**	**15,900**	**17.3**	0.7 U	**290**	**20.8**	0.268 U	1 U	**104**
CS-02	0.5-1 ft bd	CS-02	10/17/23	**38,000**	**3.14**	**2.44**	**79.4**	**1.16**	**47.2**	**5.69**	**244**	**12,800**	**20.9**	0.7 U	**450**	**25.3**	0.268 U	1 U	**151**
CS-03	0.5-1 ft bd	CS-03	10/17/23	**19,700**	**1.52**	**4.28**	**78.4**	1 U	**22.2**	**5.85**	**107**	**17,900**	**6.96**	0.7 U	**250**	**16.6**	0.268 U	1 U	**82.9**
CS-04	0.5-1 ft bd	CS-04	10/17/23	**13,600**	1 U	**1.61**	**45.4**	1 U	**17.9**	**5.61**	**21.9**	**14,800**	**3.67**	0.7 U	**140**	**17.6**	0.268 U	1 U	**35.0**
CS-05	0.5-1 ft bd	CS-05	10/17/23	**13,100**	1 U	**2.21**	**47.8**	1 U	**17.8**	**5.99**	**13.0**	**16,600**	**2.50**	0.7 U	**240**	**17.7**	0.268 U	1 U	**25.8**
CS-06	0.5-1 ft bd	CS-06	11/14/23	**13,900**	1 U	**2.05**	**37.4**	1 U	**19.5**	**5.62**	**16.8 J**	**16,000**	**2.12**	0.7 U	**190**	**22.3**	0.268 U	1 U	**29.8**
CS-07	0.5-1 ft bd	CS-07	10/17/23	**12,100**	1 U	**1.32**	**39.6**	1 U	**19.5**	**5.62**	**12.1**	**13,200**	**1.58**	0.7 U	**210**	**20.6**	0.268 U	1 U	**28.9**
CS-08	0.5-1 ft bd	CS-08	10/17/23	**14,900**	1 U	**2.73**	**55.9**	1 U	**21.5**	**5.90**	**42.6**	**16,300**	**4.93**	0.7 U	**250**	**20.7**	0.268 U	1 U	**51.0**
CS-09	0.5-1 ft bd	CS-09	10/17/23	**10,500**	1 U	**2.50**	**37.2**	1 U	**15.8**	**3.97**	**31.7**	**11,900**	**5.53**	0.7 U	**160**	**13.0**	0.268 U	1 U	**41.5**
CS-10	0.5-1 ft bd	CS-10	11/10/23	**17,500**	1 U	**2.08**	**40.4**	1 U	**20.7**	**6.44**	**13.7**	**21,000**	**2.73**	0.7 U	**210**	**23.8**	0.268 U	1 U	**27.0**
CS-11	0.5-1 ft bd	CS-11	11/14/23	**14,300**	1 U	**1.24**	**25.4**	1 U	**16.8**	5 U	**7.92 J**	**16,300**	**1.75**	0.7 U	**180 ca**	**20.3**	0.268 U	1 U	25 U
CS-12	0.5-1 ft bd	CS-12	10/17/23	**11,400**	1 U	**1.54**	**44.3**	1 U	**19.4**	**5.37**	**11.8**	**14,400**	**2.18**	0.7 U	**210**	**19.6**	0.268 U	1 U	**23.9**
CS-13	0.5-1 ft bd	CS-13	10/17/23	**28,900**	1 U	**1.44**	**36.2**	1 U	**21.6**	**5.58**	**61.6**	**13,900**	**8.79**	0.7 U	**270**	**20.4**	0.268 U	1 U	**57.5**
CS-14C	0.5-1 ft bd	CS-14	11/1/23	**11,400**	**2.75**	**8.59**	**30.1**	1 U	**12.2**	**4.23**	**35.9**	**15,000**	**21.8**	0.7 U	**140**	**8.98**	0.268 U	1 U	**39.7**
CS-15	0.5-1 ft bd	CS-15	11/10/23	**11,500**	1 U	**1.81**	**16.5**	1 U	**7.30**	**3.42**	**12.2**	**11,800**	**1.61**	0.7 U	**71**	**6.12**	0.268 U	1 U	**17.7**
DUP-231110 (CS-15)	0.5-1 ft bd	QA/QC	11/10/23	**9,160**	1 U	**1.86**	**17.2**	1 U	**7.29**	**3.34**	**14.9**	**10,000**	**1.66**	0.7 U	**66 ca**	**5.67**	0.268 U	1 U	**17.1**
CS-16	0.5-1 ft bd	CS-16	10/17/23	**14,100**	1 U	**2.00**	**47.5**	1 U	**17.7**	**5.72**	**35.7**	**16,700**	**3.80**	0.7 U	**210**	**18.7**	0.268 U	1 U	**29.1**
CS-17	0.5-1 ft bd	CS-17	10/17/23	**28,900**	1 U	**2.56**	**56.5**	1 U	**19.6**	**4.78**	**59.4**	**15,000**	**8.97**	0.7 U	**240**	**14.8**	0.268 U	1 U	**76.4**
CS-18	0.5-1 ft bd	CS-18	10/17/23	**42,400**	**1.67**	**2.79**	**48.4**	1 U	**26.4**	**5.04**	**165**	**15,300**	**17.9**	0.7 U	**260**	**28.0**	0.268 U	1 U	**128**
CS-19C	0.5-1 ft bd	CS-19	11/1/23	**10,200**	1 U	**7.60**	**44.2**	1 U	**11.0**	**4.21**	**22.0**	**13,700**	**6.98**	0.7 U	**140**	**11.1**	0.268 U	1 U	**31.9**
CS-20	2-3 ft bd	CS-20	11/1/23	**7,050**	1 U	**1.11**	**12.9**	1 U	**6.46**	**2.59**	**8.97**	**9,220**	**1.08**	0.7 U	**54**	**5.43**	0.268 U	1 U	**13.2**
CS-21	0.5-1 ft bd	CS-21	11/10/23	**14,400**	1 U	**3.09**	**19.1**	1 U	**9.45**	**3.99**	**15.1**	**14,400**	**2.19**	0.7 U	**95**	**7.97**	0.268 U	1 U	**21.5**
CS-22	0.5-1 ft bd	CS-22	10/30/23	**8,550**	1 U	**1.04**	**5.7**	1 U	**6.34**	**2.44**	**47.0**	**10,400**	**1.42**	0.7 U	**59**	**4.88**	0.268 U k	1 U	**16.3**
DUP-231030-2 (CS-22)	0.5-1 ft bd	QA/QC	10/30/23	**7,490**	1 U	**1.21**	**7.16**	1 U	**7.44**	**3.09**	**57.6**	**7,810**	**1.87**	0.7 U	**76**	**5.97**	0.268 U k	1 U	**19.5**
CS-23	0.5-1 ft bd	CS-23	10/17/23	**17,200**	**1.30**	**11.9**	**27.7**	1 U	**11.5**	**3.84**	**40.9**	**30,100**	**14.6**	0.7 U	**240**	**7.69**	0.268 U	1 U	**39.3**
CS-24	0.5-1 ft bd	CS-24	10/23/23	**8,660**	1 U	**2.42**	**7.42**	1 U	**6.64**	**2.86**	**10.5**	**9,470**	**2.06**	0.7 U	**59**	**5.68**	0.268 U	1 U	**15.6**
CS-25	0.5-1 ft bd	CS-25	10/23/23	**10,200**	1 U	**3.54**	**18**	1 U	**8.12**	**3.65**	**14.6**	**11,400**	**2.71**	0.7 U	**79**	**7.07**	0.268 U	1 U	**17.2**
CS-26	0.5-1 ft bd	CS-26	10/23/23	**12,500**	1 U	1 U	**11.6**	1 U	**8.51**	**3.00**	**43.0**	**12,100**	**1.75**	0.7 U	**70**	**6.22**	0.268 U	1 U	**18.9**
DUP-231023 (CS-26)	0.5-1 ft bd	QA/QC	10/23/23	**11,100**	1 U	**1.03**	**11.6**	1 U	**8.02**	**2.89**	**37.3**	**11,200**	**1.73**	0.7 U	**67**	**6.08**	0.268 U	1 U	**17.9**
CS-27	0.5-1 ft bd	CS-27	10/30/23	**7,650**	1 U	**1.78**	**12**	1 U	**7.32**	**2.54**	**11.5**	**11,300**	**1.49**	0.7 U	**70**	**5.67**	0.268 U k	1 U	**30.1**
CS-28	0.5-1 ft bd	CS-28	11/1/23	**8,070**	1 U	**1.47**	**22.4**	1 U	**6.68**	**2.78**	**7.67 J**	**9,750**	**1.22**	0.7 U	**61**	**5.97**	0.268 U	1 U	**15.8**
CS-29 (CS-229)	0.5-1 ft bd	CS-29	10/31/23	**11,900**	1 U	**1.35**	**10.7**	1 U	**6.99**	**3.05**	**14**	**12,000**	**2.52**	0.7 U	**69**	**6.18**	0.268 U	1 U	**17.8**
~~CS-30~~	~~excavated~~	CS-30	~~10/17/23~~	~~**88,400**~~	~~**8.91**~~	~~**4.52**~~	~~**124**~~	~~**2.19**~~	~~**126**~~	~~**10.8**~~	~~**997**~~	~~**17,400**~~	~~**104**~~	~~0.7 U~~	~~**850**~~	~~**35.7**~~	~~0.268 U~~	~~1 U~~	~~**763**~~
CS-30B	0.5-1 ft bd	CS-30	10/31/23	**8,220**	1 U	**1.23**	**18**	1 U	**7.42**	**2.37**	**8.37**	**10,100**	**14.2**	0.7 U	**68**	**5.04**	0.268 U	1 U	**23.2**
CS-30C	1 ft bd	CS-30	11/1/23	**13,400**	1 U	**17.7**	**287**	1 U	**10.6**	**2.57**	**19.5**	**48,800**	**3.74**	0.7 U	**110**	**5.61**	0.268 U	1 U	**33.9**
~~CS-31~~	~~excavated~~	CS-31	~~10/17/23~~	~~**103,000**~~	~~**12.1**~~	~~**7.72**~~	~~**99.7**~~	~~**2.45**~~	~~**77.3**~~	~~**4.34**~~	~~**546**~~	~~**38,200**~~	~~**64.1**~~	~~0.7 U~~	~~**390**~~	~~**24.8**~~	~~0.268 U~~	~~1 U~~	~~**364**~~
~~CS-31B~~	~~excavated~~		~~10/31/23~~	~~**59,700**~~	~~**6.2**~~	~~**17.3**~~	~~**69.4**~~	~~**1.06**~~	~~**50.6**~~	~~**4.80**~~	~~**715**~~	~~**18,400**~~	~~**105**~~	~~0.7 U~~	~~**420**~~	~~**27.6**~~	~~0.268 U~~	~~1 U~~	~~**535**~~
CS-31C	1 ft bd		11/1/23	**11,600**	1 U	**15.5**	**135**	1 U	**8.93**	**3.24**	**72.9**	**29,000**	**12.4**	0.7 U	**130**	**7.23**	0.268 U	1 U	**62.1**
DUP-231101 (CS-31C)	1 ft bd		11/1/23	**10,500**	1 U	**14.4**	**84**	**1.46**	**10.0**	**3.58**	**40.5**	**56,300**	**12.1**	0.7 U	**100**	**8.03**	0.268 U	1 U	**93.7**
CS-32	0.5-1 ft bd	CS-32	10/17/23	**13,200**	**1.20**	**5.02**	**27.5**	1 U	**9.83**	**4.34**	**19.6**	**14,400**	**3.77**	0.7 U	**96**	**9.11**	0.268 U	1 U	**27.7**
CS-33	0.5-1 ft bd	CS-33	10/23/23	**11,800**	1 U	**9.09**	**34.8**	1 U	**9.48**	**4.8**	**18.3**	**11,300**	**13.9**	0.7 U	**110**	**7.83**	**0.336**	1 U	**33.1**
CS-34	0.5-1 ft bd	CS-34	10/30/23	**6,900**	1 U	**1.08**	**5.39**	1 U	**9.19**	**2.46**	**12.5**	**7,590**	**1.62**	0.7 U	**56**	**4.30**	0.268 U k	1 U	**13.8**
CS-35	0.5-1 ft bd	CS-35	10/30/23	**7,000**	1 U	**1.75**	**12.2**	1 U	**7.97**	**2.62**	**6.73 J**	**9,790**	**1 U**	0.7 U	**65**	**5.61**	0.268 U k	1 U	**17.0**
CS-36	0.5-1 ft bd	CS-36	10/30/23	**11,100**	1 U	**2.88**	**19.9**	1 U	**7.92**	**2.79**	**7.20**	**12,900**	**1.12**	0.7 U	**74**	**5.81**	0.268 U k	1 U	**16.0**
CS-37	0.5-1 ft bd	CS-37	10/30/23	**16,600**	1 U	**6.89**	**26.1**	1 U	**12.1**	**6.02**	**19.3**	**18,000**	**12.8**	0.7 U	**143**	**13.9**	0.268 U k	1 U	**34.5**
CS-38	0.5-1 ft bd	CS-38	10/17/23	**20,100**	**1.04**	**3.9**	**27.9**	1 U	**20.1**	**6.85**	**101**	**16,200**	**21.5**	0.7 U	**180**	**19.4**	0.268 U	1 U	**97.7**
CS-39	0.5-1 ft bd	CS-39	10/17/23	**11,900**	1 U	**7.68**	**52.7**	1 U	**9.89**	**5.32**	**20.0**	**12,800**	**16.4**	0.7 U	**300**	**9.03**	0.268 U	1 U	**44.3**
CS-40	0.5-1 ft bd	CS-40	10/23/23	**7,980**	1 U	**2.56**	**16.5**	1 U	**6.36**	**2.75**	**7.99**	**10,800**	**1.97**	0.7 U	**79**	**5.72**	**0.367**	1 U	**19.1**
CS-41	0.5-1 ft bd	CS-41	10/30/23	**7,380**	**1.3**	**1.18**	**5.7**	1 U	**6.63**	**4.39**	**21.2**	**10,100**	**3.86**	0.7 U	**67**	**6.86**	0.268 U k	1 U	**19.4**
CS-42	0.5-1 ft bd	CS-42	10/30/23	**11,100**	1 U	**2.82**	**15.1**	1 U	**8.49**	**3.49**	**14.5**	**11,200**	**2.50**	0.7 U	**85**	**7.16**	0.268 U k	1U	**23.1**
CS-43	0.5-1 ft bd	CS-43	10/30/23	**7,490**	1 U	**1.77**	**8.32**	1 U	**7.90**	**2.66**	**45.0**	**7,810**	**4.09**	0.7 U	**89**	**5.33**	0.268 U k	1 U	**28.3**
DUP-231030-1 (CS-43)	0.5-1 ft bd	QA/QC	10/30/23	**8,040**	1 U	**1.73**	**8.12**	1 U	**6.57**	**2.38**	**23.8**	**8,380**	**3.67**	0.7 U	**72**	**4.61**	0.268 U k	1 U	**22.7**
CS-44	0.5-1 ft bd	CS-44	10/17/23	**7,090**	1 U	**4.16**	**18.4**	1 U	**6.08**	**2.32**	**14.8**	**9,400**	**8.27**	0.7 U	**72**	**4.86**	0.268 U	1 U	**32.7**
CS-45	0.5-1 ft bd	CS-45	11/27/23	**17,400**	1 U	**3.87**	**50.2**	1 U	**19.6**	**10.4**	**78.6**	**25,500**	**6.24**	0.7 U	**310**	**25.3**	0.268 U	1 U	**104**
CS-46	0.5-1 ft bd	CS-46	11/27/23	**16,800**	1 U	**3.39**	**63.7**	1 U	**14.8**	**7.37**	**27.1**	**19,600**	**3.47**	0.7 U	**310**	**18.3**	0.268 U	1 U	**31.7**
CS-47	0.5-1 ft bd	CS-47	11/27/23	**16,500**	1 U	**1.16**	**32**	1 U	**22.9**	**16.7**	**117**	**42,700**	**6.92**	0.7 U	**330**	**34.5**	0.268 U	1 U	**81.7**
CS-48	0.5-1 ft bd	CS-48	11/27/23	**14,500**	1 U	**2.77**	**67.4**	1 U	**14.3**	**5.03**	**35.0**	**17,400**	**5.38**	0.7 U	**160**	**17.4**	0.268 U	1 U	**34.7**
DUP-231127 (CS-48)	0.5-1 ft bd	QA/QC	11/27/23	**17,000**	1 U	**2.70**	**53.7**	1 U	**14.6**	**5.03**	**48.7**	**20,800**	**6.70**	0.7 U	**160**	**18.3**	0.268 U	1 U	**41.1**
CS-49	0.5-1 ft bd	CS-49	11/17/23	**11,200**	1 U	**3.12**	**55**	1 U	**13.4**	**5.95**	**19.7**	**15,800**	**2.32**	0.7 U	**240**	**13.6**	0.268 U	1 U	**30.2**
DUP-231117 (CS-49)	0.5-1 ft bd	QA/QC	11/17/23	**12,700**	1 U	**3.56**	**67.8**	1 U	**14.5**	**6.60**	**20.2**	**17,000**	**2.63**	0.7 U	**260**	**14.8**	0.268 U	1 U	**32.3**
CS-50	0.5-1 ft bd	CS-50	11/17/23	**9,280**	1 U	**2.85**	**37.7**	1 U	**14.1**	**9.61**	**65.3**	**21,200**	**11.6**	0.7 U	**340**	**20.0**	0.268 U	1 U	**144**
CS-51	0.5-1 ft bd	CS-51	11/17/23	**11,200**	1 U	**2.19**	**52**	1 U	**22.2**	**5.67**	**21.8**	**13,600**	**2.76**	0.7 U	**180**	**26.9**	0.268 U	1 U	**29.1**
CS-52	0.5-1 ft bd	CS-52	11/17/23	**9,110**	**1.25**	**2.77**	**50**	1 U	**19.6**	**6.12**	**36.4**	**10,600**	**5.67**	0.7 U	**240**	**23.5**	0.268 U	1 U	**38.6**
Samples Collected Outside of the Removal Area Footprint																			
CS-14	undisturbed soil - on-property ditch	CS-14	10/17/23	**22,100**	**3.11**	**42.4**	**96.3**	1 U	**18.9**	**5.08**	**126**	**75,800**	**31.3**	0.7 U	**610**	**13.1**	0.268 U	1 U	**174**
CS-19	undisturbed soil - on-property ditch	CS-19	10/17/23	**148,000**	**24.6**	**4.47**	**147**	**7.51**	**191**	**6.64**	**2,040**	**12,300**	**184**	0.7 U	**950**	**87.5**	0.268 U	**1.48**	**1,540**

NOTES:
All units in milligrams per kilogram (mg/kg).
Bold - analyte detected
U - analyte not detected above the laboratory reporting limit
k - The calibration results for the analyte were outside of acceptance criteria, biased high, and the analyte was not detected in the sample.
~~Strikethrough~~ - sample location has been excavated
Reported concentration exceeds the Vadose Zone PCUL (includes saturated zone for compounds with the same SL for vadose and saturated)
Reported concentration exceeds the Saturated PCUL
Reported concentration exceeds 2-times the MTCA Direct Contact value for Arsenic
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.
ft bd - feet below the dross pile (estimated)
Data from samples DPT-5, DPT-6, DPT-8, DPT-9, DPT-11, DPT-12, DPT-13 was used to inform the IAPW Phase 1 removal footprint and is superseded by the data presented above.
Excavated samples are shown as strikethrough text, these samples were replaced with samples collected after additional soil excavation was completed within this grid cell.
PCUL - Preliminary Cleanup Level

Table 7 2021 Soil Under the Dross Pile Summary
Maralco Property - Kent, WA

Analyte	Method B Direct Contact/Method A mg/kg	PCUL - Soil Protective of SW Vadose (fresh water) mg/kg	PCUL - Soil Protective of SW Sat (fresh water) mg/kg	~~DPT-5 0.3-0.9'~~	~~DPT-6 1.5-2'~~	DPT-6 2.6-3.1'	~~DPT-8 8.2-8.4'~~	~~DPT-8 9.4-10'~~	~~DPT-9 13.2-13.8'~~	DPT-9 14.5-15'	~~DPT-11 2.1-3.1'~~	DPT-11 4.5-5'	~~DPT-12 8.6-9.2'~~	~~DPT-13 7.2-8.2'~~	DPT-13 9.3-10'
Depth Below Dross Pile (ft):				~~mix of soil and dross~~	~~0.5~~	1.6	~~0.5~~	~~mix of soil and dross~~	~~mix of soil and dross~~	1.8	~~0.5~~	2.9	~~0.5~~	~~0.5~~	2.6
				~~5/24/21~~	~~5/24/21~~	5/24/21	~~5/24/21~~	~~5/24/21~~	~~5/24/21~~	5/24/21	~~5/24/21~~	5/24/21	~~5/24/21~~	~~5/24/21~~	5/24/21
Aluminum	80,000	33,000	33,000	**~~7,460~~**	**~~14,500~~**	**10,800**	**~~17,400~~**	**~~37,500~~**	**~~48,100~~**	**15,400**	**~~17,100~~**	**15,400**	**~~16,500~~**	**~~14,700~~**	**11,800**
Iron	56,000	36,000	36,000	**~~9,000~~**	**~~12,400~~**	**11,200**	**~~15,300~~**	**~~37,300~~**	**~~19,600~~**	**21,700**	**~~18,600~~**	**16,500**	**~~18,200~~**	**~~16,400~~**	**9,420**
Antimony	32	5.2	5.2	~~2 U~~	~~2 U~~	2 U	~~2 U~~	~~2 U~~	**~~4.83~~**	2 U	~~2 U~~	2 U	~~2 U~~	~~2 U~~	2 U
Arsenic	7.3	7.3	7.3	~~5 U~~	**~~10.9~~**	**2.91**	**~~11.3~~**	**~~1.74~~**	~~10 U~~	**7.51**	~~5 U~~	**2.1**	~~5 U~~	~~5 U~~	**3.15**
Cadmium	80	0.77	0.77	~~1 U~~	~~1 U~~	1 U	~~1 U~~	~~1 U~~	**~~2.37~~**	1 U	~~1 U~~	1 U	~~1 U~~	~~1 U~~	1 U
Chromium	48	48	72	**~~12~~**	**~~10.6~~**	**8.31**	**~~17~~**	**~~7.32~~**	**~~4,530~~**	**13.8**	**~~25.7~~**	**19.4**	**~~18.4~~**	**~~19.8~~**	**9.81**
Cobalt	24	11	11	~~5 U~~	~~5 U~~	**3.35**	**~~6.65~~**	**~~2.66~~**	~~10 U~~	**4.97**	**~~6.3~~**	**6.59**	**~~6.21~~**	**~~6.1~~**	**4.59**
Copper	3,200	36	36	~~25 U~~	**~~43.6~~**	**33.3**	**~~56.5~~**	**~~7.75~~**	**~~1,530~~**	**19.4**	**~~58.1~~**	25 U	**~~26.7~~**	**~~29.3~~**	**12.2**
Lead	250	24	24	**~~2.19~~**	**~~14.5~~**	**3.69**	**~~8.28~~**	**~~2.95~~**	**~~108~~**	**3.43**	**~~5.17~~**	**2.78**	**~~5.72~~**	**~~2.77~~**	**10.1**
Manganese	1,150	1,100	1,100	**~~80.9~~**	**~~140~~**	**92.7**	**~~194~~**	**~~81~~**	**~~1,860~~**	**135**	**~~242~~**	**230**	**~~229~~**	**~~253~~**	**85**
Nickel	1,600	48	48	**~~6.38~~**	**~~8.46~~**	**6.25**	**~~14~~**	**~~5.31~~**	**~~32.6~~**	**9.51**	**~~27.4~~**	**22.5**	**~~21.8~~**	**~~20.6~~**	**7.71**
Zinc	24,000	85	85	~~25 U~~	**~~353~~**	**47**	**~~56~~**	**~~13.6~~**	**~~364~~**	**26.6**	**~~60.7~~**	**32**	**~~50.8~~**	**~~35~~**	**29.9**
IAWP Phase 1 Removal Action Confirmation Sample Location (See Table 6)				CS-43	CS-35	NA	CS-41	CS-41	CS-37	CS-37	CS-10	CS-10	CS-7	CS-4/CS-8	

Notes:
All units in mg/kg.
mg/kg - milligrams per kilogram
Bold - analyte detected
U - not detected above the laboratory reporting limit
Reported concentration exceeds MTCA Soil Protective of Surface water, saturated screening level
~~Strikethrough~~ - sample location has been excavated during the IAWP Phase 1 Removal Action

NC - no criteria
ND - not detected
NA - not analyzed

Table 8 - On-Property Ditch and Stormwater Pond Data Summary
Maralco Site - Kent, WA

	PCUL - Soil Protective of SW Vadose (fresh water, mg/kg)	PCUL - Soil Protective of SW Saturated (fresh water, mg/kg)	Unnamed Ditch											Christopher Ditch				Stormwater Pond		
			B2	HB-8	HB-8	HB-9	HB-9	SW-1	SW-6	SW-8[1]	SS-1	SS-2	SS-900 (SS-2 Dup)	B3	SW-2	SW-3	SW-4	SW-7 (Removed)	HB-7 (Removed)	SED-01
Sample depth (ft bgs)			---	0-1	2.5-3	0-1	3-4	---	---	---	---	---	---	---	---	---	---	---	0.5-1.3	---
Dated Collected			6/25/87	9/11/90	9/11/90	9/11/90	9/11/90	5/10/90	5/10/90	5/9/90	10/28/16	10/28/16	10/28/16	6/25/87	5/9/90	5/10/90	5/10/90	5/10/90	9/11/90	6/3/21
Metals																				
Aluminum	33,000	33,000	NA	**188,000**	**9,770**	**17,700**	**15,200**	**39,400**	**77,900**		**55,500**	**22,200**	**81,100**	NA	**9,970**	**25,600**	**17,200**	**132,000**	**99,000**	**46,900**
Iron	36,000	36,000	NA	NA	NA	NA	NA	**10,600**	**17,700**		NA	NA	NA	NA	**18,700**	**19,500**	**43,300**	**21,000**	NA	**12,200**
Antimony	5.2	5.2	**3.2**	NA	NA	NA	NA	**4.1**	**1.5**		NA	NA	NA	0.6 U	**0.2**	**0.83**	**4.09**	**7.4**	NA	**8.79**
Arsenic	7.3	7.3	**5.8**	NA	NA	NA	NA	**3.1**	**4.4**		**6.78**	**4.3 J**	**9.47**	**4.4**	**2.2**	**3.9**	**53.4**	**4.4**	NA	**4.32**
Cadmium	0.77	0.77	**4.5**	NA	NA	NA	NA	**1.4**	**1**		**0.619 J**	**2.74**	**5.56**	1.0 U	**1**	**0.9**	**6.9**	**6**	NA	**5.37**
Chromium	48	72	**232**	**154J**	**15J**	**28J**	**18.4J**	**54.7**	**87.5**		**36.3**	**54.4**	**112**	**14**	**15.7**	**27.7**	**58.5**	**150**	**111J**	**68.4**
Cobalt	11	11	NA	NA	NA	NA	NA	**5.8**	**5.6**	See Note 1	NA	NA	NA	NA	**4.8**	**5.6**	**11.2**	**7.4**	NA	**6.1**
Copper	36	36	**1500**	**6050**	**153**	**133**	**38.7**	**562**	**883**		NA	NA	NA	**16**	**59**	**231**	**183**	**1330**	**1220**	**627**
Lead	24	24	**144**	**144**	**6.8J**	**22.6**	**5.7J**	**61**	**61**		**42**	**53.7**	**113**	**14**	**22**	**24**	**89**	**246**	**275**	**158**
Mercury	0.07	0.07	0.2 U	NA	NA	NA	NA	**0.1**	0.06 U		**0.0564**	**0.116**	**0.158**	0.2 U	**0.03**	0.1 U	0.27 U	**0.49**	NA	NA
Manganese	1,100	1,100	NA	**1,520**	**101**	**376**	**238**	**285**	**608**		NA	NA	NA	NA	**201**	**286**	**396**	**539**	**693**	**193**
Nickel	48	48	**74**	NA	NA	NA	NA	**22**	**33**		NA	NA	NA	**12**	**13**	**15**	**31**	**65**	NA	**35.1**
Selenium	0.78	0.78	0.3 U	NA	NA	NA	NA	1.2 U	0.7 U		NA	NA	NA	0.2 U	0.6 U	0.7 U	3.3 U	0.8 U	NA	NA
Silver	0.61	0.61	3.0 U	NA	NA	NA	NA	**0.9**	**0.5**		1.57 U	**0.776 J**	**3.14**	2.0 U	0.3 U	0.3 U	1.5 U	**1.3**	NA	NA
Zinc	85	85	**1300**	**3280**	**78.7**	**111**	**36.5**	**528**	**678**		NA	NA	NA	**58**	**135**	**203**	**1200**	**1150**	**999**	**957**
Chloride	NC	NC	NA	NA	NA	NA	NA	NA	NA	NA	**82.3**	**26,800**	**29,900**	NA	NA	NA	NA	NA	NA	**49.4**
Fluoride	144	144	NA	NA	NA	NA	NA	NA	NA	NA	**226**	**383**	**579**	NA	NA	NA	NA	NA	NA	**45.1**
Nitrate	128000	128000	NA	NA	NA	NA	NA	NA	NA	NA	**3.62**	**13.8**	**8.21**	NA	NA	NA	NA	NA	NA	NA
Ammonia-Nitrogen	230	300	NA	NA	NA	NA	NA	NA	NA	NA	**4.26 J**	**6.65 J**	15.6 U	NA	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds (VOCs) - detected compounds only																				
Toluene	0.023	0.023	NA	NA	NA	NA	NA	0.013 U	NA	0.022 U	NA	NA	NA	NA	0.007 U	NA	**0.074**	0.009 U	NA	NA
Xylene (total)	0.03	0.03	NA	NA	NA	NA	NA	0.013 U	NA	0.022 U	NA	NA	NA	NA	0.007 U	NA	**0.17**	0.009 U	NA	NA
Semi-Volatile Organic Compounds (SVOCs) - detected compounds only																				
Fluorene	0.08	0.08	NA	NA	NA	NA	NA	1.7 U	NA	2.8 U	NA	NA	NA	NA	0.88 U	NA	**1.1 J**	1.2 U	NA	NA
Phenanthrene	NC	NC	NA	NA	NA	NA	NA	1.7 U	NA	**0.89 J**	NA	NA	NA	NA	0.88 U	NA	**3.1 J**	**1.1 J**	NA	NA
Di-n-Butylphthalate	0.015	0.015	NA	NA	NA	NA	NA	1.7 U	NA	2.8 U	NA	NA	NA	NA	0.88 U	NA	3.8 U	**0.17 J**	NA	NA
Fluoranthene	0.001	0.001	NA	NA	NA	NA	NA	1.7 U	NA	**1.1 J**	NA	NA	NA	NA	**0.12 J**	NA	**1.9 J**	**2.3**	NA	NA
Pyrene	0.001	0.001	NA	NA	NA	NA	NA	**0.21 J**	NA	2.2 U	NA	NA	NA	NA	**0.16 J**	NA	**3.3 J**	**3.9**	NA	NA
bis(2-Ethylhexyl)phthalate	0.005	0.005	NA	NA	NA	NA	NA	**0.510 J**	NA	**11**	NA	NA	NA	NA	**0.51 J**	NA	14 U	**11**	NA	NA
Di-n-octyl Phthalate	0.008	0.008	NA	NA	NA	NA	NA	1.7 U	NA	2.8 U	NA	NA	NA	NA	0.88 U	NA	**3**	1.2 U	NA	NA
Phenol	0.047	0.047	NA	NA	NA	NA	NA	1.7 U	NA	2.8 U	NA	NA	NA	NA	0.88 U	NA	3.8 U	**0.14 J**	NA	NA
4-Methylphenol	0.085	0.085	NA	NA	NA	NA	NA	1.7 U	NA	**0.34 J**	NA	NA	NA	NA	0.88 U	NA	3.8 U	1.2 U	NA	NA
Benzoic Acid	2.9	2.9	NA	NA	NA	NA	NA	8.2 U	NA	14 U	NA	NA	NA	NA	4.3 U	NA	19 U	**0.32 J**	NA	NA
Naphthalene	0.24	0.24	NA	NA	NA	NA	NA	1.7 U	NA	**0.52 J**	NA	NA	NA	NA	0.88 U	NA	3.8 U	1.2 U	NA	NA
2-Mehtylnaphthalene	0.089	0.089	NA	NA	NA	NA	NA	1.7 U	NA	**0.59 J**	NA	NA	NA	NA	0.88 U	NA	3.8 U	**0.27 J**	NA	NA
Silanol, trimethyl	NC	NC	NA	NA	NA	NA	NA	**0.36 J**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total PAH/cPAH	0.0042	0.0042	NA	NA	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	ND	NA	**0.069**	**1.201**	NA	NA

Notes:

Bold - analyte detected
mg/kg - milligrams per kilogram dry weight
NC - no criterion
Reported concentration exceeds the Vadose Zone SL (includes saturated zone for compounds with the same SL for vadose and saturated)
Reported concentration exceeds the Saturated SL
Total cPAH is the sum of detected values based on the toxic equivalency factor (TEQ) per WAC 173- 340-708 (8)(e)
Note 1 - SW-8 is located in the off-property ditch in the S. 202nd right-of-way but the PAH data for this sample are included in this table. See Table 9 for the rest of the data associated with this sample.

NA - not analyzed or not available
J - Reported value is an estimate.
cPAH = Carcinogenic Polycyclic aromatic hydrocarbons

U - not detected at reporting limit
ROW - right of way
ND - cPAH compounds were all not detected
PCUL - Preliminary Cleanup Level

Table 9 - Off-Property Ditch Data Summary
Maralco Site - Kent, WA

	Sample ID	Sample depth (ft bgs)	Dated Collected	Aluminum	Iron	Antimony	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Nickel	Silver	Mercury	Zinc
PCUL - Soil Protective of SW Vadose (fresh water, mg/kg)				33,000	36,000	5.2	7.3	0.77	48	11	36	24	48	0.61	0.07	85
PCUL - Soil Protective of SW Saturated (fresh water, mg/kg)				33,000	36,000	5.2	7.3	0.77	72	11	36	24	48	0.61	0.07	85
Upstream[1]	B4	---	6/25/87	NA	NA	0.6 U	5.2	2.0 U	14	NA	21	20	15	3.0 U	0.1 U	67
S. 202nd ROW	B1	---	6/25/87	NA	NA	1.2	19	2.0 U	36	NA	262	64	31	3.0 U	0.26	365
	SW-8	---	5/9/90	93,700	40,600	6.6	6.8	7.4	127	5.4	1,050	261	46	1.2	0.73	957
	SED-02	0-0.5	6/9/21	12,000	19,000	2 U	3.79	1 U	11.6	4.21	41.2	10.4	10.7	NA	NA	109
	SED-02	0.5-1	6/9/21	12,100	16,500	2 U	2.18	1 U	10.1	2.85	20.2	8.24	7.54	NA	NA	58.1
	SED-03	0-0.5	6/9/21	23,200	81,800	8 U	19.2	2 U	31.4	10 U	159	40.2	25.5	NA	NA	325
	SED-03	0.5-1	6/9/21	115,000	29,000	55.4	7.21	11.8	208	10 U	1,410	189	64.2	NA	NA	2,190
	SED-04	0-0.5	7/11/23	NA	NA	NA	16.3	1.04	14.9	NA	82.6	NA	8.12	0.57 U	0.66 U	NA
	SED-04	0.5-1	7/11/23	NA	NA	NA	6.86	1 U	11.7	NA	44.0	NA	9.74	0.57 U	0.66 U	NA
	SED-05N	0-0.5	7/11/23	NA	NA	NA	7.1	1 U	11.6	NA	18.6	NA	10.3	0.57 U	0.66 U	NA
	SED-05	0-0.5	7/11/23	NA	NA	NA	28.6	1.99	26.1	NA	149.0	NA	16.4	0.57 U	0.66 U	NA
	SED-05	0.5-1	7/11/23	NA	NA	NA	15.2	1 U	16	NA	68.0	NA	9.20	0.57 U	0.66 U	NA
	SED-05	1-1.5	7/11/23	NA	NA	NA	30.8	1.73	26.9	NA	207	NA	13.9	0.5U	0.66 U	NA
	SED-05	1.5-2	7/11/23	NA	NA	NA	16.0	1.01	23.1	NA	118	NA	12.3	0.25U	0.33U	NA
	SED-05S1	0-0.5	7/11/23	NA	NA	NA	45.8	1.15	10.3	NA	30.8	NA	6.58	0.57 U	0.66 U	NA
	SED-05S1	0.5-1	7/11/23	NA	NA	NA	40.7	1 U	2.35 J	NA	5 UJ	NA	1.31 J	0.57 U	0.66 U	NA
	SED-05S1	1-1.5	7/11/23	NA	NA	NA	7.50	1U	7.86	NA	11.5	NA	4.44	0.25U	0.33U	NA
	SED-05S1	1.5-2	7/11/23	NA	NA	NA	2.34	1U	6.44	NA	7.82	NA	3.93	0.25U	0.33U	NA
	SED-05S2	0-0.5	7/11/23	NA	NA	NA	2.64	1 U	9.40	NA	14.8	NA	6.95	0.57 U	0.66 U	NA
	SED-05S3	0-0.5	7/11/23	NA	NA	NA	2.89	2 U	8.18	NA	16.0	NA	7.25	0.57 U	0.66 U	NA
	SED-06	0-0.5	7/11/23	NA	NA	NA	25.9	1.92	12.3	NA	89.4	NA	6.96	0.57 U	0.66 U	NA
	SED-06	0.5-1	7/11/23	NA	NA	NA	9.63	2.51	26.3	NA	277	NA	13.0	0.57 U	0.66 U	NA
	SED-06	1-1.5	7/11/23	NA	NA	NA	11.4	4.65	23.1	NA	189	NA	14.7	0.5U	0.66 U	NA
	SED-06	1.5-2	7/11/23	NA	NA	NA	3.36	1U	8.35	NA	16.1	NA	5.15	0.25U	0.33U	NA
	SED-07N	0.5-1	7/11/23	NA	NA	NA	3.28	1 U	13.6	NA	24.9	NA	12.6	0.57 U	0.66 U	NA
	SED-07	0-0.5	7/11/23	NA	NA	NA	19.6	1.24	12.9	NA	120	NA	8.27	0.57 U	0.66 U	NA
	SED-07	0.5-1	7/11/23	NA	NA	NA	3.73	4.45	77.2	NA	495	NA	24.3	0.57 U	0.66 U	NA
	SED-07	1-1.5	7/11/23	NA	NA	NA	2.97	1 U	7.58	NA	34.7	NA	4.88	0.57 U	0.66 U	NA
	SED-07S1	0-0.5	7/11/23	NA	NA	NA	6.82	1 U	9.49	NA	23.9	NA	6.89	0.57 U	0.66 U	NA
	SED-07S2	0-0.5	7/11/23	NA	NA	NA	4.78	1 U	8.33	NA	14.3	NA	6.53	0.57 U	0.66 U	NA
	SED-07S3	0-0.5	7/11/23	NA	NA	NA	5.71	1 U	8.05	NA	16.0	NA	6.46	0.57 U	0.66 U	NA
	SED-08	0-0.5	7/11/23	NA	NA	NA	19.8	1.34	18.9	NA	137	NA	9.62	0.57 U	0.66 U	NA
	SED-08	0.5-1	7/11/23	NA	NA	NA	9.50	1.78	30.6	NA	196	NA	14.8	0.57 U	0.66 U	NA
	SED-08	1-1.5	7/11/23	NA	NA	NA	5.85	1 U	16.2	NA	95.6	NA	7.18	0.57 U	0.66 U	NA
KCDD#1 Wetland	KCDD-S	0.5-1	8/24/21	18,400	NA	2.89	18.9	2 U	38.7	6.81	64.6	60.6	20.8	2 U	NA	NA
	KCDD-N	0.5-1	8/24/21	23,600	NA	2.95	10.8	2.01	23.1	5.27	98.6	54.7	14.7	1 U	NA	NA

NOTES:

Bold - analyte detected
mg/kg - milligrams per kilogram dry weight
U - not detected at reporting limit
Reported concentration exceeds the Vadose Zone SL (includes saturated zone for compounds with the same SL for vadose and saturated)
Reported concentration exceeds the Saturated SL

ROW - right of way
NA - not analyzed or not available
PCUL - Preliminary Cleanup Level

This table includes material collected from off-site ditches. This materail is called sediment in past report/field notes. In the development of this SRIWP, Ecology has determined that the ditch material is soil as it does not meet the Sediment Management Standards (SMS) definition of sediment (see WAC 173-204-505[22]), nor does it support benthic organisms.

1. B4 is located upstream near the NE corner of the Property.

Table 10 - Reconnaissance Grab Groundwater Data Summary
Maralco Site - Kent, WA

Analyte (ug/L)	PCUL	B-1-GW	B-2-GW	B-3-GW	B-4-GW	B-5-GW	B-6-GW	DPT-1-0521	DPT-2-0521	DPT-14	DPT-15	DPT-16	DPT-17	DPT-18	DPT-19	DPT-20	DPT-21/ DUP02	DPT-22	SB-UST-01	SB-UST-02	SB-UST-03
		10/27/16	11/2/16	11/2/16	11/2/16	11/2/16	11/2/16	5/24/21	5/24/21	8/29/22	8/29/22	8/30/22	8/30/22	8/31/22	8/31/22	8/31/22	8/31/22	8/31/22	8/29/22	8/29/22	8/29/22
Aluminum, total	302 *	**151,000**	**159,000**	**11,000**	**363,000** J	**7,880**	**43,500**	**405**	**1,160**	0.3 U	**1,660**	**348**	NA	**553**	**3,720**	**84.5**	**1800 / 632**	**634**	**9,350**	**3,120**	**1,100**
Antimony, total	5.6	NA	NA	NA	NA	NA	NA	2 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic, total	8.0	**68.6**	**45.2**	**33.8**	**65.9**	**43.9**	**64**	**13.3**	**13.6**	**8.31**	**22.1**	**3.23**	NA	**5.12**	**17.4**	**6.97**	**3.46 / 3.45**	**1.16**	**3.12**	**35.3**	**20.3**
Barium, total	1,000	**608**	**590**	**164**	**676**	**3,850**	**325**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, total	0.42	**1.13** J	**1.5** J	2 U	**1.56** J	2 U	2 U	1 U	1 U	1 U	10 U	1 U	NA	1 U	5 U	1 U	1 U / 1 U	1 U	1 U	1 U	10 U
Chromium, total	71.9	**86.6**	**124**	**15.4**	**108**	**18.7**	**44.3**	**2.41**	**1.74**	**1.19**	**7.44**	**1.65**	NA	**2.68**	**26.7**	**1.11**	**2.19 / 2.00**	**1.66**	**6.73**	**7.97**	**3.53**
Cobalt, total	4.8	NA	NA	NA	NA	NA	NA	**4.29**	1 U	1 U	**5.78**	**1.67**	NA	**1.60**	**21.7**	**1.18**	**1.51 / 1.46**	**1.17**	**1.51**	**4.38**	**1.71**
Copper, total	1.2	NA	NA	NA	NA	NA	NA	**11.1**	**9.63**	5 U	**22.4**	**6.20**	NA	**9.32**	**57.3**	5 U	5 U / 5 U	5 U	**13.0**	**21.1**	**11.2**
Iron, total	300	NA	NA	NA	NA	NA	NA	**32,200**	**10,300**	**33,900**	**84,700**	**33,800**	NA	**29,800**	**91,000**	**34,100**	**33,200 / 35,300**	**20,000**	**13,500**	**45,500**	**64,900**
Lead, total	2.1	**41.9**	**49.3**	**6.73**	**28.5**	**9.4**	**40.3**	1 U	1	1 U	**3.47**	1 U	NA	**1.66**	**7.51**	1 U	1 U / 1 U	1 U	**1.94**	**3.09**	**1.62**
Manganese, total	50	NA	NA	NA	NA	NA	NA	**2,720**	**379**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury, total	0.012	**0.0726** J	**0.234**	0.2 U	**0.0681** J	**0.0502** J	**0.338**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, total	11	NA	NA	NA	NA	NA	NA	**8.14**	**1.02**	**1.52**	**7.10**	**2.34**	NA	**3.10**	**26.6**	**1.63**	**3.10 / 2.93**	**2.46**	**3.59**	**7.26**	**2.79**
Selenium, total	3.1	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver, total	0.17	5 U	5 U	5 U	5 U	5 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc, total	24	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	**20.4**	5 U	NA	**7.15**	**91.3**	5 U	**6.14 / 5.83**	5 U	**6.65**	**18.3**	**6.30**
Aluminum, dissolved	302 *	NA	NA	NA	NA	NA	NA	NA	NA	1 U	**1.10**	**2.37**	NA	**2.14**	**3.74**	**1.67**	**1.67** / 1 U	1 U	**606**	**15.5**	**7.64**
Arsenic, dissolved	8.0	NA	NA	NA	NA	NA	NA	NA	NA	**7.90**	**18.0**	**1.55**	NA	**3.82**	**8.93**	**6.64**	**2.83 / 2.95**	1 U	5 U	**32.2**	**19.7**
Cadmium, dissolved	0.42	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	NA	1 U	1 U	1 U	1 U / 1 U	1 U	1 U	1 U	1 U
Chromium, dissolved	71.9	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	NA	2 U	2 U	2 U	1 U / 1 U	1 U	**4.72**	**1.32**	**1.51** U
Cobalt, dissolved	4.8	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	NA	2 U	2 U	2 U	1 U / 1 U	1 U	1 U	1 U	1 U
Copper, dissolved	1.2	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	NA	10 U	10 U	10 U	5 U / 5 U	5 U	5 U	5 U	5 U
Iron, dissolved	300	NA	NA	NA	NA	NA	NA	NA	NA	**32,500**	**50,400**	**27,400**	NA	**24,000**	**29,800**	**32,700**	**27900 / 29,400**	**17,600**	**8,760**	**30,000**	**57,900**
Lead, dissolved	2.1	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	NA	1 U	1 U	1 U	1 U / 1 U	1 U	1 U	1 U	1 U
Nickel, dissolved	11	NA	NA	NA	NA	NA	NA	NA	NA	**1.30**	1 U	**1.67**	NA	2 U	2 U	2 U	**1.09 / 1.17**	**1.60**	**1.62**	1 U	**1.20**
Zinc, dissolved	24	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	NA	10 U	10 U	10 U	5 U / 5 U	5 U	5 U	5 U	5 U
Chloride (mg/L)	230 (mg/L)	**265**	**177**	**341**	**109**	**8,970**	**111**	**224**	**51.6**	**20.1**	**183**	**139**	NA	**5.33**	**3.42**	**2.47**	**6.02 / 6.08**	**4.81**	**265**	**271**	**693**
Fluoride (mg/L)	0.96 (mg/L)	**0.428**	**0.850**	**0.496**	**5.09**	**7.74**	**52.9**	0.800 U	**1.38**	**1.36**	**0.14**	**0.17**	NA	0.05 U	**0.06**	0.05 U	**0.05 / 0.05**	**0.12**	**16.3**	**0.78**	**0.27**
Nitrate-nitrogen (mg/L)	10 (mg/L)	**0.488**	**0.177**	**0.0556** J	**0.363**	0.100 U	0.100 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ammonia-nitrogen (mg/L)	NC	**4.070**	**4.570**	**7.030**	**4.150**	**39.8**	**0.516**	NA	NA	**2.72**	**3.31**	**2120**	NA	**0.182**	**0.286**	**0.072**	**0.077 / 0.086**	**0.088**	**0.304**	**5.21**	**5.40**
TPH-Gasoline	1000	NA	NA	NA	NA	NA	NA	100 U	100 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel Range Organics	500	**160** J	250 U	**235** J	250 U	250 U	250 U	**850** x	**12,000**	NA	NA	NA	NA	NA	NA	NA	NA	NA	**91** x	**880** x	**290** x
Oil Range Organics	500	500 U	500 U	**500**	500 U	500 U	500 U	**370** x	**1,700**	NA	NA	NA	NA	NA	NA	NA	NA	NA	250 U	250 U	250 U
Diesel Range Organics - SGC	500	NA	NA	NA	NA	NA	NA	**140** x	**4,500**	NA	NA	NA	NA	NA	NA	NA	NA	NA	50 U	50 U	50 U
Oil Range Organics - SGC	500	NA	NA	NA	NA	NA	NA	250 U	**430** x	NA	NA	NA	NA	NA	NA	NA	NA	NA	250 U	250 U	250 U
Benzene	0.44	NA	NA	NA	NA	NA	NA	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	12	NA	NA	NA	NA	NA	NA	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	53	NA	NA	NA	NA	NA	NA	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Xylenes	57	NA	NA	NA	NA	NA	NA	3 U	3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	100	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	30	**0.112**	0.05 U	**0.459**	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	**0.056**	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NC	**0.0136** J	0.05 U	**0.0735** J	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(A)Anthracene	0.00016	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(A)Pyrene	0.000016	**0.0812**	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(B)Fluoranthene	0.00016	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA

Table 10 - Reconnaissance Grab Groundwater Data Summary
Maralco Site - Kent, WA

Analyte (ug/L)	PCUL	B-1-GW	B-2-GW	B-3-GW	B-4-GW	B-5-GW	B-6-GW	DPT-1-0521	DPT-2-0521	DPT-14	DPT-15	DPT-16	DPT-17	DPT-18	DPT-19	DPT-20	DPT-21/ DUP02	DPT-22	SB-UST-01	SB-UST-02	SB-UST-03
		10/27/16	11/2/16	11/2/16	11/2/16	11/2/16	11/2/16	5/24/21	5/24/21	8/29/22	8/29/22	8/30/22	8/30/22	8/31/22	8/31/22	8/31/22	8/31/22	8/31/22	8/29/22	8/29/22	8/29/22
Benzo(G,H,I)Perylene	na	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.04 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(K)Fluoranthene	0.0016	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.0098	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(A,H)Anthracene	0.000016	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Total cPAH	0.0043	**0.0812**	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	0.02	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	10	**0.0431 J**	0.05 U	**0.483**	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	**0.034**	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	8.8	**0.167 J**	**0.0429 J**	**0.614**	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NC	**0.0124 J**	0.05 U	**0.0249 J**	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	0.015	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	0.17/0.86 **	**0.147 J**	**0.0167 J**	**2.38**	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	32	**0.0585 J**	**0.0165 J**	**0.226 J**	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	100	0.25 U	0.25 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

NOTES:

Bold - analyte detected

Units - ug/L for except mg/L for chloride, fluoride, nitrate-nitrogen, and ammonia-nitrogen

ug/L - micrograms per liter

mg/L - milligrams per liter

SGC - with silica gel cleanup

PQL = practical quantitation limit

Detected value exceeds PCUL

NC - no criterion

* Aluminum value based on the West Coast Marine Forest ecoregion and that the default value is 302 ug/L.

** Protection of indoor air/protection of surface water SL presented

Carcinogenic polycyclic aromatic hydrocarbon. Total cPAH is the sum of detected values based on the toxic equivalency factor (TEQ) per WAC 173- 340-708 (8)(e)

PCUL - Preliminary Cleanup Level

J - Reported value is an estimate.

ND - cPAH compounds were all not detected

NA - not analyzed

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

U - not detected at listed reporting limit

TPH - total petroleum hydrocarbons

Table 11 - Monitoring Well Groundwater Data Summary
Maralco Site - Kent, WA

Analyte (ug/L)	PCUL	MW-1 10/2/90	MW-1 9/14/22	MW-2 10/1/90	MW-2 1/24/03	DUP OF MW-2 1/24/03	MW-2 11/2/16	MW-2 9/14/22	MW-3 10/1/90	MW-3 1/24/03	MW3A 7/26/17	MW3A 6/3/21	MW3A 9/13/22
Aluminum, total	302 *	**17,800**	**33.0**	**2,350**	**600**	**860**	**174**	**65.0**	**3,850**	**820**	**5,800**	**2,160**	**993**
Antimony, total	5.6	30 U	NA	30 U	NA	NA	NA	NA	30 U	NA	NA	2 U	NA
Arsenic, total	8.0	**7.96**	1 U	**5.3**	3 U	3 U	10 U	**1.69**	**5.38**	**40**	5 U	1 U	**1.03** U
Barium	1,000	**109**	NA	**33.3**	56 U	56 U	**5.65**	NA	**3,530**	**2,500**	50 U	NA	NA
Cadmium, total	0.72	2 U	1 U	2 U	4 U	4 U	2 U	1 U	2 UJ	4.4 U	5 U	1 U	1 U
Chromium, total	71	**16**	1 U	5 U	11 U	11 U	10 U	1 U	5 U	**14**	10 U	1 U	**2.99**
Cobalt, total	4.8	**15** J	**1.15**	5 U	NA	NA	NA	**2.51**	**61.3**	NA	NA	1 U	1 U
Copper, total	1.2	**33.5**	5 U	**11.9**	NA	NA	NA	5 U	**17.6**	NA	NA	**6.73**	**12.4**
Iron, total	300	**32,500**	**93.6**	**44,400**	NA	NA	NA	**9,430**	**1,140,000**	NA	NA	**304**	**1,150**
Lead, total	2.1	**5.32**	1 U	**2.0** J	**1.2**	**1.4**	**2.59**	1 U	**1.0** J	**2.7**	2 U	1 U	1 U
Manganese, total	50	**974**	NA	**2,150**	NA	NA	NA	NA	**39,100**	NA	NA	**37.5**	NA
Mercury, total	0.012	**0.12**	NA	0.04 U	0.5 U	0.5 U	0.2 U	NA	**0.11 J**	0.5 U	0.5 U	NA	NA
Nickel, total	52	**15** J	**2.97**	10 U	NA	NA	NA	**4.97**	10 U	NA	NA	1 U	**1.66**
Silver, total	0.17	2 U	NA	2 U	11 U	11 U	5 U	NA	2 U	11 U	10 U	NA	NA
Selenium, total	3.1	2 UJ	1 Uk	2 UJ	2.6 U	2.6 U	10 U	NA	4 UJ	**43**	50 U	NA	NA
Zinc, total	24	**543**	5 U	**26**	NA	NA	NA	5 U	**33**	NA	NA	5 U	5 U
Aluminum, dissolved	302 *	NA	**5.84**	NA	NA	NA	NA	1 U	NA	NA	NA	NA	**493**
Arsenic, dissolved	8.0	NA	1 U	NA	NA	NA	NA	5 U	NA	NA	NA	NA	5 U
Barium, dissolved	1000	NA	**5.5**	NA	NA	NA	NA	**3.3**	NA	NA	NA	NA	**4.7**
Cadmium, dissolved	0.42	NA	1 U	NA	NA	NA	NA	1 U	NA	NA	NA	NA	1 U
Chromium, dissolved	71.9	NA	1 U	NA	NA	NA	NA	1 U	NA	NA	NA	NA	**1.90**
Cobalt, dissolved	4.8	NA	**1.12**	NA	NA	NA	NA	**2.70**	NA	NA	NA	NA	1 U
Copper, dissolved	1.2	NA	5 U	NA	NA	NA	NA	5 U	NA	NA	NA	NA	5 U
Iron, dissolved	300	NA	5 U	NA	NA	NA	NA	**9,410**	NA	NA	NA	NA	**695**
Lead, dissolved	2.1	NA	50 U	NA	NA	NA	NA	1 U	NA	NA	NA	NA	1 U
Manganese, dissolved	50	NA	**88**	NA	NA	NA	NA	**240** ve	NA	NA	NA	NA	**21**
Mercury, dissolved	0.012	NA	0.2 Uj jl	NA	NA	NA	NA	0.2 Uj jl	NA	NA	NA	NA	0.2 Uj jl
Nickel, dissolved	11	NA	1 U	NA	NA	NA	NA	**5.02**	NA	NA	NA	NA	**1.13**
Selenium, dissolved	3.1	NA	1 U	NA	NA	NA	NA	1 Uca	NA	NA	NA	NA	1 Uca
Silver, dissolved	0.17	NA	1 U	NA	NA	NA	NA	1 U	NA	NA	NA	NA	1 U
Zinc, dissolved	24	NA	**2.79**	NA	NA	NA	NA	5 U	NA	NA	NA	NA	5 U
Total Cyanide (mg/L)	0.0019 (mg/L)	0.004 U	NA	0.004 U	NA	NA	NA	NA	0.004 U	NA	NA	NA	NA
Chloride (mg/L)	230 (mg/L)	NA	**20.3**	NA	**9.64**	**8.89**	**3.89**	**12.9**	NA	**9100**	**78**	**14.2**	**17.2**
Fluoride (mg/L)	0.96 (mg/L)	NA	0.5 U	NA	ND	ND	**0.0807**	0.5 U	NA	ND	**27**	**19.8**	**14.4**
Nitrate-Nitrogen (mg/L)	10 (mg/L)	NA	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA
Ammonia-Nitrogen (mg/L)	NC	**0.175**	**0.076**	**0.124**	**1.26**	**0.433**	NA	**0.208**	**14.638**	**33.7**	NA	NA	**493**
TPH-Gasoline	1000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel Range Organics- SGC	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Oil Range Organics - SGC	500	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel Range Organics	500	NA	NA	NA	NA	NA	82.5 U	NA	NA	NA	NA	NA	NA
Oil Range Organics	500	NA	NA	NA	NA	NA	165 U	NA	NA	NA	NA	NA	NA
Volatile Organic Compounds[1]	Varies	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA
Semi-Volatile Organic Compounds	Varies	See Note 2	NA	See Note 2	NA	NA	NA	NA	See Note 2	NA	NA	NA	NA

Analyte (ug/L)	MW-4 10/1/90	MW-4 1/24/03	MW-4 9/13/22	MW4A 7/26/17	MW4A 6/3/21	DUP OF MW4A 6/3/21	MW-5 1/24/03	MW5A 7/26/17	MW5A 6/3/21	MW-5R 9/13/22	MW6 7/26/17	MW6 6/3/21	MW6 9/13/22	MW-7 9/13/22	MW-8 9/14/22
Aluminum, total	**27,500**	**3,600**	**159**	**61**	100 U	100 U	**28,000**	**93,000**	**32,200**	**1,500**	**130**	**273**	**308**	**487 / 1,270**	**13.4**
Antimony, total	30 U	NA	NA	NA	2 U	2 U	NA	NA	4 U	NA	NA	2 U	NA	NA	NA
Arsenic, total	**17.1**	**19**	**12.9**	5 U	**9.45**	**9.37**	**11**	**6**	**73.2**	**12.6**	5 U	**18.3**	**35.3**	**5.84 / 5.16**	10 U
Barium	**605**	**77**	NA	50 U	NA	NA	**170**	50 U	NA	NA	50 U	NA	NA	NA	NA
Cadmium, total	2 U	4.4 U	10 U	5 U	1 U	1 U	4.4 U	5 U	**4.60**	1 U	5 U	1 U	10 U	1 / 1 U	10 U
Chromium, total	**25**	**22**	**2.99**	10 U	1 U	**1.01**	**38**	**10**	**98.6**	**3.18**	10 U	**2.13**	**2.84**	**2.40 / 2.68**	10 U
Cobalt, total	**14 J**	NA	1 U	NA	1 U	1 U	NA	NA	**34.6**	**2.74**	NA	**2.77**	**2.03**	**1.66 / 1.78**	**14.9**
Copper, total	**79.9**	NA	**5.11**	NA	**8.56**	**9.51**	NA	NA	**589**	5 U	NA	**19.0**	5 U	5 / 5 U	50 U
Iron, total	**65,800**	NA	**48,600**	NA	**62,900**	**64,500**	NA	NA	**157,000**	**2,190**	NA	**47,700**	**54,200**	**11,000 / 11,100**	**75,400**
Lead, total	**9.51**	**9.0**	**1.24** U	2 U	1 U	1 U	**8.0**	**2**	**53.7**	1 U	2 U	1 U	1 U	1 / 1 U	10 U
Manganese, total	**2,760**	NA	NA	NA	**2,660**	**2,750**	NA	NA	**2,510**	NA	NA	**1,590**	NA	NA	NA
Mercury, total	**0.077 J**	0.5 U	NA	0.5 U	NA	NA	0.5 U	0.5 U	NA	NA	0.5 U	NA	NA	NA	NA
Nickel, total	**28 J**	NA	1 U	NA	**1.06**	**1.06**	NA	NA	**76.7**	**5.26**	NA	**2.71**	**1.26**	**2.26 / 2.46**	**20.0**
Silver, total	2 U	11 U	NA	10 U	NA	NA	11 U	10 U	NA	NA	10 U	NA	NA	NA	NA
Selenium, total	2 UJ	5.6 U	NA	50 U	NA	NA	5.6 U	50 U	NA	NA	50 U	NA	NA	NA	NA
Zinc, total	**92.2**	NA	5 U	NA	5 U	5 U	NA	NA	**431**	5 U	NA	5 U	5 U	5 / 5 U	**130**
Aluminum, dissolved	NA	NA	**8.50**	NA	NA	NA	NA	NA	NA	**72.3**	NA	NA	**61**	**43.0 / 41.2**	1 U
Arsenic, dissolved	NA	NA	**11.0**	NA	NA	NA	NA	NA	NA	**12.6**	NA	NA	**33.8**	**6.17 / 5.94**	10 U
Barium, dissolved	NA	NA	**87**	NA	NA	NA	NA	NA	NA	**33**	NA	NA	**150**	**110/100**	**2,100**
Cadmium, dissolved	NA	NA	1 U	NA	NA	NA	NA	NA	NA	1 U	NA	NA	1 U	1 / 1 U	10 U
Chromium, dissolved	NA	NA	**3.66**	NA	NA	NA	NA	NA	NA	**3.06**	NA	NA	**3.44**	**2.13 / 2.00**	10 U
Cobalt, dissolved	NA	NA	1 U	NA	NA	NA	NA	NA	NA	**2.84**	NA	NA	**2.58**	**1.89 / 1.79**	**17.5**
Copper, dissolved	NA	NA	5 U	NA	NA	NA	NA	NA	NA	5 U	NA	NA	5 U	5 / 5 U	50 U
Iron, dissolved	NA	NA	**48,000**	NA	NA	NA	NA	NA	NA	**1,980**	NA	NA	**49,900**	**11,000 / 11,100**	**74,300**
Lead, dissolved	NA	NA	5 U	NA	NA	NA	NA	NA	NA	1 U	NA	NA	5 U	1 / 1 U	10 U
Manganese, dissolved	NA	NA	**2000** ve	NA	NA	NA	NA	NA	NA	**660** ve	NA	NA	**930** ve	**770/740** ve	**7,700**
Mercury, dissolved	NA	NA	0.2 Uj jl	NA	NA	NA	NA	NA	NA	0.2 Uj jl	NA	NA	0.2 Uj jl J	0.2/0.2 Uj jl	0.2 Uj jl ca
Nickel, dissolved	NA	NA	1 U	NA	NA	NA	NA	NA	NA	**4.81**	NA	NA	**1.32**	**2.13 / 2.03**	**19.2**
Selenium, dissolved	NA	NA	1 Uca	NA	NA	NA	NA	NA	NA	1 Uca	NA	NA	1 Uca	1/1 Uca	**8.3** j
Silver, dissolved	NA	NA	1 U	NA	NA	NA	NA	NA	NA	1 U	NA	NA	1 U	1/1 U	3.2 Uj
Zinc, dissolved	NA	NA	5 U	NA	NA	NA	NA	NA	NA	5 U	NA	NA	5 U	5 / 5 U	**155**
Total Cyanide (mg/L)	0.004 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chloride (mg/L)	NA	**92.0**	**350**	**290**	**275**	**280**	**442**	**150**	**81.3**	**145**	**270**	**207**	**156**	**475 / 482**	**3,960**
Fluoride (mg/L)	NA	**6.89**	**1.39**	0.200 U	0.800 U	0.800 U	**2.10**	**0.23**	**1.92**	**0.53**	**4.1**	**16.0**	**22.2**	**7.98 / 6.96**	**0.5** U
Nitrate-Nitrogen (mg/L)	NA	ND	NA	NA	NA	NA	**1.50**	NA	NA	NA	NA	NA	NA	NA	NA
Ammonia-Nitrogen (mg/L)	**6.683**	**1.71**	**3.99**	NA	NA	NA	**1.52**	NA	NA	**5.01**	NA	NA	**5.91**	**4.75 / 4.90**	**35.4**
TPH-Gasoline	NA	NA	NA	NA	100 U	100 U	NA	NA	NA	NA	NA	100 U	NA	NA	NA
Diesel Range Organics- SGC	NA	NA	NA	NA	50 U	50 U	NA	NA	NA	NA	NA	50 U	NA	NA	NA
Oil Range Organics - SGC	NA	NA	NA	NA	250 U	250 U	NA	NA	NA	NA	NA	250 U	NA	NA	NA
Diesel Range Organics	NA	NA	NA	20 U	**200** x	**210** x	NA	NA	NA	NA	NA	50 U	NA	NA	NA
Oil Range Organics	NA	NA	NA	50 U	250 U	250 U	NA	NA	NA	NA	NA	250 U	NA	NA	NA
Volatile Organic Compounds[1]	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Semi-Volatile Organic Compounds	See Note 2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

Bold - analyte detected
Units - ug/L for except mg/L for chloride, fluoride, nitrate-nitrogen, and ammonia-nitrogen
mg/L - milligrams per liter
ug/L - micrograms per liter
SGC - with silica gel cleanup
NC - no criterion
J - Reported value is an estimate.
U - not detected at listed reporting limit
NA - not analyzed
ND - no detected compounds
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.
ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.
j - The analyte concentration is reported below the lowest calibration standard. The value reported 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.
ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.
Note 1: Volatile Organic Compounds (VOCs) were analyzed are reported in the Morrison-Knudsen Environmental Services, Draft Phase I Remedial Investigation Report, Maralco Site. Kent, WA. All results were ND.
Note 2: Semi Volatile Organic Compounds (SVOCs) were analyzed and reported in the Morrison-Knudsen Environmental Services, Draft Phase I Remedial Investigation Report, Maralco Site. Kent, WA. All results were ND except Diethylphthalate in MW-1/3 (max 0.5 ug/L), 4-methylphenol in MW-1/2 (max 0.5 ug/L), and dimethylphthalate in MW-1/3(max 0.3 ug/L))
Detected value exceeds PCUL
* Aluminum value based on the West Coast Marine Forest ecoregion and that the default value is 302 ug/L.
PCUL - Preliminary Cleanup Level
TPH - total petroleum hydrocarbons

Table 12 - Groundwater Sampling Field Parameters

Maralco Site - Kent, WA

Well ID	MW-1	MW-2	MW3A	MW-4	MW-5R	MW6	MW-7	MW-8
Date Sampled	**9/14/2022**	**9/14/2022**	**9/13/2022**	**9/13/2022**	**9/13/2022**	**9/13/2022**	**9/13/2022**	**9/14/2022**
Top of PVC Elevation (ft NAVD88)	30.04	30.70	29.97	28.74	29.92	29.65	29.90	27.80
Total Well Depth (ft)	16.05	16.39	13.35	18.34	20.16	13.54	19.9	20.09
Initial Water Level (ft BTOC)	7.95	9.6	6.25	7.41	8.12	5.5	8.3	5.03
Temp (deg C)	12.2	13.7	14.5	13.6	14.9	16.7	17.3	13.7
pH	5.66	6.05	6.46	6.58	6.71	6.84	6.7	5.96
Conductivity (us/cm)	80.2	161.1	381.2	1,572	1,307	1,531	1,960	10,895
DO (mg/L)	6.03	1.39	1.37	1.35	1.57	1.61	1.16	1.37
ORP (mV)	19.90	0.80	65.60	-74.60	25.20	-82.50	-9.30	79.60
Turbidity (NTU)	1.27	8.5	8.15	7.44	17.3	3.9	27.2	5.44
Color/Odor	clear/none	clear/none	slightly cloudy/none	slight peaty color /none	clear/none	slight peaty color /none	slightly yellow color/none	clear/none

Notes:

ft BTOC - feet below top of casing

dec C = degree Celsius

us/cm = micro siemens per centimeter

mg/L = milligrams per liter

mV =millivolts

NTU = Nephelometric Turbidity Units

Table 13 Surface Water Data Summary
Maralco Property - Kent, WA

Location	Sample ID	Date Collected	Analyte:	Metals (ug/L)																	
				Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Selenium	Silver	Thallium
			SW PCUL[1] (ug/L):	302 *	5.6	0.018 **	1000	75.6	0.42	72	4.8	1.2	300	2.1	NC	50	0.012	11	3.1	0.17	0.062
	SW-3	5/10/90	Total	24000	100 U	100 U	3590	2 U	28.9	5 U	1500 U	2090	78000	134	176000	24200	0.02 U	40 U	200 U	7.4 J	200 U
	SW-3	5/10/90	Dissolved	25600	200 U	107 J	3480 J	2 U	38 J	5 U	70 J	2150 J	77000	1270J	192	24.9	0.21	44 J	200 U	3 U	304 J
	SW-3R	1/29/91	Total	2750 E	NA	NA	1150	NA	NA	5 U	NA	74.3 B	NA	1 U	60	6090	NA	NA	NA	NA	NA
	SW-3R	1/29/91	Dissolved	803	NA	NA	947	NA	NA	10 U	NA	93	NA	1410	63800	5780	NA	NA	NA	NA	NA
	SW-4	5/10/90	Total	315	1 U	2 J	48.7	2 U	0.25 J	5 U	15 U	10.6 JB	16.6	3.7 JB	5850	1040	0.02 U	40 U	2 U	3 U	2.5 U
	SW-4	5/10/90	Dissolved	55 B	NA	1.5 U	33.3	2 U	0.1 U	5 U	15 U	2 U	3130	2 JB	6	583	0.02 U	40 U	NA	3 U	2.5 U
	SW-4R	1/29/91	Total	254 E	NA	NA	47.9	NA	NA	5 U	NA	13 B	NA	1.2 J	4	446	NA	NA	NA	NA	NA
	SW-4R	1/29/91	Dissolved	200 U	NA	NA	75	NA	NA	10 U	NA	25 U	NA	5 U	4190	379	NA	NA	NA	NA	NA
	SW-6	5/10/90	Total	662	200 U	100 U	1200	2 U	33.7 J	5 U	1500 U	268	796	180 U	159000	5260	1.4	40 U	200 U	5.1 J	250U
	SW-6	5/10/90	Dissolved	420	200 U	100 U	1140	2 U	38.6 J	5 U	15 U	364 J	14.7 JB	60 U	171	5350.0	0.02 U	40 U	200 U	3 U	250 U
	SW-6R	1/29/91	Total	4200	NA	NA	1250	NA	NA	5 U	NA	146 E	NA	2 U	64	5050	NA	NA	NA	NA	NA
	SW-6R	1/29/91	Dissolved	1310	NA	NA	1040	NA	NA	10 U	NA	80	NA	440	72200	5100	NA	NA	NA	NA	NA
	SW-10	10/28/16	Total	730	NA	10 U	481	NA	2.13	1.91 J	NA	NA	NA	5 U	NA	NA	0.2 U	NA	10 U	5 U	NA
	SW-11	10/28/16	Total	618 J	NA	10 U	15.5	NA	2 U	1.41 J	NA	NA	NA	2 J	NA	NA	0.2 U	NA	10 U	5 U	NA
	SW-900 (Dup of SW-11)	10/28/16	Total	373 J	NA	10 U	14.4	NA	2 U	10 U	NA	NA	NA	5 U	NA	NA	0.2 U	NA	10 U	5 U	NA
Storm-water Pond	SW-7	5/10/90	Total	216000	1.2 J	83 J	33.9	2.2 J	11.1	18 J	51.1 J	268	3230	14	31700	3170	0.06 J	121 J	2 U	3 U	2.5 U
	SW-7	5/10/90	Dissolved	207000	1 U	1.5 U	32	4.3 J	10.9	9 U	45.9 J	308 J	716	16.2 B	32	3195	0.02 U	121 J	2 U	3 U	2.5 U
	SW-7R	1/29/91	Total	1930 E	NA	NA	27.7	NA	NA	5 U	NA	27	NA	3.3 J	18	208	NA	NA	NA	NA	NA
	SW-7R	1/29/91	Dissolved	279	NA	NA	70	NA	NA	10 U	NA	25 U	NA	5 U	19900	211	NA	NA	NA	NA	NA
S. 202nd ROW Ditch	A1	6/25/87	Total	NA	5.8	3.8	NA	10 U	5 U	10 U	NA	180	NA	87	NA	NA	0.2 U	50 U	1 U	10 U	2U
	SW-8	5/10/90	Total	5620	1 U	1.5 U	22.7	2 U	0.59	5 J	15 U	35.6	23200	8	6230	747	0.02 U	40 U	2 U	3 U	2.5 U
	SW-8	5/10/90	Dissolved	85 B	1 U	1.5 U	9.1 B	2 U	0.1 J	5 U	15 U	6.2 JB	2530	1.4 JB	5.71	41.5	0.02 U	40 U	2 U	3 U	2.5 U
	SW-8R	1/29/91	Total	754	NA	NA	39.8	NA	NA	5 U	NA	17.7 B	NA	2.7 J	4.56	485	NA	NA	NA	NA	NA

Notes:

Bold - analyte detected
Reported concentration exceeds a SL value
ug/L - micrograms per liter
NC - no criterion
NA - Not analyzed
1. PCULs are based on protection of drinking water - see Table 14.

J - Reported value is an estimate.
E - Exceeds laboratory calibration criteria
U - Compound is not detected at or above reporting limit
* Aluminum value based on the West Coast Marine Forest ecoregion and that the default value is 302 ug/L.
** Arsenic PCUL based of 0.018 ug/L is based on the protection of surface water.

Table 13 Surface Water Data Summary
Maralco Property - Kent, WA

Location	Sample ID	Date Collected	Analyte:	Tin	Vanadium	Zinc	Geochemical Parameters (µg/L) Chloride	Fluoride	Nitrate	Ammonia Nitrogen	Total Kjedahl Nitrogen	Cyanide	VOCs	SVOCs
			SW PCUL[1] (ug/L):	9600	80	24	230,000	960	10,000	NC	NC	1.9	Varies	Varies
	SW-3	5/10/90	Total	5000 U	4 U	**2610**	NA	NA	NA	**188,200**	**162,890**	**20**	NA	NA
	SW-3	5/10/90	Dissolved	NA	4 U	**2680 J**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-3R	1/29/91	Total	NA	NA	**285 E**	**17,600,000**	NA	NA	**64,500**	NA	**65**	NA	NA
	SW-3R	1/29/91	Dissolved	NA	NA	**256**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-4	5/10/90	Total	**104 J**	4 U	**56.1**	NA	NA	NA	500 U	**2,060**	4 U	NA	NA
	SW-4	5/10/90	Dissolved	40 U	4 U	**19.1 J**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-4R	1/29/91	Total	NA	NA	**96.3 E**	**643,000**	NA	NA	**2,130**	NA	10 U	NA	NA
	SW-4R	1/29/91	Dissolved	NA	NA	**68**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-6	5/10/90	Total	5000 U	4 U	**65.4**	NA	NA	NA	**108,400**	**93,830**	**13**	NA	NA
	SW-6	5/10/90	Dissolved	4000 U	4 U	**52 BJ**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-6R	1/29/91	Total	NA	NA	**198 E**	**24,900,000**	NA	NA	**83,500**	NA	**108**	NA	NA
	SW-6R	1/29/91	Dissolved	NA	NA	**219**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-10	10/28/16	Total	NA	NA	NA	**8,940,000**	**6,630**	**10,200**	**2,680**	NA	NA	NA	NA
	SW-11	10/28/16	Total	NA	NA	NA	**379,000**	**4,170**	**288 J**	**62 J**	NA	NA	NA	NA
	SW-900 (Dup of SW-11)	10/28/16	Total	NA	NA	NA	**367,000**	**4,210**	**288 J**	**60 J**	NA	NA	NA	NA
Storm-water Pond	SW-7	5/10/90	Total	50 U	**7 B**	**1740**	NA	NA	NA	**600**	**880**	4 U	ND	ND
Storm-water Pond	SW-7	5/10/90	Dissolved	50 U	4 U	**1810**	NA	NA	NA	NA	NA	NA	NA	NA
Storm-water Pond	SW-7R	1/29/91	Total	NA	NA	**50.2 E**	**1,130,000**	NA	NA	**680**	NA	10 U	NA	NA
Storm-water Pond	SW-7R	1/29/91	Dissolved	NA	NA	20 U	NA	NA	NA	NA	NA	NA	NA	NA
S. 202nd ROW Ditch	A1	6/25/87	Total	NA	NA	**150**	NA	NA	NA	NA	NA	NA	NA	NA
S. 202nd ROW Ditch	SW-8	5/10/90	Total	50 U	**4.6 J**	**95.6**	NA	NA	NA	500 U	**1,600**	4 U	ND	ND
S. 202nd ROW Ditch	SW-8	5/10/90	Dissolved	50 U	4 U	**12.2 J**	NA	NA	NA	NA	NA	NA	NA	NA
S. 202nd ROW Ditch	SW-8R	1/29/91	Total	NA	NA	**94.1**	**440,000**	NA	NA	**1,230**	NA	10 U	NA	NA

Notes:

Bold - analyte detected
Reported concentration exceeds a SL value
ug/L - micrograms per liter
NC - no criterion
NA - Not analyzed
1. PCULs are based on protection of drinking water - see Table 1

J - Reported value is an estimate.
E - Exceeds laboratory calibration criteria
U - Compound is not detected at or above reporting limit
* Aluminum value based on the West Coast Marine Forest ecoregion and that the default value is 302 ug/L.
** Arsenic PCUL based of 0.018 ug/L is based on the protection of surface water.

Table 14 - Project Preliminary Cleanup Levels
Maralco Site - Kent, WA

	Soil					Groundwater and Surface Water			
Chemical (all concentrations in mg/kg)	Most Stringent Soil PCUL Vadose Zone mg/kg	Basis	Most Stringent Soil PCUL Saturated Zone mg/kg	Basis	Constituent of Interest?	PCUL[1] ug/L	Basis	Groundwater Constituent of Interest?	Surface Water Constituent of Interest?
Metals									
Aluminum	33000	NB	33000	NB	Yes	302	SW	Yes	Yes
Antimony	5.2	NB	5.2	NB	Yes	5.6	SW	Yes	Yes
Arsenic	7.3	NB	7.3	NB	Yes	8/0.018 *	NB/SW	Yes	Yes
Barium	250.0	NB	250.0	NB	No	1,000	SW	Yes	Yes
Cadmium	0.77	NB	0.77	NB	Yes	0.42	SW	Yes	Yes
Chromium, total	48	NB	72	Sed	Yes	72	Sed	Yes	No
Chromium, trivalent	61	SW	61	SW	No	61	SW	No	No
Chromium, hexavalent	0.01	GW	0.01	GW	No	0.36	SW	No	No
Cobalt	11	NB	11	NB	Yes	4.8	DW	No	Yes
Copper	36	NB	36	NB	Yes	1.2	SW	Yes	Yes
Iron	36000	NB	36000	NB	Yes	300	DW	Yes	Yes
Lead	24	NB	24	NB	Yes	2.1	Sed	Yes	Yes
Manganese	1100	NB	1100	NB	Yes	50	DW	Yes	Yes
Mercury, inorganic	0.07	NB	0.07	NB	Yes	0.012	SW/PQL**	Yes	Yes
Nickel	48	NB	48	NB	Yes	11	SW	Yes	Yes
Thallium	0.004	SW	0.004	SW	No	0.062	SW	No	Yes
Selenium	0.78	NB	0.78	NB	No	3.1	SW	No	No
Silver	0.61	NB	0.61	NB	Yes	0.17	SW	Yes	Yes
Vanadium	45.00	NB	80.00	DW	Yes	80	DW	Yes	Yes
Zinc	85	NB	85	NB	Yes	24	SW	Yes	Yes
Nonmetal Inorganics									
Cyanide	0.02	SW	0.02	SW	Yes	---	---	No	Yes
Chloride	NA	---	NA	---	No	230,000 ***	SW	Yes	Yes
Fluoride	144.3	DW	144.3	DW	No	960	DW	Yes	No
Total Petroleum Hydrocarbons									
Total diesel and oil range hydrocarbons	260	TEE	2000	SW	Yes	500	Method A	Yes	No
Semi-Volatile Organic Compounds - Polycyclic Aromatic Hydrocarbons									
Fluoranthene	0.001	Sed	0.001	Sed	Yes	0.020	Sed	Yes	No
Fluorene	0.08	GW	0.080	GW	Yes	---	---	No	No
1-Methylnaphthalene	0.0024	DW	0.0024	DW	No	0.17/0.86	Indoor Air/DW	Yes	No
2-Methylnaphthalene	0.089	DW	0.089	DW	Yes	32.0	DW	No	No
Naphthalene	0.236	DW	0.24	DW	Yes	8.8/160	Indoor Air/DW	No	No
Phenol	0.047	Sed	0.047	Sed	Yes	98	Sed	No	No
Pyrene	0.001	Sed	0.001	Sed	Yes	0.015	Sed	Yes	No
Benzo(a)anthracene	0.0000573	SW	0.0000573	SW	No	0.00016	SW	Yes	No
Benzo(b)fluoranthene	0.0000959	SW	0.0000959	SW	Yes	0.00016	SW	Yes	No
Benzo(k)fluoranthene	0.0009397	SW	0.0009397	SW	Yes	0.00016	SW	Yes	No
Benzo(a)pyrene	0.0000155	SW	0.0000155	SW	Yes	0.000016	SW	Yes	No
Chrysene	0.0018023	Sed	0.0018023	Sed	Yes	0.0098	Sed	Yes	No
Dibenz(a,h)anthracene	0.0000286	SW	0.0000286	SW	Yes	0.000016	SW	Yes	No
Indeno(1,2,3-cd)pyrene	0.0003120	SW	0.0003120	SW	Yes	0.00016	SW	Yes	No
Total Carcinogenic Polycyclic Aromatic Hydrocarbons (TEQ)	0.0042	Sed	0.0042	Sed	Yes	0.0043	Sed	Yes	No
Other Semi-Volatile Organic Compounds									
Bis(2-ethylhexyl) phthalate	0.005	Sed	0.005	Sed	Yes	---	---	No	No
Di-n-butylphthalate	0.015	Sed	0.015	Sed	Yes	---	---	No	No
Di-n-octyl phthalate	0.008	Sed	0.008	Sed	Yes	---	---	No	No
4-Methylphenol (p-cresol)	0.09	Sed	0.09	Sed	Yes	---	---	No	No
Benzene	0.00015	DW	0.00015	DW	Yes	0.44	SW	Yes	No
Ethylbenzene	0.00590	DW	0.00590	DW	No	---	---	No	No
Toluene	0.02	DW	0.023	DW	Yes	---	---	No	No
Total xylenes	0.030	DW	0.030	DW	Yes	---	---	No	No

Notes:

mg/kg - milligrams per kilogram dry weight
ug/L - micrograms per liter
DC - direct contact
PQL - practical quantitative limit
DW - leaching to protect drinking water
NB - natural background
SW - leaching to protect surface water via groundwater
Sed - leaching to protect sediment via groundwater
TEQ - Total Toxic Equivalent Concentration (per Ecology's Implementation Memorandum #10, dated April 20, 2015).
1.The most stringent groundwater or surface water PCUL value.
* Arsenic groundwater PCUL (of 8 ug/L) is based on natural background and the surface water PCUL (of 0.018 ug/L) is based on the protection of surface water.
** - this PCUL may be updated based on the actual mercury concentrations at the site and the partitioning factors. This will be evaluated in the RIFS.
*** - not listed in PCUL. CLARC SW value used.

Table 15 Summary of Proposed RIWP Field Work
Maralco Property - Kent, WA

Data Gap	Sample Type	Figure 15 Sample ID Reference	Frequency *	Analysis **	Target Interval (see Note 1)
Groundwater Quality at Phase 2 Interim Action Areas 2a and 2b	Groundwater samples will be collected from direct push boreholes, one located near and downgradient of HB-1, HB-2, HB-3 and a second located near and downgradient of HB-5.	DPT-23 and DPT-24	Completed 12/20/24. One time event.	Groundwater - total/dissolved metals, chloride, fluoride - PAHs at DPT-24 only	Top of temporary well screen will be placed just above the top of the observed water table (estimated to be 8 ft bgs).
	If metal or salt ions are detected above screening levels in groundwater from temporary borings (DPT-23 or DPT-24), a monitoring well will be installed near that location.	Contingent MW-A (see Note 2)	If monitoring well installed, it will be sampled quarterly.	Groundwater - total/dissolved metals, cyanide and salt ions	Proposed well screens will be installed similar to existing wells, expected to be 5-15 ft bgs.
Extent of Salt Ions and Metals in Groundwater Off Property	Three direct push sampling locations on the Puget Pipe property to the north.	DPT-25, -26, and -27	One time event for DPT locations.	Soil - metals	From each location a vadose sample will be collected from 2-3 ft bgs and a saturated sample will be collected from the water table interface.
				Groundwater - total/dissolved metals, chloride, fluoride	Top of temporary well screen will be placed just above the top of the observed water table (estimated to be 8 ft bgs).
	A monitoring well will be installed if concentrations are detected above screening levels at direct push locations (DPT-23, -26 or -27). Two new monitoring wells will be installed along 77th Avenue S, west of the property and the BNSF property.	Contingent MW-B (see Note 2), MW-11, and MW-12	Monitoring wells will be sampled quarterly.	Groundwater - total/dissolved metals, cyanide and salt ions (all locations)	Proposed well screens will be installed similar to existing wells, expected to be 5-15 ft bgs.
Soil and Groundwater Quality Beneath Former Building	Two direct push boreholes beneath the former building following demolition. One borehole will be advanced immediately downgradient of the furnace location. A second location will be advanced about 100 feet north of the first location.	DPT-28 and DPT-29	Completed on 1/6/25. One time event.	Soil - metals	From each location a vadose sample will be collected from 2-3 ft below the preload/soil interface and a saturated sample will be collected from the water table interface.
				Groundwater - total/dissolved metals, chloride, fluoride	Top of temporary well screen will be placed just above the top of the observed water table (estimated to be 12 ft bgs with preload material in place).
Groundwater Quality Beneath Former Dross Pile	Three evenly spaced direct push locations beneath the former dross pile.	DPT-30 through DPT-32	Completed on 1/6/25. One time event.	Groundwater - total/dissolved metals, chloride, fluoride	Top of temporary well screen will be placed just above the top of the observed water table (estimated to be 7 ft bgs).
Groundwater and Soil Quality Associated with the former UST	Two direct push boreholes in the vicinity of the former UST. One location will replicate the south sidewall sample at PE-1. The second location will evaluate the elevated water sample collected at SB-1.	DPT-33 and DPT-34	Completed 12/20/24. One time event.	Soil - TPH-DRO/ORO, metals, benzene, toluene, total xylenes, PAHs and other SVOCs	8-10 ft below original ground surface.
				Groundwater - TPH-DRO/ORO, total/dissolved metals, chloride, fluoride	Top of temporary well screen will be placed just above the top of the observed water table (estimated to be 7 ft bgs).
	A monitoring well will be installed approximately 10 feet downgradient from DPT-2.	MW-9	The well will be sampled quarterly.	Groundwater - TPH-Dx (with and without silica gel cleanup and VPH/EPH), cPAHs/PAHs, BTEX, total/dissolved metals and cyanide	Proposed well screens will be installed similar to existing wells, expected to be 5-15 ft bgs.
Monitoring Well Inspection, Replacement, and Sampling	MW-4 and MW-8 are damaged and will be abandoned. MW-3R, MW-4R, MW-5R2, MW-6R, and MW-8R will be installed as replacement wells for MW3A, MW4, MW-5R, MW6 and MW-8. MW4A will not be replaced but a new well (MW-10) will be installed 50 to 100 feet east of this location. Existing wells (MW-1, MW-2, and MW-7) will be inspected and may be converted to flush mount surface completion and developed based on observed site conditions.	Existing wells: MW-1, MW-2, and MW-7. Proposed Wells: MW-3R, MW-4R, MW-5R2, MW-6R, MW-8R and MW-10	Wells will be sampled quarterly.	Groundwater– total/dissolved metals, cyanide, salt ions at all wells. TPH-Dx (with and without silica gel cleanup and VPH/EPH) and BTEX at MW-4R, MW-5R2, MW-6R, MW-7 and MW-10. PAH/cPAHs and other GW SVOCs at MW-4R, MW-10. Chromium speciation first quarter at MW-5R2.	Proposed well screens will be installed similar to existing wells, expected to be 5-15 ft bgs.
Surface Water Quality Following Interim Actions	Install a staff gauge and monitor surface water at the upstream end of the culvert that discharges from the property to the S 202nd Street ditch. Additional samples will also be collected from stormwater entering from the southwest adjacent property and from the ditch at 80th Avenue S. There are two other locations where stormwater enters the property from catch basins in S 202nd Street. These locations are not proposed for monitoring due to the limited catchment addressed and the low anticipated flows. These locations may be sampled, if needed.	SW-Staff Gauge SW-South SW-East	One time event during the wet season.	Surface water - total/dissolved metals, salt ions, cyanide	Surface water samples will be collected from the upper 6 inches of the water column.

Notes:

Blue Shade Ecology approved this portion of the SRIWP field work via an email dated 12/19/2024.

GW Metals - aluminum, antimony, arsenic, barium, cobalt, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, vanadium, and zinc.

Soil Metals - aluminum, antimony, arsenic, barium, cobalt, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, silver, thallium, vanadium, and zinc.

TPH DRO/ORO- Total Petroleum Hydrocarbons Diesel/Oil-Range Organics. Groundwater samples will be analyzed with and without silica gel cleanup and also for extractable/volatile petroleum hydrocarbons (EPH/VPH).

Other GW SVOCs - 1-methylnaphthalene, fluoranthene, and pyrene

PAHs - polycyclic aromatic hydrocarbons (includes carcinogenic polycyclic aromatic hydrocarbon)

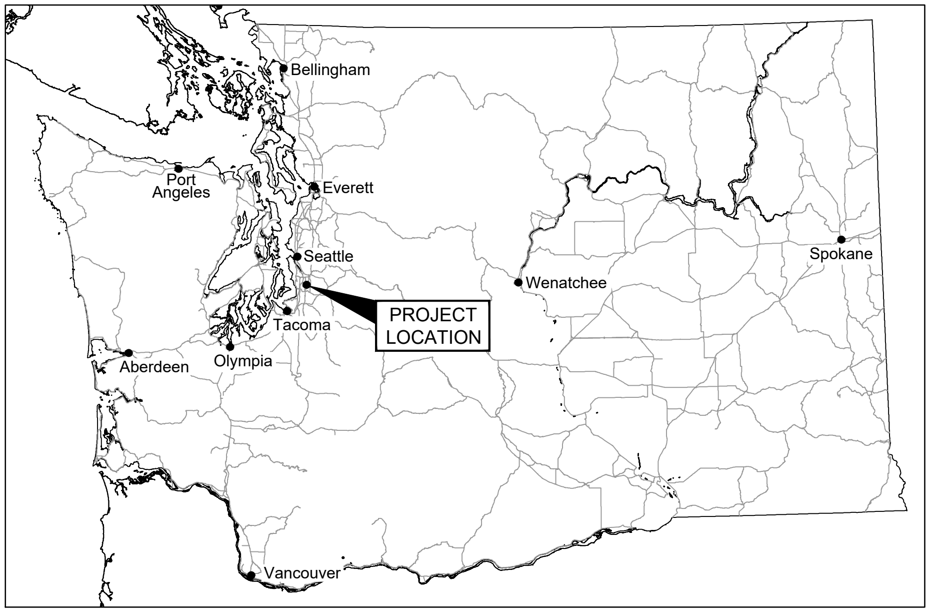
* Four quarters of quarterly groundwater sampling is planned.

** Soil samples may be collected during monitoring well installation based on field observations or to support empirical demonstration of compliance with PCULs. If a soil sample is collected at the installation of MW-9, that sample will be analyzed for PAH compounds. The quarterly groundwater monitoring well analysis program may be reduced if detections are below PCUL subject to approval from Ecology.

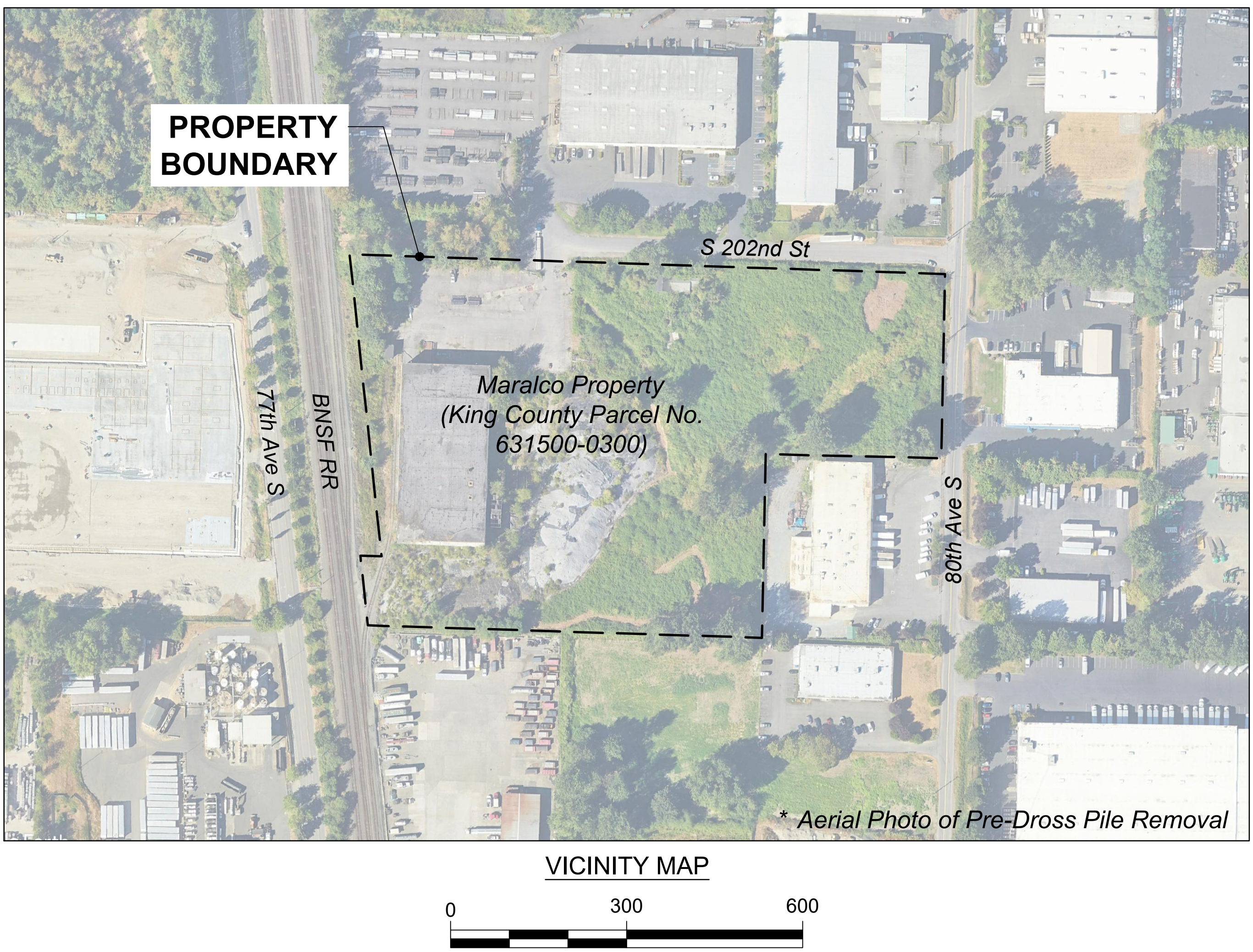
Note 1 - Target depths may be adjusted in the field based on observed water table, field observations of potential contamination, or sample recovery.

Note 2 - For contingent monitoring wells, the well ID will be adjusted so that it will be numbered sequentially based on existing wells and status of other contingent wells.

Figures



WASHINGTON LOCATION MAP



VICINITY MAP

Source: Google Earth. Image date 8/25/2022

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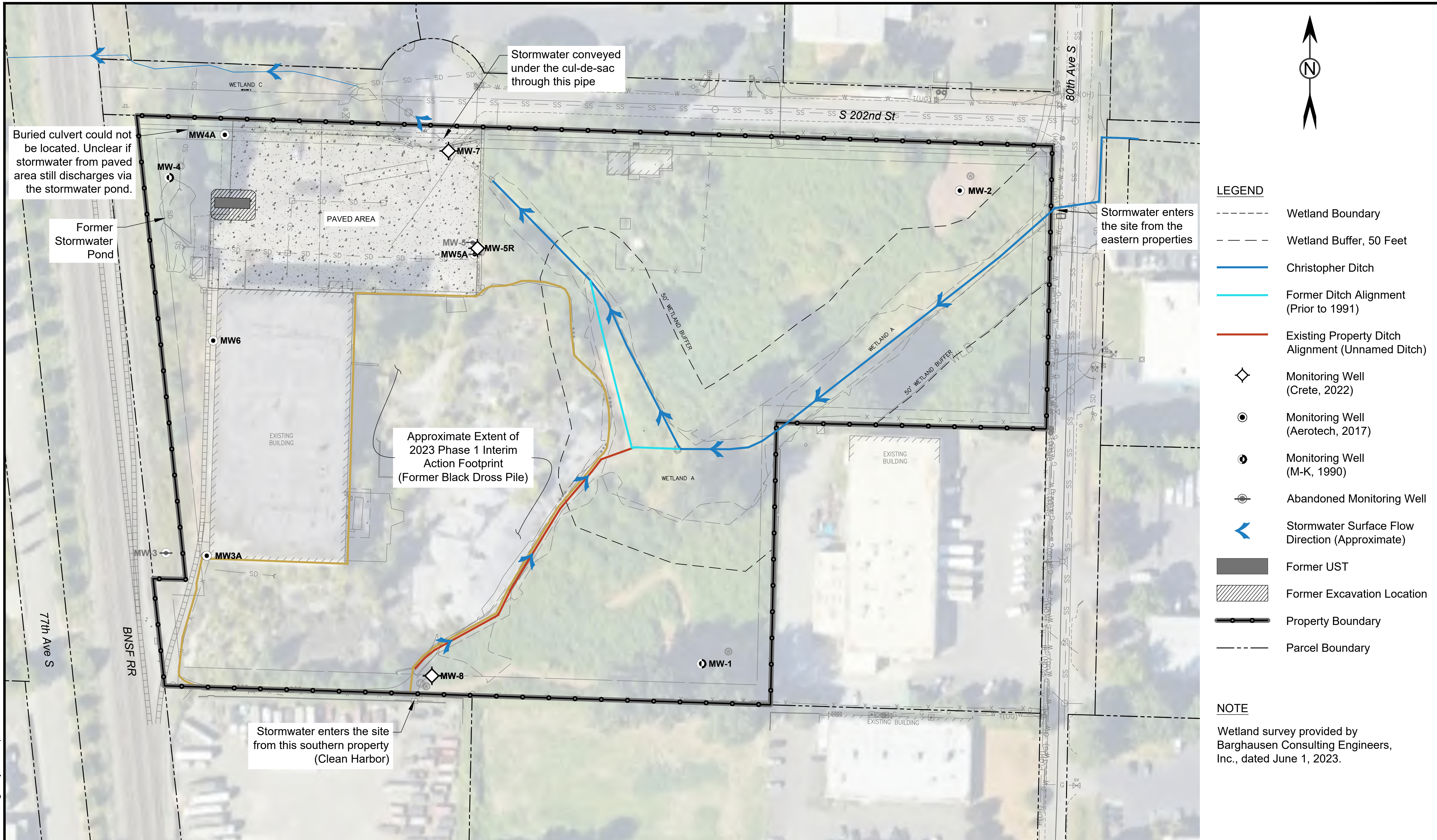
Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 1
Vicinity Map

File: Maralco Vicmap.dwg Layout: Vicmap



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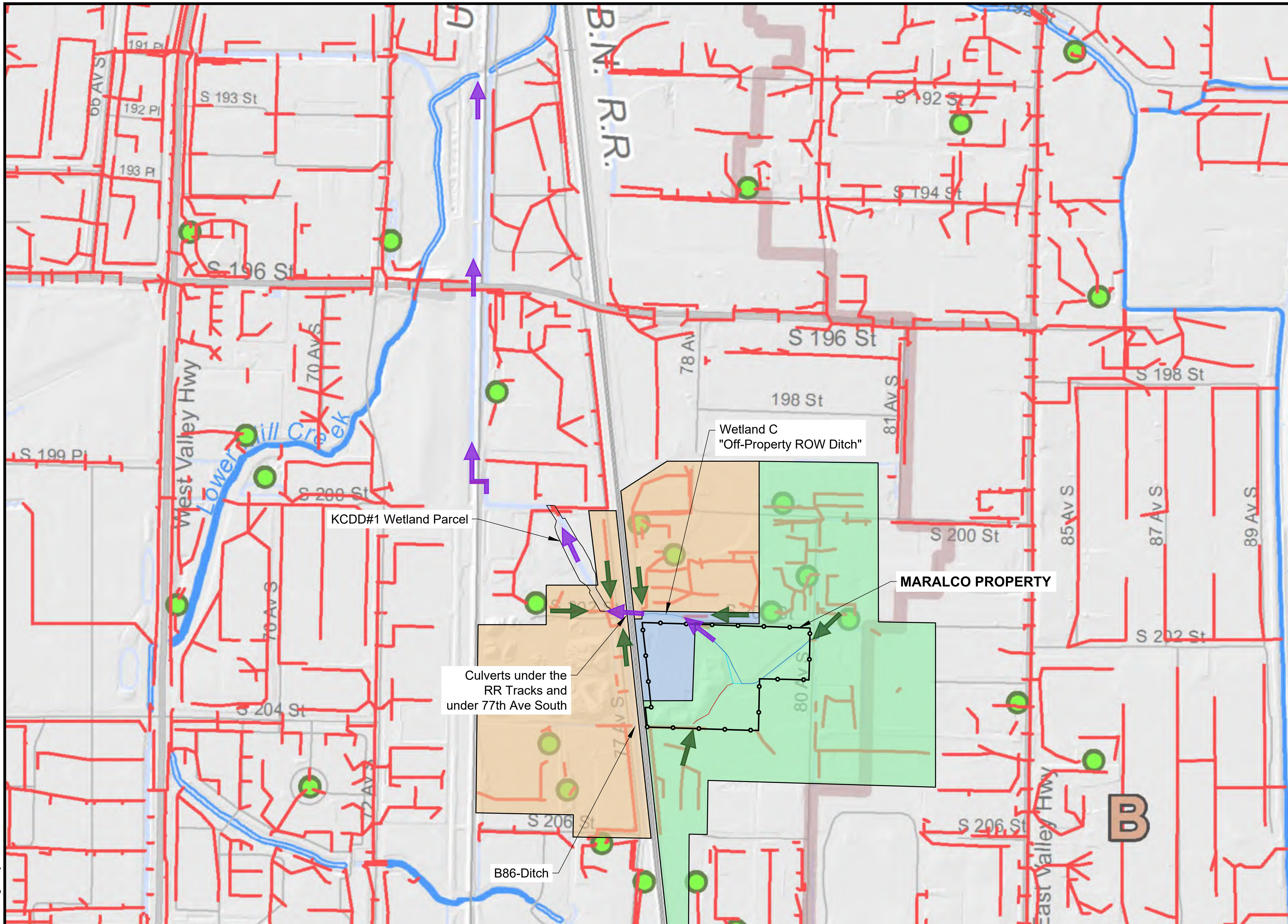
Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 2
Property Features

File: Maralco Site_SRIWP2025.dwg Layout: Prop Features



N

LEGEND

- Project Boundary
- Storm Drainage to Property
- Additional Storm Drainage to ROW Ditch
- Additional Storm Drainage to KCDD#1 Wetland
- Storm Sewer
- Detention Facility
- Christopher Ditch
- Former Ditch Alignment (Prior to 1993)
- Existing Property Ditch Alignment (Unnamed Ditch)
- Downstream Stormwater Flow in Main Ditch
- Stormwater Inputs to Main Ditch from Near Maralco Property

Source: "Surface Drainage Facilities" City of Kent GIS Department website, dated August 2019.

File: Maralco Site Adj_2024.dwg Layout: Storm

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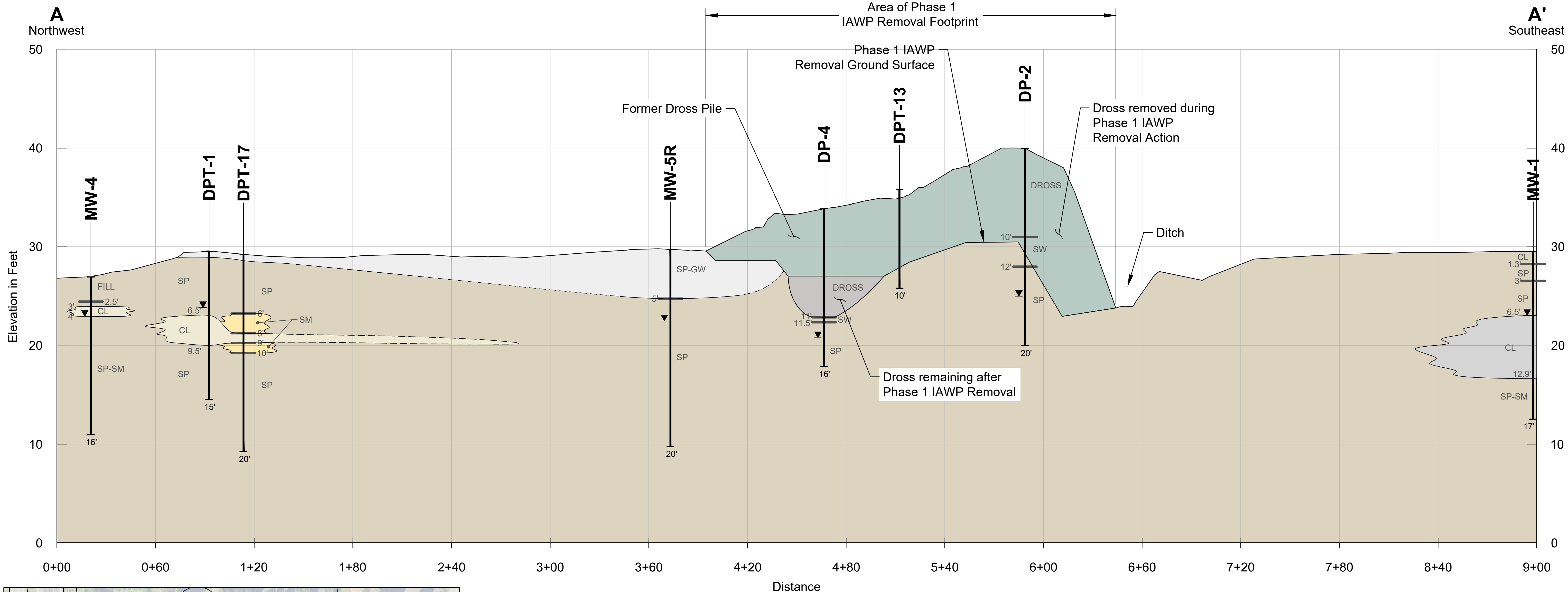
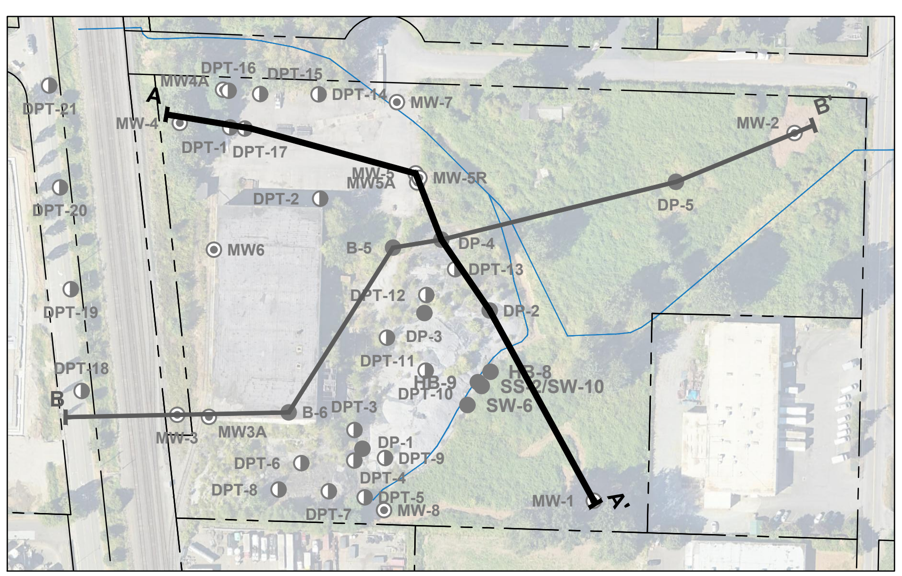
0 600 1200
SCALE IN FEET

Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 3
Current Stormwater Flow Conditions





KEY MAP

LEGEND

B-1	Exploration Designation
2'	Noted Lithologic Contact Depth Below Ground Surface (in Feet)
SM	Unified Soil Classification System
▼	Water Level Observed at Time of Drilling
	Approximate Distinct Lithologic Contact
16.5'	Depth of Exploration (in Feet)

SOIL CLASSIFICATIONS

SP	sand or sand-gravel mixtures, poorly-graded
SM	silty sand, sand and silt mixtures, minor to no gravel
CL	clay, low to moderate plasticity
ML	silt, sometimes with sand/clay/gravel
GW	gravel or sand-gravel mixtures, well-graded, fine to coarse
SW	sand or sand-gravel mixtures, well-graded, fine to coarse
CH	clay, high plasticity

0 10 20
VERTICAL SCALE IN FEET

0 60 120
HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION = 6X

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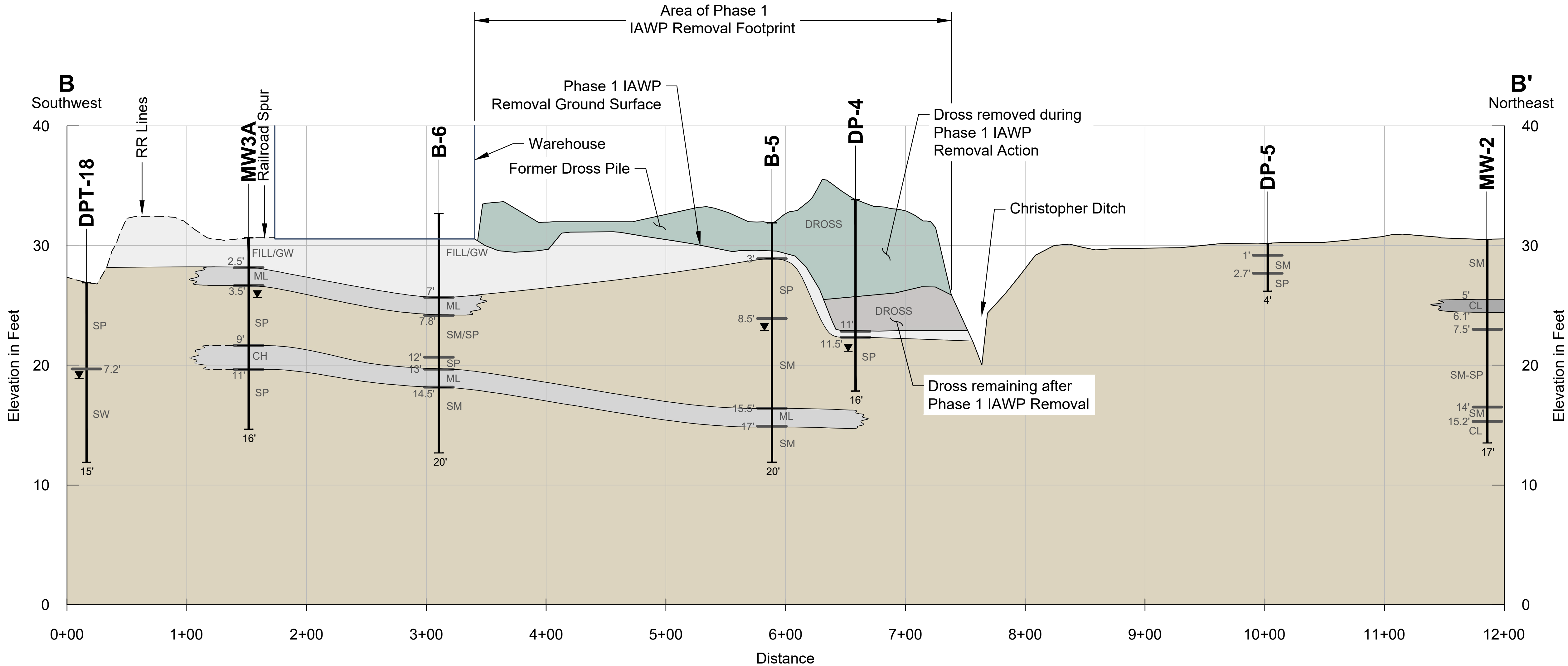
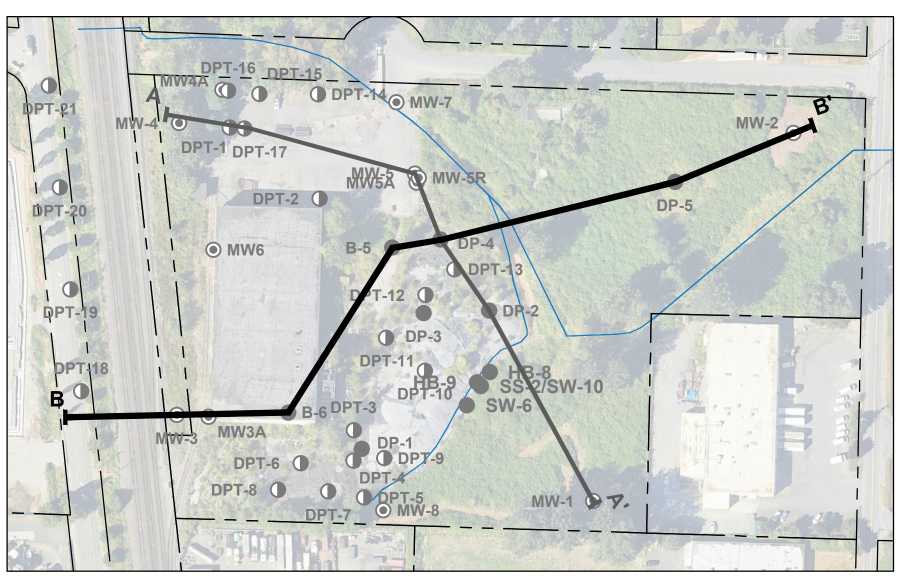
Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 4
Lithologic Cross-Section A-A'

File: Maralco Sections_2024.dwg Layout: Section A





KEY MAP

LEGEND

B-1	Exploration Designation
2'	Noted Lithologic Contact Depth Below Ground Surface (in Feet)
SM	Unified Soil Classification System
	Water Level Observed at Time of Drilling
	Approximate Distinct Lithologic Contact
16.5'	Depth of Exploration (in Feet)

SOIL DESCRIPTIONS

SP	sand or sand-gravel mixtures, poorly-graded
SM	silty sand, sand and silt mixtures, minor to no gravel
CL	clay, low to moderate plasticity
ML	silt, sometimes with sand/clay/gravel
GW	gravel or sand-gravel mixtures, well-graded, fine to coarse
SW	sand or sand-gravel mixtures, well-graded, fine to coarse
CH	clay, high plasticity

0 10 20
VERTICAL SCALE IN FEET

0 100 200
HORIZONTAL SCALE IN FEET
VERTICAL EXAGGERATION = 10X

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Maralco Site
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Kent, Washington
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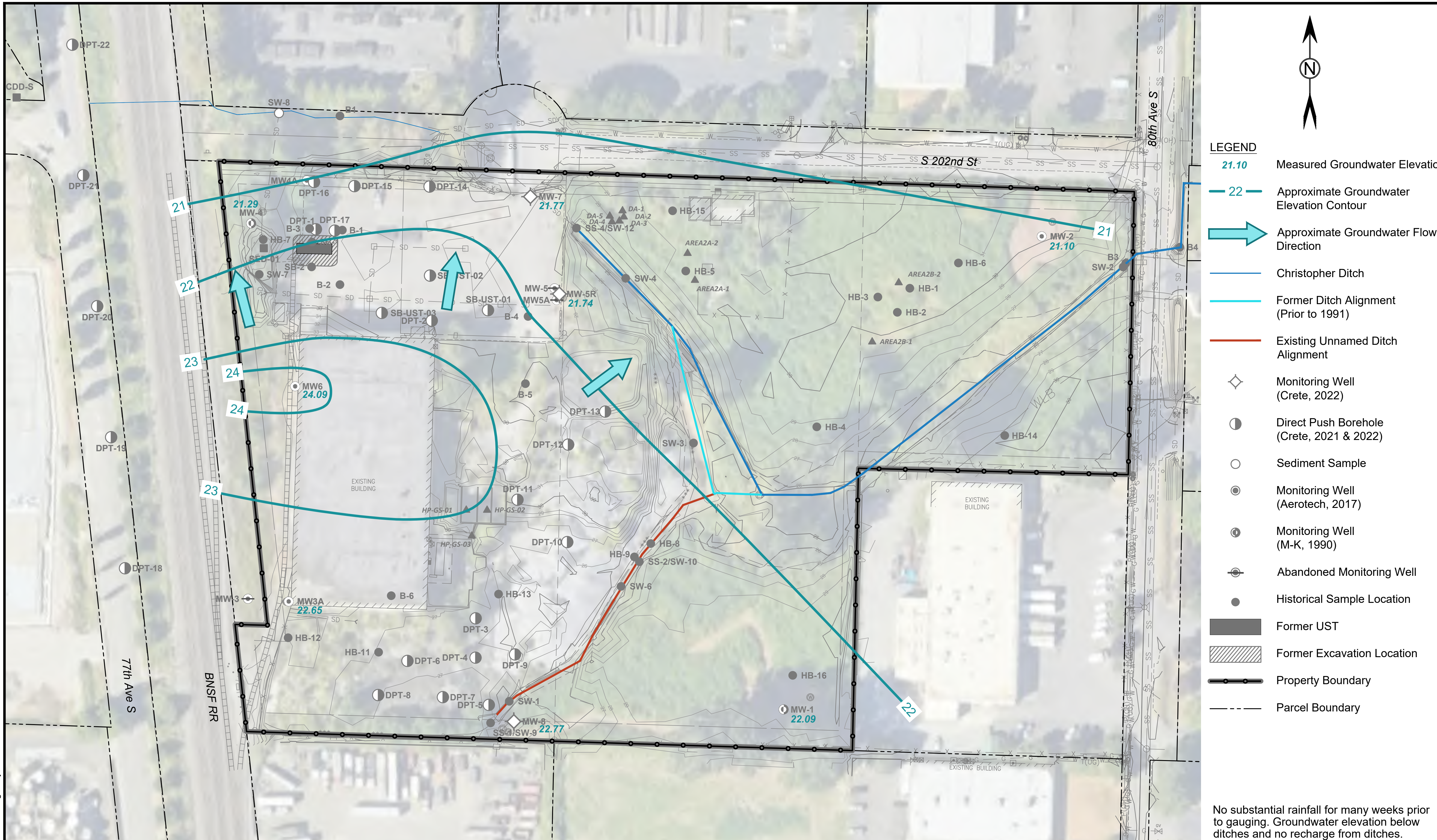
Figure 5
Lithologic Cross-Section B-B'

File: Maralco Sections_2024.dwg Layout: Section B



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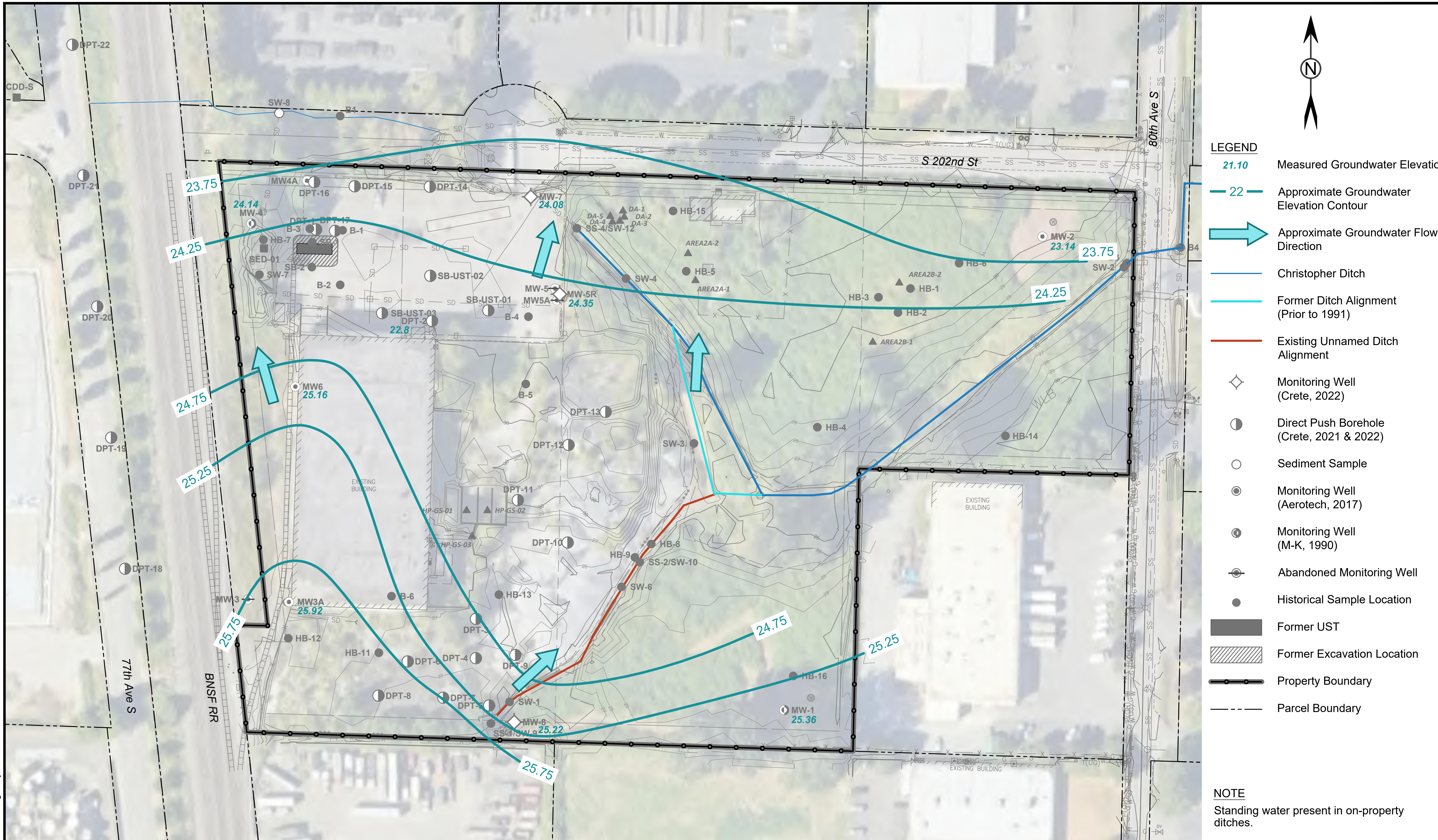
Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 6
Groundwater Flow Map
September 14, 2022

File: Maralco Site_SRIWP2025.dwg Layout: GW-20220914



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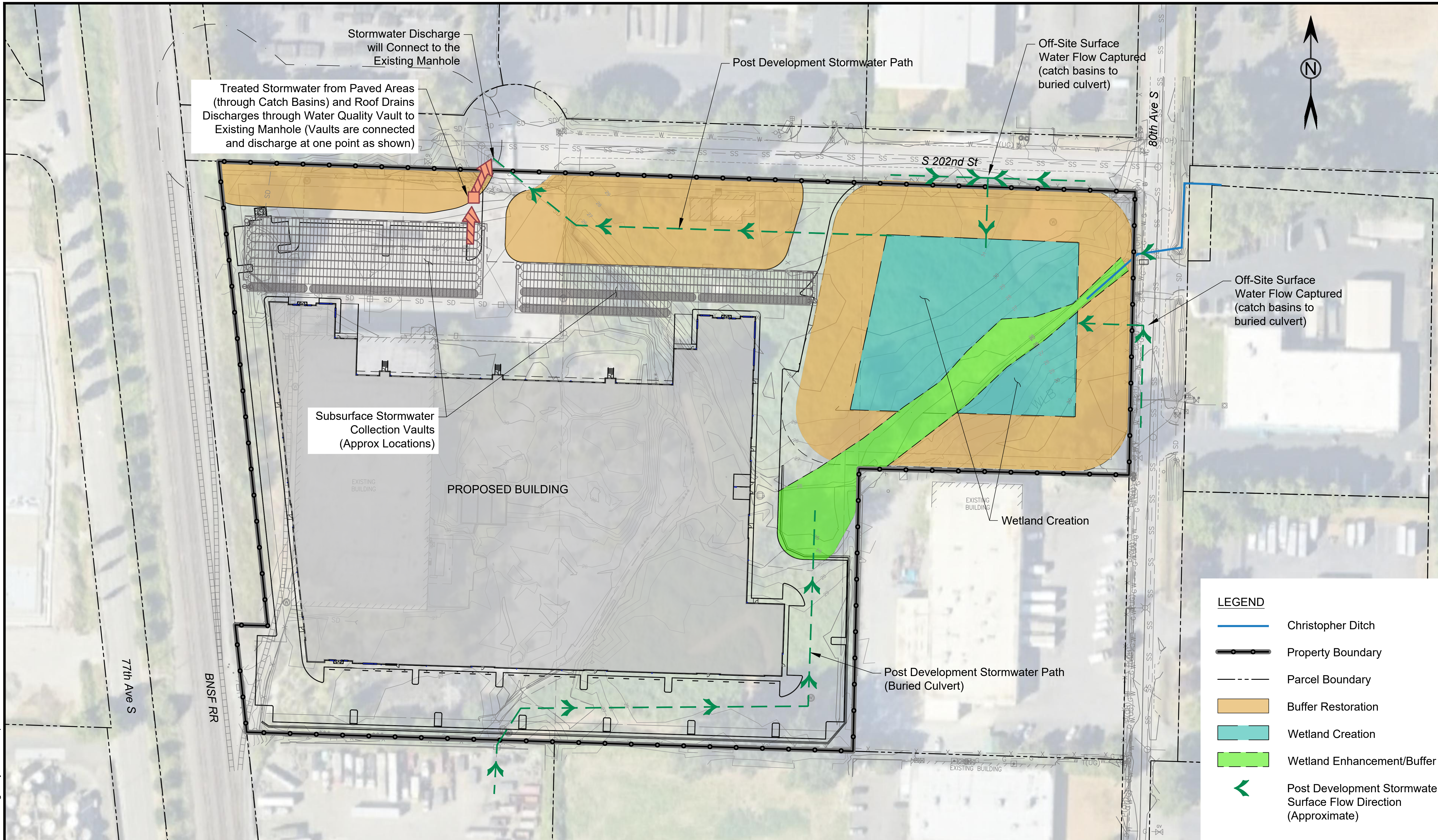
0 100 200
SCALE IN FEET

Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 7
Groundwater Flow Map
November 30, 2023

File: Maralco Site_SRIWP2025.dwg Layout: GW-20231130



File: Maralco Site_SRIWP2025.dwg Layout: Concept Plan

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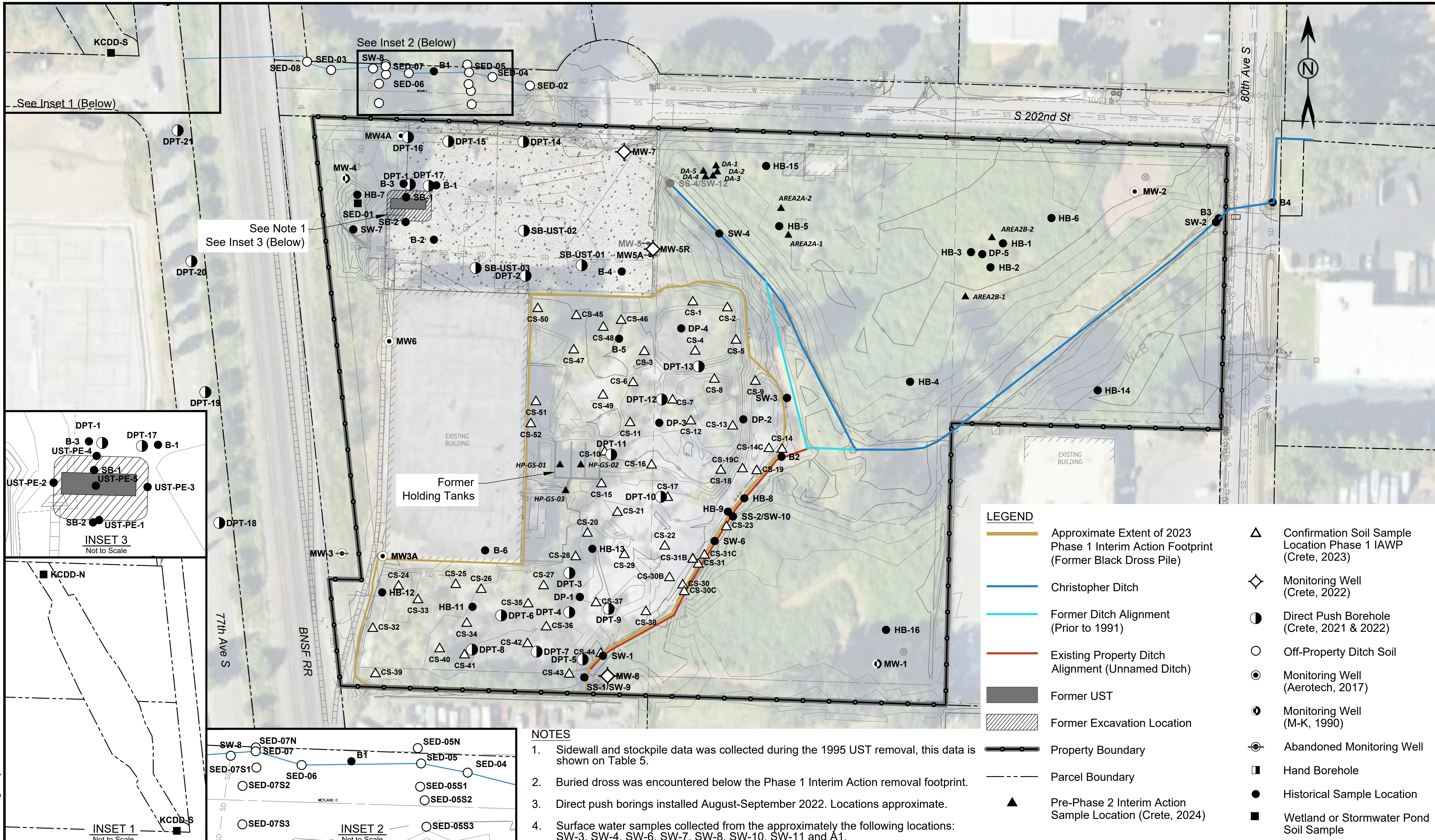
0 100 200
SCALE IN FEET

Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 8
Property Development Plan



NOTES

1. Sidewall and stockpile data was collected during the 1995 UST removal, this data is shown on Table 5.
2. Buried dross was encountered below the Phase 1 Interim Action removal footprint.
3. Direct push borings installed August-September 2022. Locations approximate.
4. Surface water samples collected from the approximately the following locations: SW-3, SW-4, SW-6, SW-7, SW-8, SW-10, SW-11 and A1.

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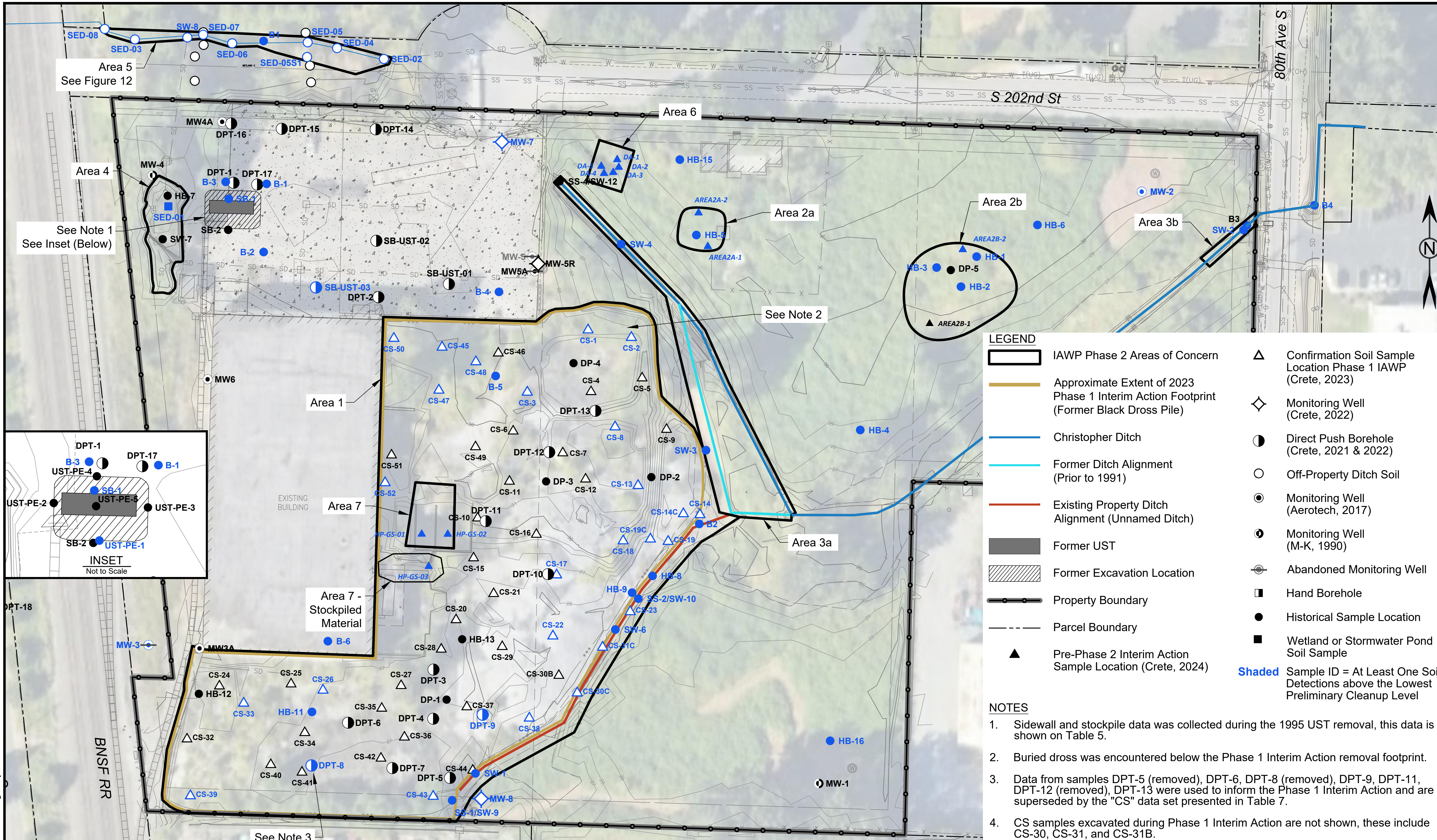
Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 9
Extent of Site Investigation Efforts

File: Maralco Site_SRIWP2025.dwg Layout: Site Invest



LEGEND

- IAWP Phase 2 Areas of Concern
- Approximate Extent of 2023 Phase 1 Interim Action Footprint (Former Black Dross Pile)
- Christopher Ditch
- Former Ditch Alignment (Prior to 1991)
- Existing Property Ditch Alignment (Unnamed Ditch)
- Former UST
- Former Excavation Location
- Property Boundary
- Parcel Boundary
- Pre-Phase 2 Interim Action Sample Location (Crete, 2024)
- Confirmation Soil Sample Location Phase 1 IAWP (Crete, 2023)
- Monitoring Well (Crete, 2022)
- Direct Push Borehole (Crete, 2021 & 2022)
- Off-Property Ditch Soil
- Monitoring Well (Aerotech, 2017)
- Monitoring Well (M-K, 1990)
- Abandoned Monitoring Well
- Hand Borehole
- Historical Sample Location
- Wetland or Stormwater Pond Soil Sample
- Shaded Sample ID = At Least One Soil Detections above the Lowest Preliminary Cleanup Level

NOTES

1. Sidewall and stockpile data was collected during the 1995 UST removal, this data is shown on Table 5.
2. Buried dross was encountered below the Phase 1 Interim Action removal footprint.
3. Data from samples DPT-5 (removed), DPT-6, DPT-8 (removed), DPT-9, DPT-11, DPT-12 (removed), DPT-13 were used to inform the Phase 1 Interim Action and are superseded by the "CS" data set presented in Table 7.
4. CS samples excavated during Phase 1 Interim Action are not shown, these include CS-30, CS-31, and CS-31B.

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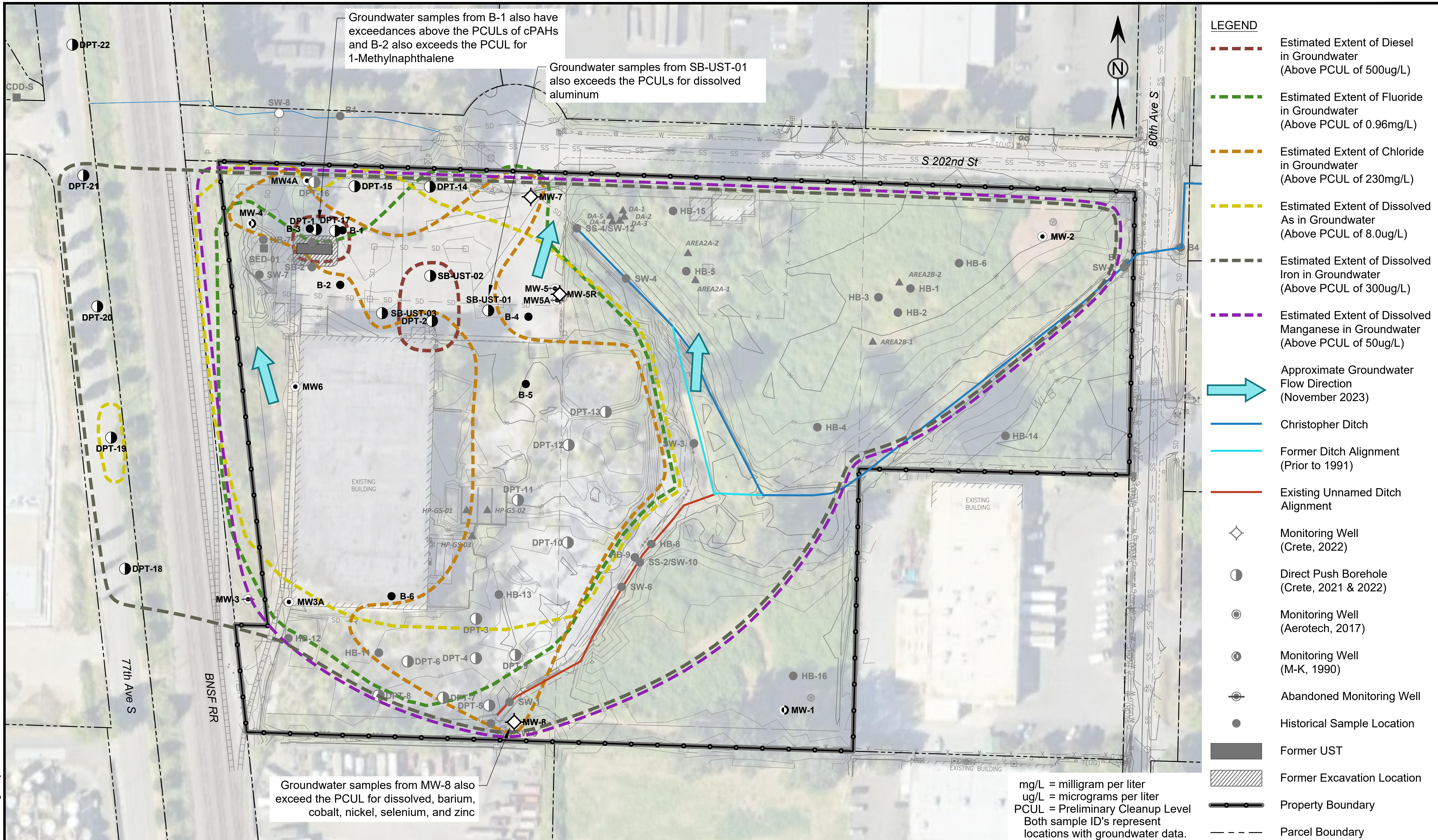
0 80 160
SCALE IN FEET

Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 10
Extent of On-Property Soil Contamination

File: Maralco Site_SRIWP2025.dwg Layout: 10-Soil



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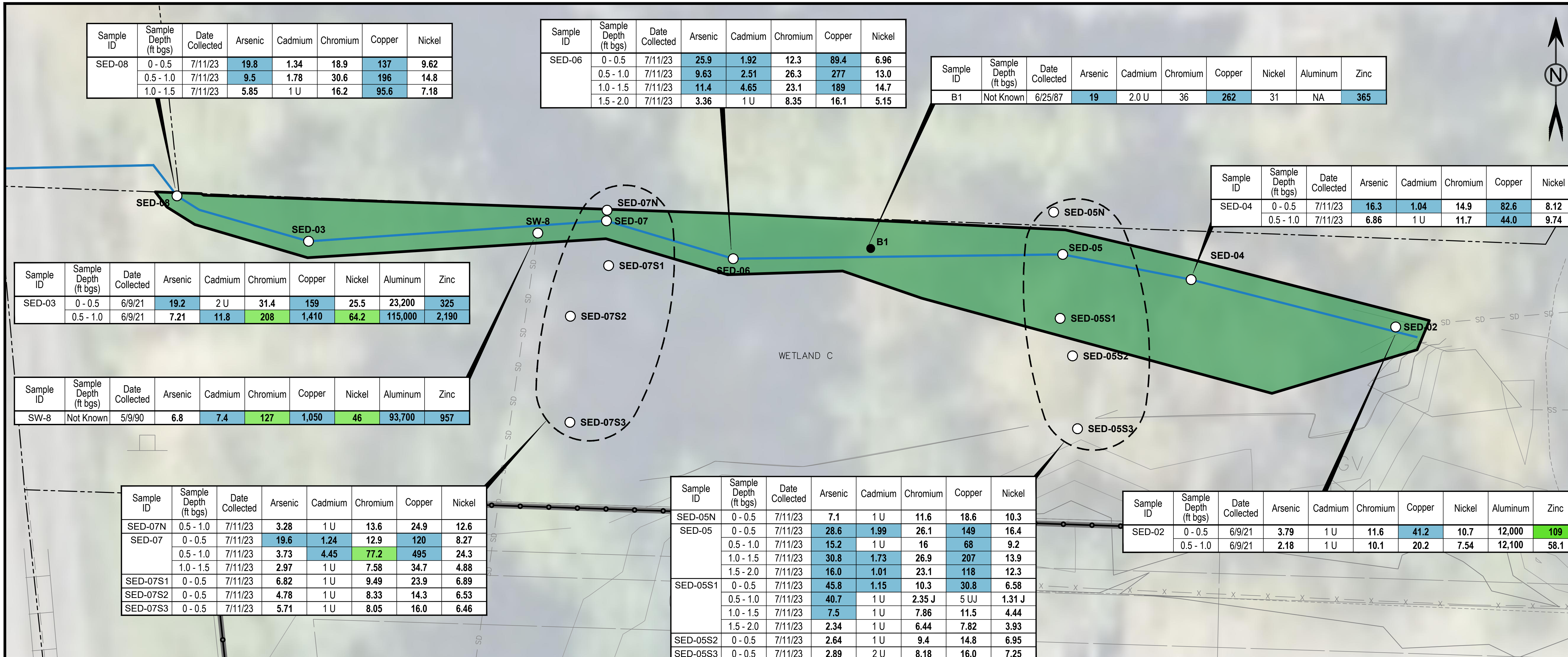
0 100 200
SCALE IN FEET

Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 11
Extent of Groundwater Impacts

File: Maralco Site_SRIWP2025.dwg Layout: GW



Sample ID	Sample Depth (ft bgs)	Date Collected	Arsenic	Cadmium	Chromium	Copper	Nickel
SED-08	0 - 0.5	7/11/23	**19.8**	**1.34**	**18.9**	**137**	**9.62**
	0.5 - 1.0	7/11/23	**9.5**	**1.78**	**30.6**	**196**	**14.8**
	1.0 - 1.5	7/11/23	**5.85**	1 U	**16.2**	**95.6**	**7.18**

Sample ID	Sample Depth (ft bgs)	Date Collected	Arsenic	Cadmium	Chromium	Copper	Nickel
SED-06	0 - 0.5	7/11/23	**25.9**	**1.92**	**12.3**	**89.4**	**6.96**
	0.5 - 1.0	7/11/23	**9.63**	**2.51**	**26.3**	**277**	**13.0**
	1.0 - 1.5	7/11/23	**11.4**	**4.65**	**23.1**	**189**	**14.7**
	1.5 - 2.0	7/11/23	**3.36**	1 U	**8.35**	**16.1**	**5.15**

Sample ID	Sample Depth (ft bgs)	Date Collected	Arsenic	Cadmium	Chromium	Copper	Nickel	Aluminum	Zinc
B1	Not Known	6/25/87	**19**	2.0 U	36	**262**	31	NA	**365**

Sample ID	Sample Depth (ft bgs)	Date Collected	Arsenic	Cadmium	Chromium	Copper	Nickel
SED-04	0 - 0.5	7/11/23	**16.3**	**1.04**	**14.9**	**82.6**	**8.12**
	0.5 - 1.0	7/11/23	**6.86**	1 U	**11.7**	**44.0**	**9.74**

Sample ID	Sample Depth (ft bgs)	Date Collected	Arsenic	Cadmium	Chromium	Copper	Nickel	Aluminum	Zinc
SED-03	0 - 0.5	6/9/21	**19.2**	2 U	**31.4**	**159**	**25.5**	**23,200**	**325**
	0.5 - 1.0	6/9/21	**7.21**	**11.8**	**208**	**1,410**	**64.2**	**115,000**	**2,190**

Sample ID	Sample Depth (ft bgs)	Date Collected	Arsenic	Cadmium	Chromium	Copper	Nickel	Aluminum	Zinc
SW-8	Not Known	5/9/90	**6.8**	**7.4**	**127**	**1,050**	**46**	**93,700**	**957**

Sample ID	Sample Depth (ft bgs)	Date Collected	Arsenic	Cadmium	Chromium	Copper	Nickel
SED-07N	0.5 - 1.0	7/11/23	**3.28**	1 U	**13.6**	**24.9**	**12.6**
SED-07	0 - 0.5	7/11/23	**19.6**	**1.24**	**12.9**	**120**	**8.27**
	0.5 - 1.0	7/11/23	**3.73**	**4.45**	**77.2**	**495**	**24.3**
	1.0 - 1.5	7/11/23	**2.97**	1 U	**7.58**	**34.7**	**4.88**
SED-07S1	0 - 0.5	7/11/23	**6.82**	1 U	**9.49**	**23.9**	**6.89**
SED-07S2	0 - 0.5	7/11/23	**4.78**	1 U	**8.33**	**14.3**	**6.53**
SED-07S3	0 - 0.5	7/11/23	**5.71**	1 U	**8.05**	**16.0**	**6.46**

Sample ID	Sample Depth (ft bgs)	Date Collected	Arsenic	Cadmium	Chromium	Copper	Nickel
SED-05N	0 - 0.5	7/11/23	**7.1**	1 U	**11.6**	**18.6**	**10.3**
SED-05	0 - 0.5	7/11/23	**28.6**	**1.99**	**26.1**	**149**	**16.4**
	0.5 - 1.0	7/11/23	**15.2**	1 U	**16**	**68**	**9.2**
	1.0 - 1.5	7/11/23	**30.8**	**1.73**	**26.9**	**207**	**13.9**
	1.5 - 2.0	7/11/23	**16.0**	**1.01**	**23.1**	**118**	**12.3**
SED-05S1	0 - 0.5	7/11/23	**45.8**	**1.15**	**10.3**	**30.8**	**6.58**
	0.5 - 1.0	7/11/23	**40.7**	1 U	**2.35 J**	5 UJ	**1.31 J**
	1.0 - 1.5	7/11/23	**7.5**	1 U	**7.86**	**11.5**	**4.44**
	1.5 - 2.0	7/11/23	**2.34**	1 U	**6.44**	**7.82**	**3.93**
SED-05S2	0 - 0.5	7/11/23	**2.64**	1 U	**9.4**	**14.8**	**6.95**
SED-05S3	0 - 0.5	7/11/23	**2.89**	2 U	**8.18**	**16.0**	**7.25**

Sample ID	Sample Depth (ft bgs)	Date Collected	Arsenic	Cadmium	Chromium	Copper	Nickel	Aluminum	Zinc
SED-02	0 - 0.5	6/9/21	**3.79**	1 U	**11.6**	**41.2**	**10.7**	**12,000**	**109**
	0.5 - 1.0	6/9/21	**2.18**	1 U	**10.1**	**20.2**	**7.54**	**12,100**	**58.1**

LEGEND

- ○ Sediment Sample
- IAWP Phase 2 Areas of Concern
- Christopher Ditch
- Property Boundary
- Parcel Boundary
- ● Historical Sample Location

mg/kg = milligram per kilogram
MTCA = Model Toxics Control Act
U = Concentration Below Reporting Detection Limit (non-Detect Value)

Bold = Detection
Shading (blue) Detection Level above the PCUL - Soil Protective of SW Vadose
Shading (green) Detection Level above the PCUL - Soil Protective of SW Saturated

0 20 40
SCALE IN FEET

Analytical Data

Sample ID	Sample Depth (ft bgs)	Date Collected	Arsenic	Cadmium	Chromium	Copper	Nickel	Aluminum	Zinc
SW-8	Not Known	5/9/90	**6.8**	**7.4**	**127**	**1,050**	**46**	**93,700**	**957**

Date Sampled
Result (mg/kg)

	Arsenic	Cadmium	Chromium	Copper	Nickel	Aluminum	Zinc
PCUL - Soil Protective of SW Vadose SL (mg/kg)	7.3	0.77	1500	36	68	33,000	130
PCUL - Soil Protective of SW Saturated SL (mg/kg)	7.3	0.77	74	36	48	33,000	85

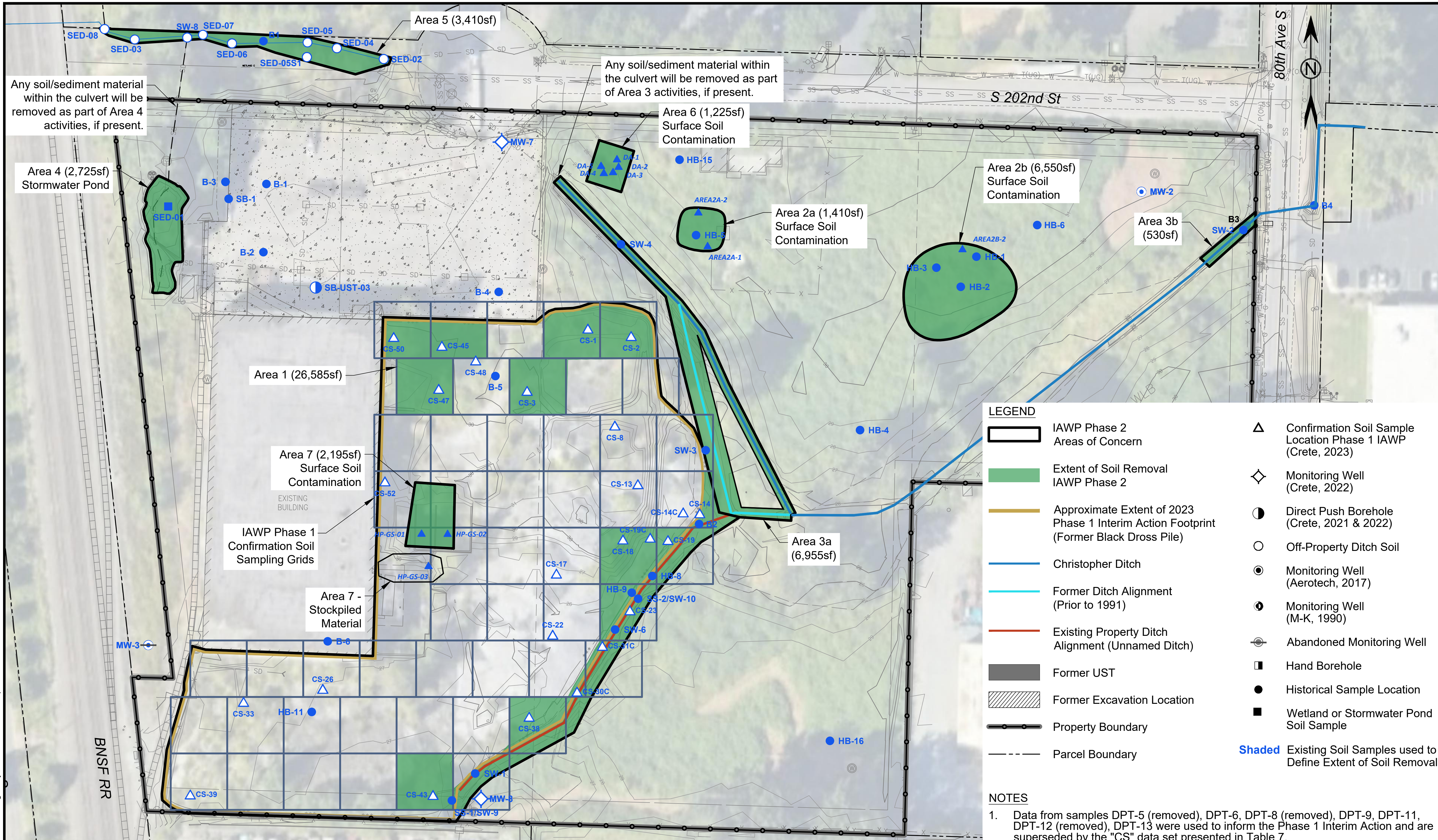
NOTE
Wetland survey provided by Barghausen Consulting Engineers, Inc., dated June 1, 2023.

CRETE CONSULTING, INC.

Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 12
Extent of 202nd Street Right-of-Way Ditch Soil Contamination

File: Maralco Site_SRIWP2025.dwg Layout: Ditch off-prop



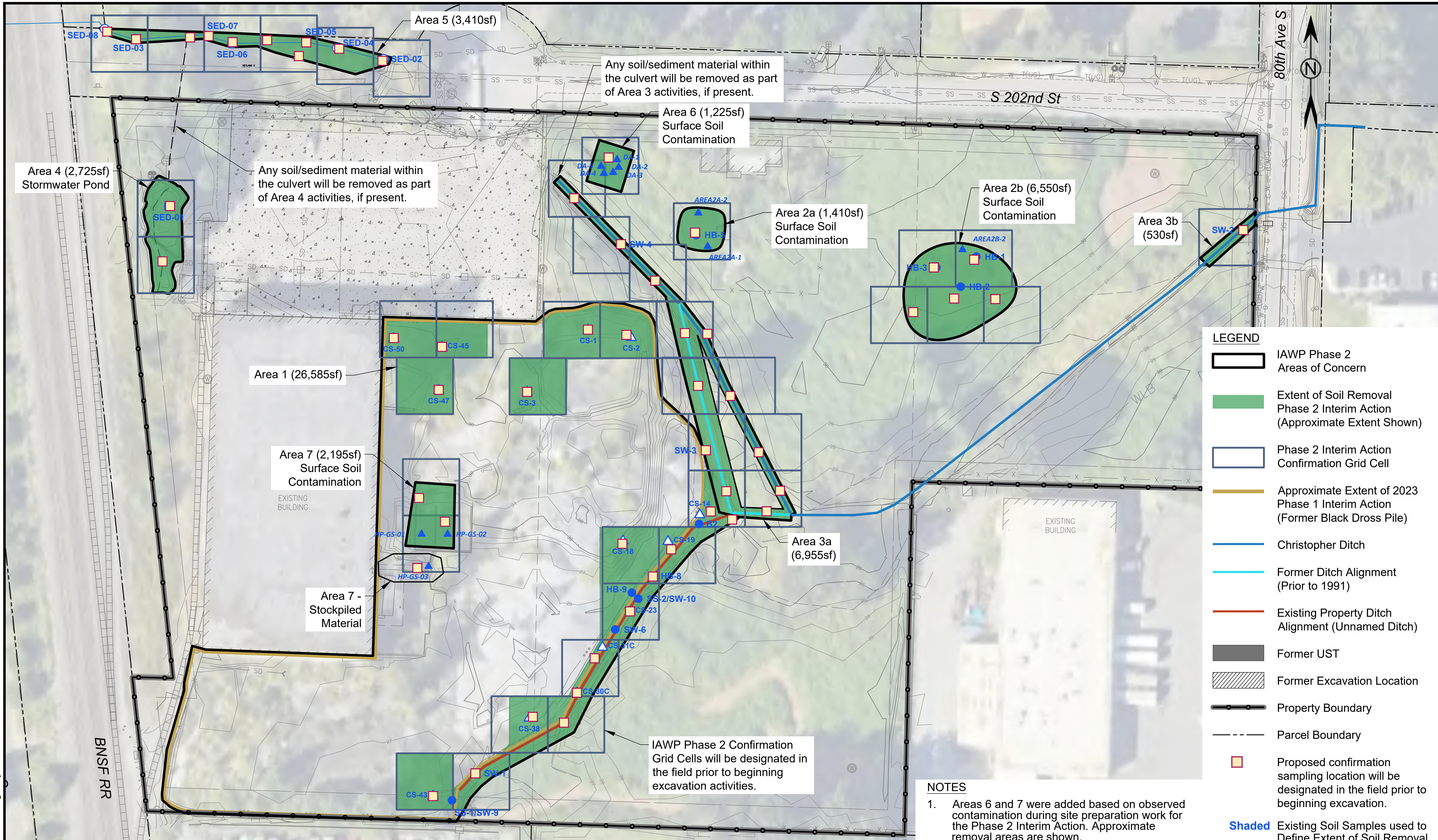
File: Maralco Site_SRIWP2025.dwg Layout: 13-Cont On-Prop

CRETE CONSULTING, INC.

0 80 160
SCALE IN FEET

Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 13
IAWP Phase 2 Action
Extent of Contaminated Soil Removal Areas



NOTES

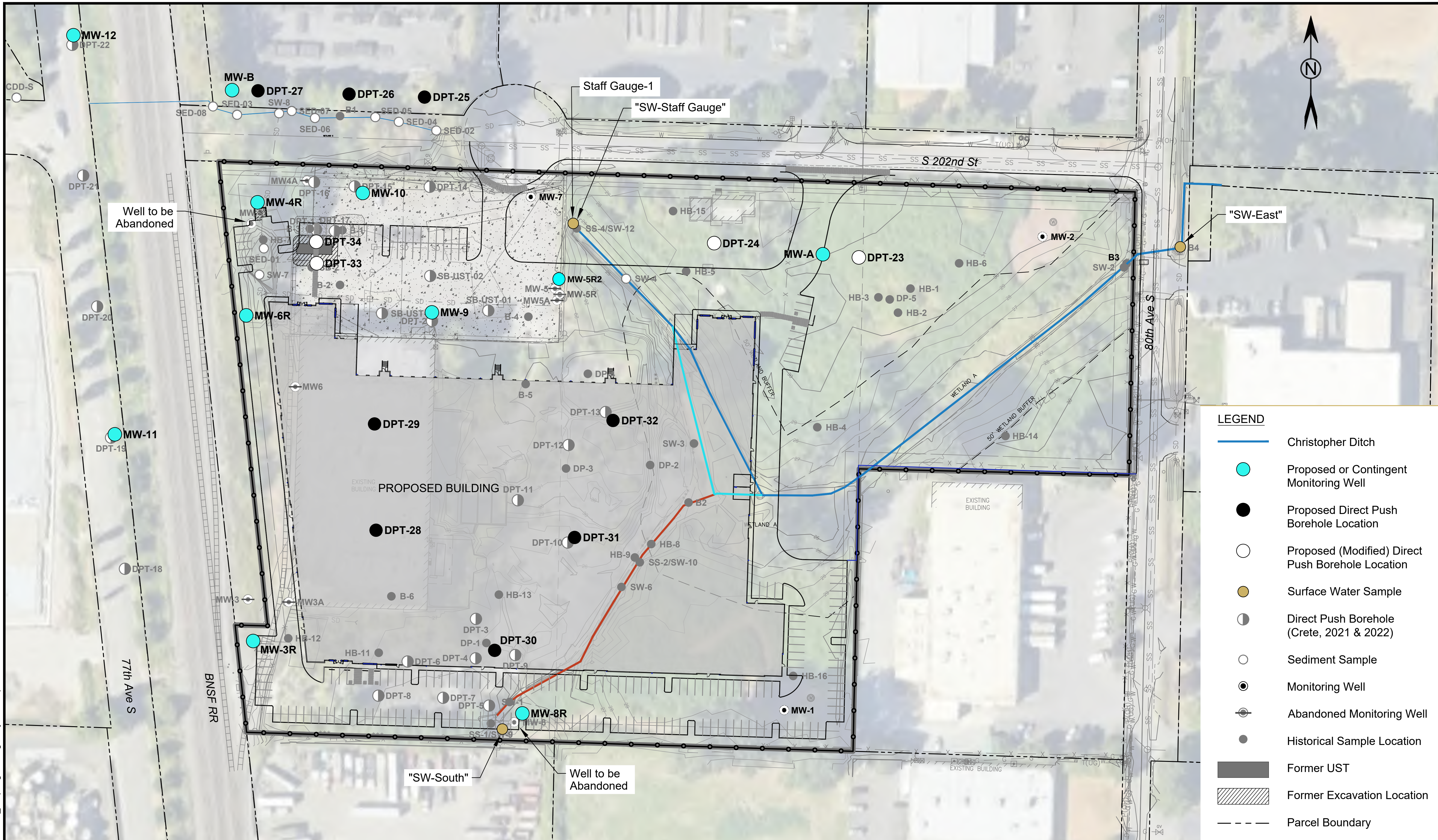
1. Areas 6 and 7 were added based on observed contamination during site preparation work for the Phase 2 Interim Action. Approximate removal areas are shown.

CRETE CONSULTING, INC.

Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 14
Confirmation Soil Sample Locations

File: Maralco Site_SRIWP2025.dwg Layout: 14 Conf



CRETE
CONSULTING, INC.

0 100 200
SCALE IN FEET

Maralco Site
7730 South 202nd Street
Kent, Washington
1/13/25

Figure 15
Proposed Sample Locations

File: Maralco Site_SRIWP2025_Prop Fig 15.dwg Layout: Prop

Appendix A

Recent (Since 2021) Analytical Data Reports

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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

June 3, 2021

Jamie Stevens, Project Manager
Crete Consulting
108 S. Washington St., Suite 300
Seattle, WA 98104

Dear Ms Stevens:

Included are the results from the testing of material submitted on May 25, 2021 from the Maralco, F&BI 105456 project. There are 32 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Rusty Jones
CTC0603R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on May 25, 2020 by Friedman & Bruya, Inc. from the Crete Consulting Maralco, F&BI 105456 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
105456 -01	DTP-1 5-6'
105456 -02	DTP-1 6-7'
105456 -03	DTP-1 9-10'
105456 -04	DTP-1-0521
105456 -05	DTP-2 5-6'
105456 -06	DTP-2 6-7.5'
105456 -07	DTP-2 8.5-10'
105456 -08	DTP-2-0521
105456 -09	DTP-3 2.5-3'
105456 -10	DTP-3 4.5'
105456 -11	DTP-3 6.5'
105456 -12	DTP-4 1.5-2.0'
105456 -13	DTP-4 4.5-5'
105456 -14	DTP-4 6.1-7.6'
105456 -15	DTP-5 0.3-0.9'
105456 -16	DTP-5 3.8-4.2'
105456 -17	DTP-5 4.2-5'
105456 -18	DTP-6 1.5-2'
105456 -19	DTP-6 2.6-3.1'
105456 -20	DTP-6 4.3-5'
105456 -21	DTP-7 11.7-12.2'
105456 -22	DTP-7 14.3-15'
105456 -23	DTP-8 8.2-8.4'
105456 -24	DTP-8 9.4-10'
105456 -25	DTP-8 11.7-12.2'
105456 -26	DTP-9 13.2-13.8'
105456 -27	DTP-9 14.5-15'
105456 -28	DTP-11 2.1-3.1'
105456 -29	DTP-11 4.5-5'
105456 -30	DTP-11 8.6-9.2'
105456 -31	DTP-13 7.2-8.2'
105456 -32	DTP-13 9.3-10'
105456 -33	DC-052421

CASE NARRATIVE (continued)

Samples DTP-1-0521 and DTP-2-0521 were sent to Fremont Analytical for chloride and fluoride analysis. In addition, samples DTP-5 0.3-0.9', DTP-6 1.5-2', DTP-8 8.2-8.4', DTP-9 13.2-13.8', DTP-11 2.1-3.1', DTP-11 8.6-9.2' and DTP-13 7.2-8.2' were sent to Fremont for aluminum and iron analysis. The report is enclosed.

All quality control requirements were acceptable.

Date of Report: 06/03/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456
Date Extracted: 05/27/21
Date Analyzed: 05/28/21

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES AND TPH AS GASOLINE USING METHODS 8021B AND NWTPH-Gx

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 50-150)
DTP-1 5-6’ 105456-01	<0.02	<0.02	<0.02	<0.06	<5	74
DTP-2 6-7.5’ 105456-06	<0.02	<0.02	<0.02	<0.06	<5	88
Method Blank 01-1286 MB2	<0.02	<0.02	<0.02	<0.06	<5	86

Date of Report: 06/03/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456
Date Extracted: 05/27/21
Date Analyzed: 05/28/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES AND TPH AS GASOLINE USING METHODS 8021B AND NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Gasoline Range	Surrogate (% Recovery) (Limit 52-124)
DTP-1-0521 105456-04	<1	<1	<1	<3	<100	99
DTP-2-0521 105456-08	<1	<1	<1	<3	<100	99
Method Blank 01-1287 MB	<1	<1	<1	<3	<100	96

Date of Report: 06/03/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456
Date Extracted: 05/26/21
Date Analyzed: 05/26/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
DTP-1-0521 105456-04	850 x	370 x	94
DTP-2-0521 105456-08	12,000 x	1,700 x	127
Method Blank 01-1318 MB	<50	<250	103

Date of Report: 06/03/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456
Date Extracted: 05/26/21
Date Analyzed: 05/26/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx
Sample Extracts Passed Through a Silica Gel Column Prior to Analysis
Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 47-140)
DTP-1-0521 105456-04	140 x	<250	117
DTP-2-0521 105456-08	4,500	430 x	ip
Method Blank 01-1318 MB	<50	<250	120

Date of Report: 06/03/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456
Date Extracted: 05/25/21
Date Analyzed: 05/25/21

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 53-144)
DTP-1 5-6’ 105456-01	<50	<250	101
DTP-2 6-7.5’ 105456-06	1,100	<250	102
Method Blank 01-1316 MB	<50	<250	101

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-5 0.3-0.9'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-15
Date Analyzed:	05/26/21	Data File:	105456-15.146
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Cadmium	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-5 0.3-0.9'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-15 x5
Date Analyzed:	05/27/21	Data File:	105456-15 x5.090
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<5
Chromium	12.0
Cobalt	<5
Copper	<25
Manganese	80.9
Nickel	6.38
Zinc	<25

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-6 1.5-2’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-18
Date Analyzed:	05/26/21	Data File:	105456-18.147
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Cadmium	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-6 1.5-2’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-18 x5
Date Analyzed:	05/27/21	Data File:	105456-18 x5.094
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	10.9
Chromium	10.6
Cobalt	<5
Copper	43.6
Manganese	140
Nickel	8.46
Zinc	353

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-8 8.2-8.4’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-23
Date Analyzed:	05/26/21	Data File:	105456-23.154
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Cadmium	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-8 8.2-8.4’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-23 x5
Date Analyzed:	05/27/21	Data File:	105456-23 x5.095
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	11.3
Chromium	17.0
Cobalt	6.65
Copper	56.5
Manganese	194
Nickel	14.0
Zinc	56.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-9 13.2-13.8’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-26
Date Analyzed:	05/26/21	Data File:	105456-26.155
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	4.83
Cadmium	2.37

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-9 13.2-13.8’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-26 x10
Date Analyzed:	05/27/21	Data File:	105456-26 x10.096
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<10
Chromium	4,530
Cobalt	<10
Copper	1,530
Manganese	1,860
Nickel	32.6
Zinc	364

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-11 2.1-3.1'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-28
Date Analyzed:	05/26/21	Data File:	105456-28.156
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Cadmium	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-11 2.1-3.1'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-28 x5
Date Analyzed:	05/27/21	Data File:	105456-28 x5.097
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<5
Chromium	25.7
Cobalt	6.30
Copper	58.1
Manganese	242
Nickel	27.4
Zinc	60.7

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-11 8.6-9.2'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-30
Date Analyzed:	05/26/21	Data File:	105456-30.157
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Cadmium	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-11 8.6-9.2’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-30 x5
Date Analyzed:	05/27/21	Data File:	105456-30 x5.098
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<5
Chromium	18.4
Cobalt	6.21
Copper	26.7
Manganese	229
Nickel	21.8
Zinc	50.8

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-13 7.2-8.2'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-31
Date Analyzed:	05/26/21	Data File:	105456-31.158
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Cadmium	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	DTP-13 7.2-8.2'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-31 x5
Date Analyzed:	05/27/21	Data File:	105456-31 x5.099
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<5
Chromium	19.8
Cobalt	6.10
Copper	29.3
Manganese	253
Nickel	20.6
Zinc	35.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	NA	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	I1-335 mb
Date Analyzed:	05/26/21	Data File:	I1-335 mb.103
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Manganese	<1
Nickel	<1
Zinc	<5

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	DTP-2 6-7.5'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/25/21	Lab ID:	105456-06 1/6
Date Analyzed:	05/25/21	Data File:	052505.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	57	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

Analysis For PCBs By EPA Method 8082A

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 105456
Date Extracted:	05/25/21	Lab ID:	01-1279 mb2 1/6
Date Analyzed:	05/25/21	Data File:	052504.D
Matrix:	Soil	Instrument:	GC7
Units:	mg/kg (ppm) Dry Weight	Operator:	IJL

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
TCMX	74	23	127

Compounds:	Concentration mg/kg (ppm)
Aroclor 1221	<0.02
Aroclor 1232	<0.02
Aroclor 1016	<0.02
Aroclor 1242	<0.02
Aroclor 1248	<0.02
Aroclor 1254	<0.02
Aroclor 1260	<0.02
Aroclor 1262	<0.02
Aroclor 1268	<0.02

Date of Report: 06/03/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES, AND TPH AS GASOLINE USING EPA METHOD 8021B AND NWTPH-Gx

Laboratory Code: 105390-02 (Duplicate)

Analyte	Reporting Units	Sample Result (Wet Wt)	Duplicate Result (Wet Wt)	RPD (Limit 20)
Benzene	mg/kg (ppm)	<0.02	<0.02	nm
Toluene	mg/kg (ppm)	<0.02	<0.02	nm
Ethylbenzene	mg/kg (ppm)	<0.02	<0.02	nm
Xylenes	mg/kg (ppm)	<0.06	<0.06	nm
Gasoline	mg/kg (ppm)	<5	<5	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	mg/kg (ppm)	0.5	96	69-120
Toluene	mg/kg (ppm)	0.5	100	70-117
Ethylbenzene	mg/kg (ppm)	0.5	100	65-123
Xylenes	mg/kg (ppm)	1.5	100	66-120
Gasoline	mg/kg (ppm)	20	85	71-131

Date of Report: 06/03/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR BENZENE, TOLUENE, ETHYLBENZENE, XYLENES, AND TPH AS GASOLINE USING EPA METHOD 8021B AND NWTPH-Gx

Laboratory Code: 105510-04 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Benzene	ug/L (ppb)	<1	<1	nm
Toluene	ug/L (ppb)	<1	<1	nm
Ethylbenzene	ug/L (ppb)	<1	<1	nm
Xylenes	ug/L (ppb)	<3	<3	nm
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Benzene	ug/L (ppb)	50	103	65-118
Toluene	ug/L (ppb)	50	105	72-122
Ethylbenzene	ug/L (ppb)	50	107	73-126
Xylenes	ug/L (ppb)	150	103	74-118
Gasoline	ug/L (ppb)	1,000	102	69-134

Date of Report: 06/03/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	100	96	63-142	4

Date of Report: 06/03/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample Silica Gel

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	124	116	61-133	7

Date of Report: 06/03/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: 105455-05 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	88	88	64-133	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	84	58-147

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 06/03/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456

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

Laboratory Code: 105471-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Antimony	mg/kg (ppm)	20	<5	84	83	75-125	1
Arsenic	mg/kg (ppm)	10	19.7	90 b	65 b	75-125	32 b
Cadmium	mg/kg (ppm)	10	<5	91	92	75-125	1
Chromium	mg/kg (ppm)	50	19.7	90	89	75-125	1
Cobalt	mg/kg (ppm)	20	<5	86	88	75-125	2
Copper	mg/kg (ppm)	50	246	70 b	34 b	75-125	69 b
Manganese	mg/kg (ppm	20	338	145 b	0 b	75-125	200 b
Nickel	mg/kg (ppm)	25	16.9	82	76	75-125	8
Zinc	mg/kg (ppm)	50	115	119 b	65 b	75-125	59 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Antimony	mg/kg (ppm)	20	98	80-120
Arsenic	mg/kg (ppm)	10	96	80-120
Cadmium	mg/kg (ppm)	10	95	80-120
Chromium	mg/kg (ppm)	50	103	80-120
Cobalt	mg/kg (ppm)	20	96	80-120
Copper	mg/kg (ppm)	50	98	80-120
Manganese	mg/kg (ppm)	20	98	80-120
Nickel	mg/kg (ppm)	25	98	80-120
Zinc	mg/kg (ppm)	50	90	80-120

Date of Report: 06/03/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL SAMPLES FOR
POLYCHLORINATED BIPHENYLS AS
AROCLOR 1016/1260 BY EPA METHOD 8082A**

Laboratory Code: 105390-02 1/6 (Matrix Spike) 1/6

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Control Limits	RPD (Limit 20)
Aroclor 1016	mg/kg (ppm)	0.25	<0.02	73	86	29-125	16
Aroclor 1260	mg/kg (ppm)	0.25	<0.02	75	89	25-137	17

Laboratory Code: Laboratory Control Sample 1/6

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Aroclor 1016	mg/kg (ppm)	0.25	98	55-137
Aroclor 1260	mg/kg (ppm)	0.25	103	51-150

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.

105456

SAMPLE CHAIN OF CUSTODY

ME [redacted] 05/25/21

Page # 1 of 4 VS3 VW1

[redacted]
Report To R. Jones | G. Hainsworth

Company Crete Consulting, Inc.

Address 108 S. Washington, Ste 300

City, State, ZIP Seattle, WA 98104

Phone ______ Email ______

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME MARALCO

PO #

REMARKS Metals List: Antimony, Aluminum, Ag, Cd, Chrom., Cobalt, Cu, Pb, Fe, Ni, Manganese, Zn

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
☒ Standard turnaround EW3
☐ RUSH______ BLL4
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	Chlorides / Fluorides	Metals (see List)			Notes
DPT-1 5-6'	01 A-F	5/24/21	0905	SOIL	6	X	X	X									
DPT-1 6-7'	02		0910		6												
DPT-1 9-10'	03		0920		6												
DPT-1-0521	04		0935	WATER	6	X	X	X					X				w/ + w/ SGC
DPT-2 5-6'	05		1015	SOIL	6												
DPT-2 6-7.5'	06		1020		6	X	X	X				X					
DPT-2 8.5-10'	07		1025		6												
DPT-2-0521	08		1040	WATER	6	X	X	X					X				w/ + w/ SGC
DPT-3 2.5-3'	09		1115	SOIL	1												
DPT-3 4.5'	10		1120		1												

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	5.25.21	1026
Received by: [signature]	Liz Webber-Bruya	F&B	5/25/21	1026
Relinquished by:				
Received by:		Samples received at 3 °C		

105456

SAMPLE CHAIN OF CUSTODY ME 05/25/21 VW1

Page # 2 of 4 VS3

Report To See Page 1

Company

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R-Jones

PROJECT NAME MARALCO

PO #

REMARKS Metals List: Sb, Al, As, Cd, Cr, Co, Cu, Fe, Mn, Pb, Ni, Zn

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME

☒ Standard turnaround EDB

☐ RUSH

Rush charges authorized by: BJU

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	Metals (see list)				Notes
DPT-3 6.5'	11	5.24.21	1125	SOIL	1												
DPT-4 1.5-2.0'	12	↓	1140	↓	1												
DPT-4 4.5-5'	13		1145		1												
DPT-4 6.1-7.6'	14		1150		1												
DPT-5 0.3-0.9'	15		1205		1								X				
DPT-5 3.8-4.2'	16		1210		1												
DPT-5 4.2-5'	17		1215		1												
DPT-6 1.5-2'	18		1235		1								X				
DPT-6 2.6-3.1'	19		1240		1												
DPT-6 4.3-5'	20	↓	1245	↓	1												

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R-Jones	Rusty Jones	CRETE	5.25.21	1026
Received by:	[signature]	Liz Webber-Bruya	F?B	5/25/21	1026
Relinquished by:					
Received by:					

Samples received at 3 °C

105456

SAMPLE CHAIN OF CUSTODY ME 05/25/21 [redacted]

Report To See Page 1

Company

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones	
PROJECT NAME MARALCO	PO #
REMARKS Metals List: Sb, Al, As, Cd, Cr, Co, Cu, Fe, Mn, Pb, Ni, Zn	INVOICE TO

Page # 3 of 4 VWL

TURNAROUND TIME
- ☒ Standard Turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Dispose after 30 days
- ☐ Archive Samples
- ☐ Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	Metals (see List)				Notes
DPT-7 11.7-12.2'	21	5.24.21	1305	SOIL	1												
DPT-7 14.3-15'	22		1310		1												
DPT-8 8.2-8.4'	23		1325		1								X				
DPT-8 9.4-10'	24		1330		1												
DPT-8 11.7-12.2'	25		1335		1												
DPT-9 ~~8.2-8.8~~ 13.2-13.8	26		1400		1								X				
DPT-9 ~~9.5-10~~ 14.5-15'	27		1405		1												
DPT-11 2.1-3.1'	28		1500		1								X				
DPT-11 4.5-5'	29		1505		1												
DPT-12 8.6-9.2'	30		1525		1								X				

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	5.25.21	1026
Received by:	Liz Webber-Bruya	F&B	5/25/21	1026
Relinquished by:				
Received by:		Samples received at 3 °C		

105456 [redacted]

SAMPLE CHAIN OF CUSTODY

ME 05/25/21

Page # 4 of 4 VW1 VS3

Report To See Page 1

Company

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R-Jones [redacted]

PROJECT NAME MARALCO

PO #

REMARKS Metals List: Sb, Al, As, Cd, Cr, Co, Cu, Fe, Mn, Pb, Ni, Zn

INVOICE TO

TURNAROUND TIME EJB
☒ Standard Turnaround
☐ RUSH BDY
Rush charges authorized by:

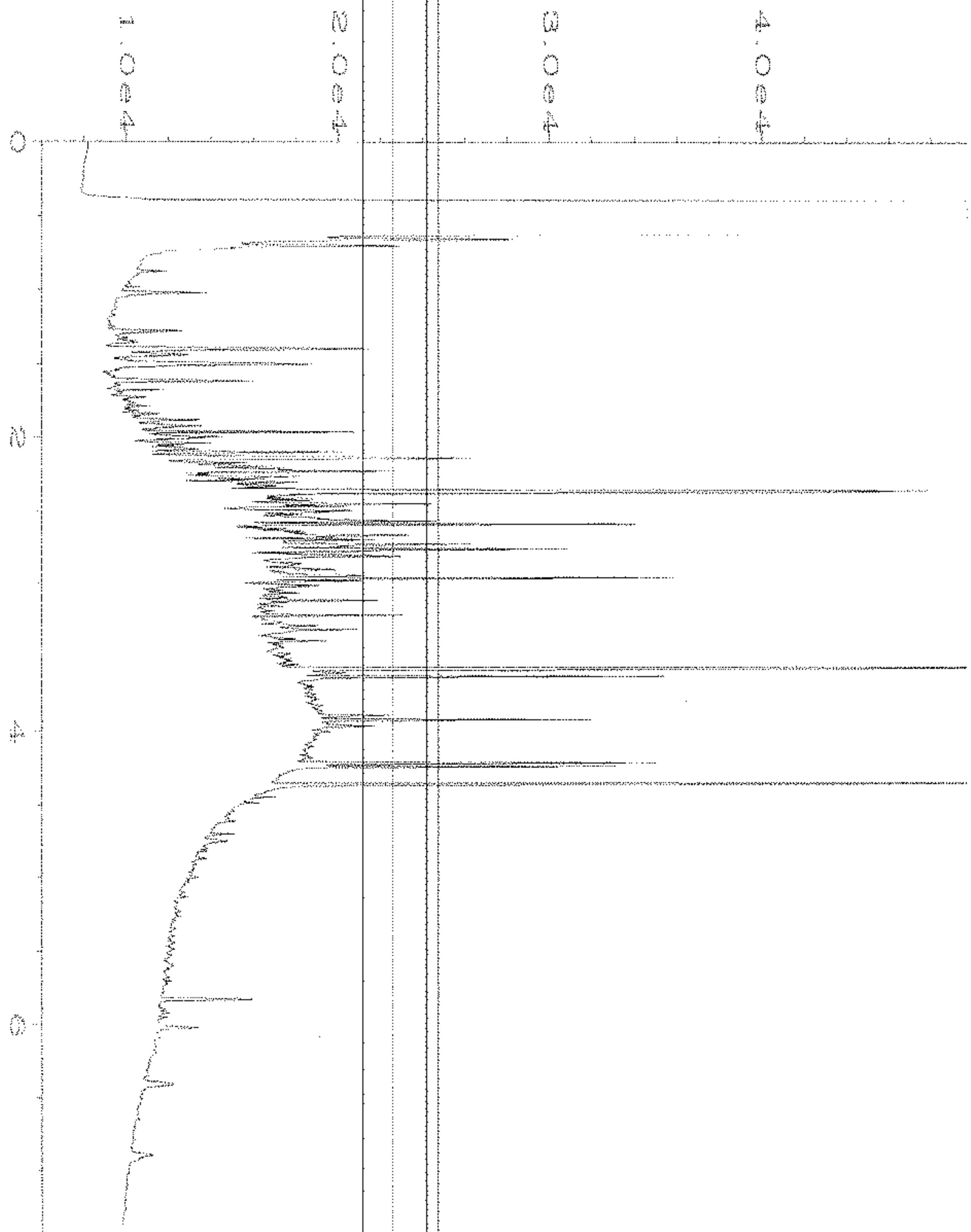
SAMPLE DISPOSAL
☐ Dispose after 30 days
☐ Archive Samples
☐ Other

ANALYSES REQUESTED

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	Metals (see List)	DOT 4.3	Dangerous when wet		Notes
DPT-13 7.2-8.2'	31	5/24/21	1550	SOIL	1								X				
DPT-13 9.3-10'	32	↓	1555	↓	1												
DC-052421	33 A-D	5/24/21	1600	SOIL	4										X	®	Added at lab (NP) 5/25/21
																	(Y) per RJ 6/3/21 MG

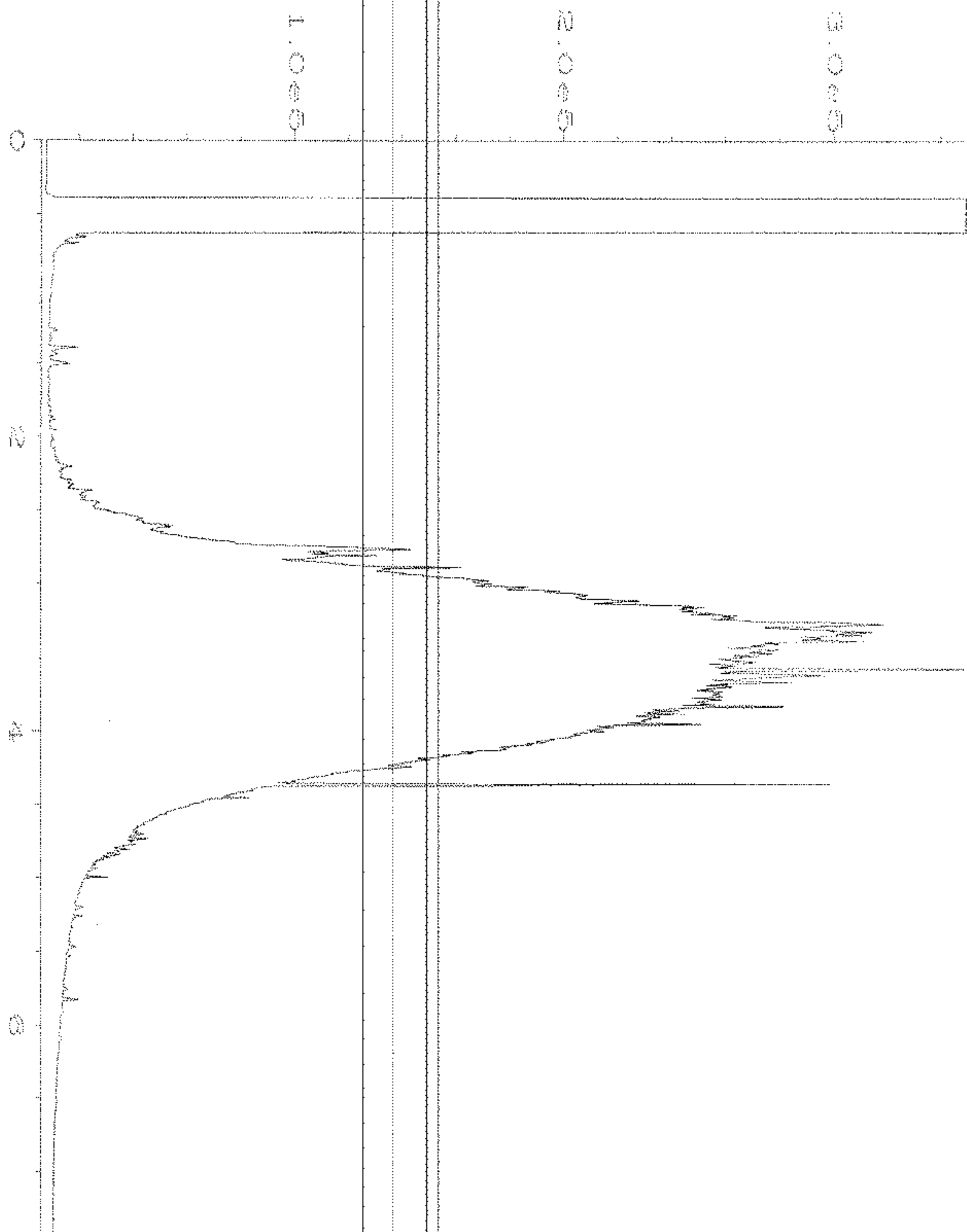
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R-Jones	Rusty Jones	CRETE	5.25.21	1026
Received by: [signature]	Liz Webber-Bruya	F&B	5/25/21	1026
Relinquished by:				
Received by:		Samples received at 3 °C		



Data File Name : C:\HPCHEM\1\DATA\05-26-21\022F0601.D
Operator : TL
Instrument : GC1
Sample Name : 105456-04
Run Time Bar Code:
Acquired on : 26 May 21 03:04 PM
Report Created on: 27 May 21 09:38 AM

Page Number : 1
Vial Number : 22
Injection Number : 1
Sequence Line : 6
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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Data File Name    : C:\HPCHEM\1\DATA\05-26-21\023F0601.D
Operator          : TL                              Page Number      : 1
Instrument        : GC1                             Vial Number      : 23
Sample Name       : 105456-08                       Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 6
Acquired on       : 26 May 21   03:16 PM            Instrument Method: DX.MTH
Report Created on: 27 May 21   09:38 AM             Analysis Method  : DEFAULT.MTH
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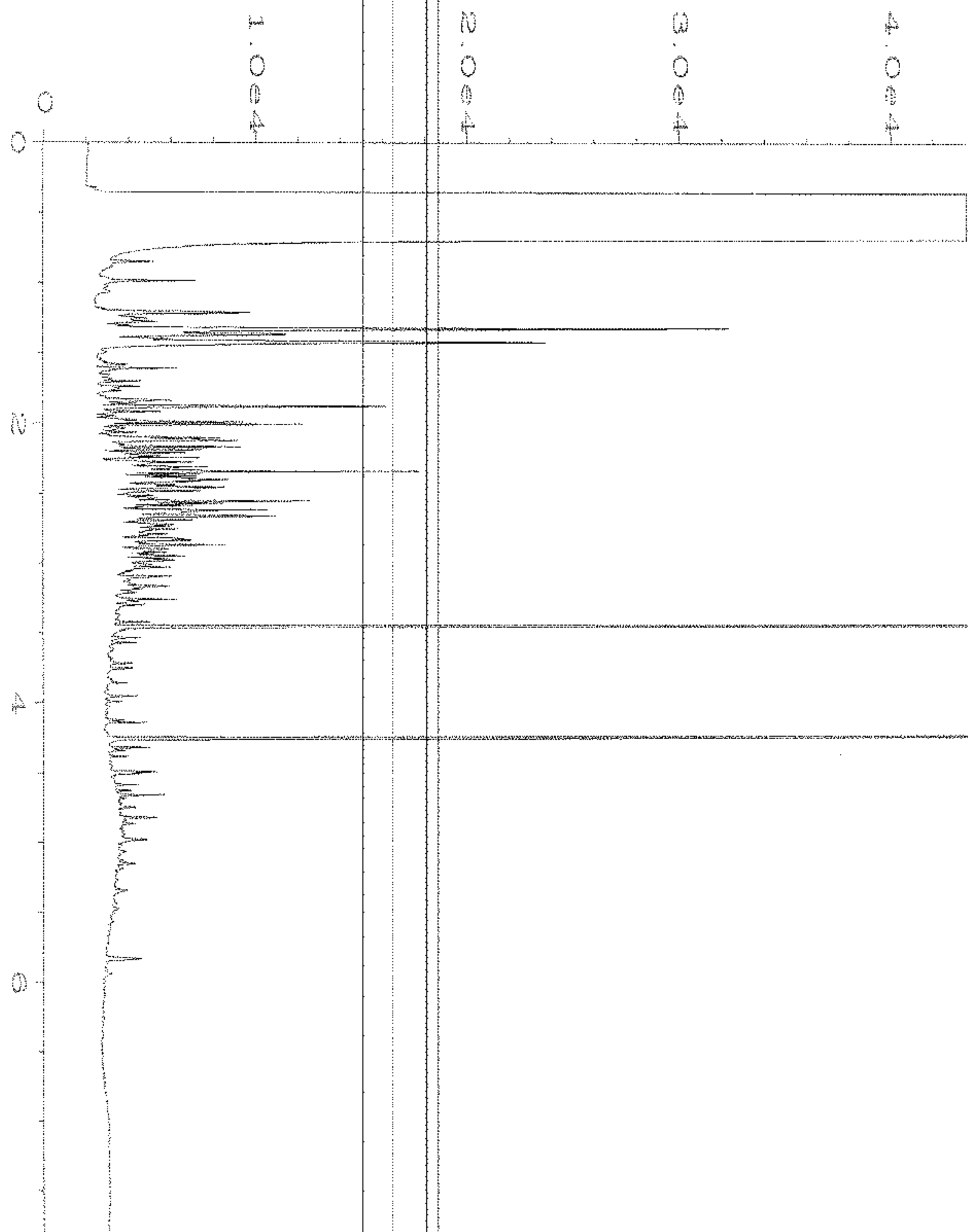
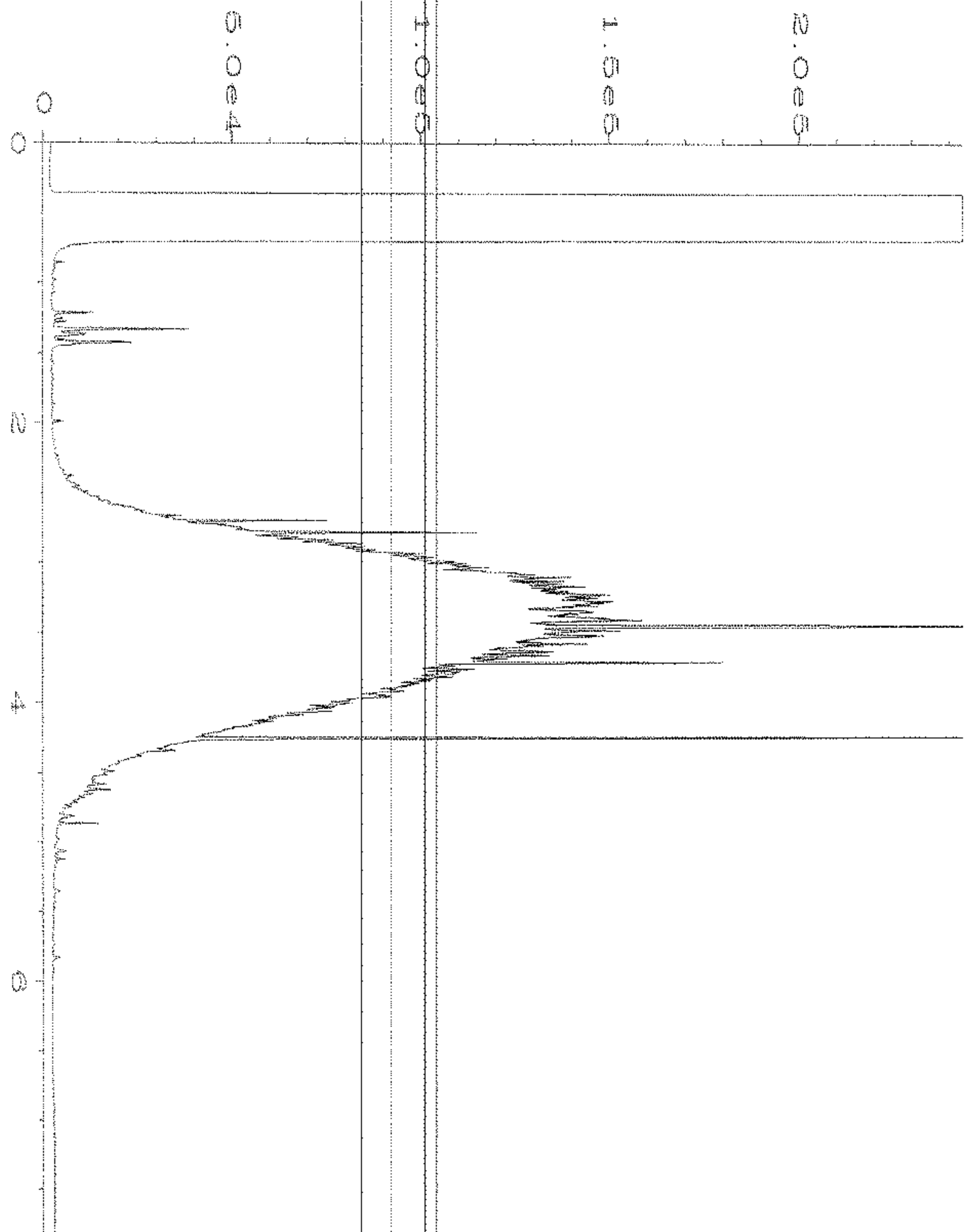


Data File Name : C:\HPCHEM\4\DATA\05-26-21\036F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 105456-04 sg
Run Time Bar Code:
Acquired on : 26 May 21 05:58 PM
Report Created on: 27 May 21 08:26 AM

Page Number : 1
Vial Number : 36
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



Data File Name : C:\HPCHEM\4\DATA\05-26-21\037F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 105456-08 sg
Run Time Bar Code:
Acquired on : 26 May 21 06:10 PM
Report Created on: 27 May 21 08:26 AM

Page Number : 1
Vial Number : 37
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

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

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 105456
Work Order Number: 2105396

June 11, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 9 sample(s) on 5/25/2021 for the analyses presented in the following report.

Ion Chromatography by EPA Method 300.0
Sample Moisture (Percent Moisture)
Total Metals by EPA Method 200.8
Total Metals by EPA Method 6020B

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

CC:
Grant Hainsworth
Rusty Jones

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

CLIENT:	Friedman & Bruya
Project:	105456
Work Order:	2105396

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2105396-001	DPT-1-0521	05/24/2021 9:35 AM	05/25/2021 2:29 PM
2105396-002	DPT-2-0521	05/24/2021 10:40 AM	05/25/2021 2:29 PM
2105396-003	DPT-5 0.3-0.9'	05/24/2021 12:05 PM	05/25/2021 2:29 PM
2105396-004	DPT-6 1.5-2'	05/24/2021 12:35 PM	05/25/2021 2:29 PM
2105396-005	DPT-8 8.2-8.4'	05/24/2021 1:25 PM	05/25/2021 2:29 PM
2105396-006	DPT-9 13.2-13.8'	05/24/2021 2:00 PM	05/25/2021 2:29 PM
2105396-007	DPT-11 2.1-3.1'	05/24/2021 3:00 PM	05/25/2021 2:29 PM
2105396-008	DPT-12 8.6-9.2'	05/24/2021 3:25 PM	05/25/2021 2:29 PM
2105396-009	DPT-13 7.2-8.2'	05/24/2021 3:50 PM	05/25/2021 2:29 PM

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

Case Narrative

WO#: **2105396**

Date: **6/11/2021**

CLIENT: Friedman & Bruya
Project: 105456

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.

Revision 1 includes additional analyses requested by the client.

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

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Project: 105456
Lab ID: 2105396-001
Client Sample ID: **DPT-1-0521**

Collection Date: 5/24/2021 9:35:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32507		Analyst: SS
Fluoride	ND	0.800	D	mg/L	10	6/1/2021 11:41:00 PM
Chloride	224	10.0	D	mg/L	100	6/2/2021 10:41:00 AM

NOTES:
Diluted due to matrix.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 200.8				Batch ID: 32582		Analyst: EH
Aluminum	405	100		µg/L	1	6/11/2021 3:25:54 PM

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Project: 105456
Lab ID: 2105396-002
Client Sample ID: **DPT-2-0521**

Collection Date: 5/24/2021 10:40:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32507		Analyst: SS
Fluoride	1.38	0.800	D	mg/L	10	6/2/2021 12:04:00 AM
Chloride	51.6	2.00	D	mg/L	20	6/2/2021 11:04:00 AM
Total Metals by EPA Method 200.8				Batch ID: 32582		Analyst: EH
Aluminum	1,160	100		µg/L	1	6/11/2021 3:31:28 PM

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Project: 105456
Lab ID: 2105396-003
Client Sample ID: DPT-5 0.3-0.9'

Collection Date: 5/24/2021 12:05:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	7,460	950	D	mg/Kg-dry	100	5/27/2021 5:08:00 PM
Iron	9,000	950	D	mg/Kg-dry	100	5/27/2021 5:08:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	19.6	0.500		wt%	1	6/1/2021 2:59:23 PM

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Collection Date: 5/24/2021 12:35:00 PM
Project: 105456
Lab ID: 2105396-004
Matrix: Soil
Client Sample ID: DPT-6 1.5-2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	14,500	954	D	mg/Kg-dry	100	5/27/2021 5:13:34 PM
Iron	12,400	954	D	mg/Kg-dry	100	5/27/2021 5:13:34 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	21.2	0.500		wt%	1	6/1/2021 2:59:23 PM

Fremont Analytical

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Project: 105456
Lab ID: 2105396-005
Client Sample ID: **DPT-8 8.2-8.4'**

Collection Date: 5/24/2021 1:25:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	17,400	905	D	mg/Kg-dry	100	5/27/2021 5:19:08 PM
Iron	15,300	905	D	mg/Kg-dry	100	5/27/2021 5:19:08 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	16.9	0.500		wt%	1	6/1/2021 2:59:23 PM

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Collection Date: 5/24/2021 2:00:00 PM
Project: 105456
Lab ID: 2105396-006
Matrix: Soil
Client Sample ID: **DPT-9 13.2-13.8'**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	48,100	982	D	mg/Kg-dry	100	5/27/2021 5:24:42 PM
Iron	19,600	982	D	mg/Kg-dry	100	5/27/2021 5:24:42 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	23.4	0.500		wt%	1	6/1/2021 2:59:23 PM

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Project: 105456
Lab ID: 2105396-007
Client Sample ID: **DPT-11 2.1-3.1'**

Collection Date: 5/24/2021 3:00:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	17,100	889	D	mg/Kg-dry	100	5/27/2021 5:30:17 PM
Iron	18,600	889	D	mg/Kg-dry	100	5/27/2021 5:30:17 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	9.28	0.500		wt%	1	6/1/2021 2:59:23 PM

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Collection Date: 5/24/2021 3:25:00 PM
Project: 105456
Lab ID: 2105396-008
Matrix: Soil
Client Sample ID: **DPT-12 8.6-9.2'**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	16,500	891	D	mg/Kg-dry	100	5/27/2021 5:35:52 PM
Iron	18,200	891	D	mg/Kg-dry	100	5/27/2021 5:35:52 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	9.52	0.500		wt%	1	6/1/2021 2:59:23 PM

Fremont Analytical

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Project: 105456
Lab ID: 2105396-009
Client Sample ID: DPT-13 7.2-8.2'

Collection Date: 5/24/2021 3:50:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	14,700	886	D	mg/Kg-dry	100	5/27/2021 5:41:26 PM
Iron	16,400	886	D	mg/Kg-dry	100	5/27/2021 5:41:26 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	9.70	0.500		wt%	1	6/1/2021 2:59:23 PM

Fremont Analytical

Date: *6/11/2021*

Work Order: 2105396
CLIENT: Friedman & Bruya
Project: 105456

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-32507** SampType: **MBLK** Units: **mg/L** Prep Date: **6/1/2021** RunNo: **67663**
Client ID: **MBLKW** Batch ID: **32507** Analysis Date: **6/1/2021** SeqNo: **1364754**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.0800									
Chloride	ND	0.100									

Sample ID: **LCS-32507** SampType: **LCS** Units: **mg/L** Prep Date: **6/1/2021** RunNo: **67663**
Client ID: **LCSW** Batch ID: **32507** Analysis Date: **6/1/2021** SeqNo: **1364755**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	0.531	0.0800	0.5000	0	106	90	110				
Chloride	0.707	0.100	0.7500	0	94.3	90	110				

Sample ID: **2105395-001AMS** SampType: **MS** Units: **mg/L** Prep Date: **6/1/2021** RunNo: **67663**
Client ID: **BATCH** Batch ID: **32507** Analysis Date: **6/1/2021** SeqNo: **1364758**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	4.96	0.800	5.000	0	99.2	80	120				D
Chloride	18.2	1.00	7.500	10.42	103	80	120				D

Sample ID: **2105395-001AMSD** SampType: **MSD** Units: **mg/L** Prep Date: **6/1/2021** RunNo: **67663**
Client ID: **BATCH** Batch ID: **32507** Analysis Date: **6/1/2021** SeqNo: **1364759**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	4.89	0.800	5.000	0	97.8	80	120	4.960	1.42	20	D
Chloride	18.0	1.00	7.500	10.42	101	80	120	18.18	0.829	20	D

Work Order: 2105396
CLIENT: Friedman & Bruya
Project: 105456

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2105420-001ADUP** SampType: **DUP** Units: **mg/L** Prep Date: **6/1/2021** RunNo: **67663**
Client ID: **BATCH** Batch ID: **32507** Analysis Date: **6/2/2021** SeqNo: **1364773**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	8.00						0		20	D
Chloride	90.1	10.0						84.60	6.30	20	D

Sample ID: **2105420-001AMS** SampType: **MS** Units: **mg/L** Prep Date: **6/1/2021** RunNo: **67663**
Client ID: **BATCH** Batch ID: **32507** Analysis Date: **6/2/2021** SeqNo: **1364774**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	47.9	8.00	50.00	0	95.8	80	120				D
Chloride	203	10.0	75.00	84.60	158	80	120				DS

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Work Order: 2105396
CLIENT: Friedman & Bruya
Project: 105456

QC SUMMARY REPORT

Total Metals by EPA Method 200.8

Sample ID: **MB-32582** SampType: **MBLK** Units: **µg/L** Prep Date: **6/8/2021** RunNo: **67806**
Client ID: **MBLKW** Batch ID: **32582** Analysis Date: **6/9/2021** SeqNo: **1367906**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	100									

Sample ID: **2106098-001EDUP** SampType: **DUP** Units: **µg/L** Prep Date: **6/8/2021** RunNo: **67806**
Client ID: **BATCH** Batch ID: **32582** Analysis Date: **6/9/2021** SeqNo: **1367909**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	100						220.5	86.6	30	R

NOTES:
R - High RPD observed due to low analyte concentration. High RPDs may be expected in this range.

Sample ID: **2106098-001EMS** SampType: **MS** Units: **µg/L** Prep Date: **6/8/2021** RunNo: **67806**
Client ID: **BATCH** Batch ID: **32582** Analysis Date: **6/9/2021** SeqNo: **1367910**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	5,090	100	5,000	220.5	97.4	70	130				

Sample ID: **2106098-001EMSD** SampType: **MSD** Units: **µg/L** Prep Date: **6/8/2021** RunNo: **67806**
Client ID: **BATCH** Batch ID: **32582** Analysis Date: **6/9/2021** SeqNo: **1367911**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	5,430	100	5,000	220.5	104	70	130	5,089	6.56	30	

Sample ID: **LCS-32582** SampType: **LCS** Units: **µg/L** Prep Date: **6/8/2021** RunNo: **67806**
Client ID: **LCSW** Batch ID: **32582** Analysis Date: **6/11/2021** SeqNo: **1369682**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	1,050	100	1,000	0	105	85	115				

Work Order: 2105396
CLIENT: Friedman & Bruya
Project: 105456

QC SUMMARY REPORT

Total Metals by EPA Method 6020B

Sample ID: **MB-32448**	SampType: **MBLK**				Units: **mg/Kg**		Prep Date: **5/26/2021**		RunNo: **67547**		
Client ID: **MBLKS**	Batch ID: **32448**						Analysis Date: **5/26/2021**		SeqNo: **1362250**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	7.87									
Iron	ND	7.87									

Sample ID: **LCS-32448**	SampType: **LCS**				Units: **mg/Kg**		Prep Date: **5/26/2021**		RunNo: **67547**		
Client ID: **LCSS**	Batch ID: **32448**						Analysis Date: **5/26/2021**		SeqNo: **1362251**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	415	7.87	393.7	0	105	80	120				
Iron	403	7.87	393.7	0	102	80	120				

Sample ID: **2105343-003AMS**	SampType: **MS**				Units: **mg/Kg-dry**		Prep Date: **5/26/2021**		RunNo: **67547**		
Client ID: **BATCH**	Batch ID: **32448**						Analysis Date: **5/26/2021**		SeqNo: **1362254**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	15,400	8.20	410.1	16,210	-192	75	125				ES
Iron	24,500	8.20	410.1	24,830	-73.1	75	125				ES

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Sample ID: **2105343-003AMSD**	SampType: **MSD**				Units: **mg/Kg-dry**		Prep Date: **5/26/2021**		RunNo: **67547**		
Client ID: **BATCH**	Batch ID: **32448**						Analysis Date: **5/26/2021**		SeqNo: **1362255**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	16,800	8.20	410.1	16,210	142	75	125	15,420	8.49	20	ES
Iron	27,100	8.20	410.1	24,830	565	75	125	24,530	10.1	20	ES

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**2105396**
Logged by:	**Clare Griggs**	Date Received:	**5/25/2021 2:29:00 PM**

Chain of Custody

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

Log In

		Yes	No	NA / Not Present
3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >2°C to 6°C *	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☑	No ☐	NA ☐
			HNO3 to 001B & 002B	
12.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

		Yes	No	NA
18.	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: ______

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample	3.8

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

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2105390

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont

PROJECT NAME/NO. 105456

PO # B-255

REMARKS

Please Email Results

Page # ______ of ______

TURNAROUND TIME
- ☐ Standard TAT
- ☐ RUSH______

Rush charges authorized by:

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Chloride/ Fluoride	Iron, Aluminium						Notes
DPT-1-0521		5/24/21	935	Water	1				X							
DPT-2-0521			1040	Water	1				X							
DPT-5 0.3-0.9'			1205	Soil	1					X						
DPT-6 1.5-2'			1235	Soil	1					X						
DPT-8 8.2-8.4'			1325	Soil	1					X						
DPT-9 13.2-13.8'			1400	Soil	1					X						
DPT-11 2.1-3.1'			1500	Soil	1					X						
DPT-12 8.6-9.2'			1525	Soil	1					X						
DPT-13 7.2-8.2'			1550	Soil	1					X						

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	5/25/21	
Received by:	Carter Johnson	FAI	5/25/21	1429
Relinquished by:				
Received by:				

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2105396

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont

PROJECT NAME/NO. 105456

PO # B-255

REMARKS

Please Email Results

Page # ____ of ____

TURNAROUND TIME
- ☐ Standard TAT
- ☐ RUSH ____

Rush charges authorized by: ____

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Chloride / Fluoride	Iron, Aluminum	Aluminum					Notes
																X = run per ME, Std TAT, 6/7/21 -CG
DPT-1-0521		5/24/21	935	Water	1				X		X					
DPT-2-0521			1040	Water	1				X		X					
DPT-5 0.3-0.9'			1205	Soil	1					X						
DPT-6 1.5-2'			1235	Soil	1					X						
DPT-8 8.2-8.4'			1325	Soil	1					X						
DPT-9 13.2-13.8'			1400	Soil	1					X						
DPT-11 2.1-3.1'			1500	Soil	1					X						
DPT-12 8.6-9.2'			1525	Soil	1					X						
DPT-13 7.2-8.2'			1550	Soil	1					X						

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	5/25/21	
Received by:	Carter Johnson	FAI	5/25/21	1429
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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

June 22, 2021

Jamie Stevens, Project Manager
Crete Consulting
108 S. Washington St., Suite 300
Seattle, WA 98104

Dear Ms Stevens:

Included are the additional results from the testing of material submitted on May 25, 2021 from the Maralco, F&BI 105456 project. There are 19 pages included in this report.

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

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Rusty Jones, Grant Hainsworth
CTC0622R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on May 25, 2020 by Friedman & Bruya, Inc. from the Crete Consulting Maralco, F&BI 105456 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
105456 -01	DPT-1 5-6'
105456 -02	DPT-1 6-7'
105456 -03	DPT-1 9-10'
105456 -04	DPT-1-0521
105456 -05	DPT-2 5-6'
105456 -06	DPT-2 6-7.5'
105456 -07	DPT-2 8.5-10'
105456 -08	DPT-2-0521
105456 -09	DPT-3 2.5-3'
105456 -10	DPT-3 4.5'
105456 -11	DPT-3 6.5'
105456 -12	DPT-4 1.5-2.0'
105456 -13	DPT-4 4.5-5'
105456 -14	DPT-4 6.1-7.6'
105456 -15	DPT-5 0.3-0.9'
105456 -16	DPT-5 3.8-4.2'
105456 -17	DPT-5 4.2-5'
105456 -18	DPT-6 1.5-2'
105456 -19	DPT-6 2.6-3.1'
105456 -20	DPT-6 4.3-5'
105456 -21	DPT-7 11.7-12.2'
105456 -22	DPT-7 14.3-15'
105456 -23	DPT-8 8.2-8.4'
105456 -24	DPT-8 9.4-10'
105456 -25	DPT-8 11.7-12.2'
105456 -26	DPT-9 13.2-13.8'
105456 -27	DPT-9 14.5-15'
105456 -28	DPT-11 2.1-3.1'
105456 -29	DPT-11 4.5-5'
105456 -30	DPT-12 8.6-9.2'
105456 -31	DPT-13 7.2-8.2'
105456 -32	DPT-13 9.3-10'
105456 -33	DC-052421

Sample DC-052421 was sent to Fauske for UN DOT 4.3 dangerous when wet analysis. The report will be forwarded upon receipt.

Samples DPT-1-0521 and DPT-2-0521 were sent to Fremont Analytical for aluminum analysis. In addition, samples DPT-6 2.6-3.1', DPT-8 9.4-10', DPT-9 14.5-15', DPT-11 4.5-5', and DPT-13 9.3-10' were sent to Fremont for aluminum and iron analysis. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-1-0521	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	06/08/21	Lab ID:	105456-04
Date Analyzed:	06/08/21	Data File:	105456-04.066
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Antimony	<2
Arsenic	13.3
Cadmium	<1
Chromium	2.41
Cobalt	4.29
Copper	11.1
Lead	<1
Nickel	8.14
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-1-0521	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	06/08/21	Lab ID:	105456-04 x100
Date Analyzed:	06/10/21	Data File:	105456-04 x100.035
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	32,200
Manganese	2,720

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-2-0521	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	06/08/21	Lab ID:	105456-08
Date Analyzed:	06/08/21	Data File:	105456-08.067
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Antimony	<2
Arsenic	13.6
Cadmium	<1
Chromium	1.74
Cobalt	<1
Copper	9.63
Lead	<1
Manganese	379
Nickel	1.02
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-2-0521	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	06/08/21	Lab ID:	105456-08 x10
Date Analyzed:	06/10/21	Data File:	105456-08 x10.036
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	10,300

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 105456
Date Extracted:	06/08/21	Lab ID:	I1-355 mb2
Date Analyzed:	06/08/21	Data File:	I1-355 mb2.063
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Antimony	<2
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Iron	<50
Lead	<1
Manganese	<1
Nickel	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-6 2.6-3.1’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	06/18/21	Lab ID:	105456-19
Date Analyzed:	06/18/21	Data File:	105456-19.104
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Arsenic	2.91
Cadmium	<1
Chromium	8.31
Cobalt	3.35
Copper	33.3
Lead	3.69
Manganese	92.7
Nickel	6.25
Zinc	47.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-8 9.4-10'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	06/18/21	Lab ID:	105456-24
Date Analyzed:	06/18/21	Data File:	105456-24.105
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Arsenic	1.74
Cadmium	<1
Chromium	7.32
Cobalt	2.66
Copper	7.75
Lead	2.95
Manganese	81.0
Nickel	5.31
Zinc	13.6

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-9 14.5-15'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	06/08/21	Lab ID:	105456-27
Date Analyzed:	06/08/21	Data File:	105456-27.124
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Arsenic	7.51
Cadmium	<1
Lead	3.43

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-9 14.5-15’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	06/08/21	Lab ID:	105456-27 x2
Date Analyzed:	06/09/21	Data File:	105456-27 x2.037
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	13.8
Cobalt	4.97
Copper	19.4
Manganese	135
Nickel	9.51
Zinc	26.6

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-11 4.5-5’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	06/18/21	Lab ID:	105456-29
Date Analyzed:	06/18/21	Data File:	105456-29.106
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Arsenic	2.10
Cadmium	<1
Lead	2.78

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-11 4.5-5’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	06/18/21	Lab ID:	105456-29 x5
Date Analyzed:	06/21/21	Data File:	105456-29 x5.031
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Analyte:	Concentration mg/kg (ppm)
Chromium	19.4
Cobalt	6.59
Copper	<25
Manganese	230
Nickel	22.5
Zinc	32.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-13 9.3-10’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	06/18/21	Lab ID:	105456-32
Date Analyzed:	06/18/21	Data File:	105456-32.107
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Arsenic	3.15
Cadmium	<1
Chromium	9.81
Cobalt	4.59
Copper	12.2
Lead	10.1
Manganese	85.0
Nickel	7.71
Zinc	29.9

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 105456
Date Extracted:	06/18/21	Lab ID:	I1-381 mb2
Date Analyzed:	06/18/21	Data File:	I1-381 mb2.103
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	AP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Manganese	<1
Nickel	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 105456
Date Extracted:	06/08/21	Lab ID:	I1-357 mb
Date Analyzed:	06/08/21	Data File:	I1-357 mb.115
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Manganese	<1
Nickel	<1
Zinc	<5

Date of Report: 06/22/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456

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

Laboratory Code: 106278-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Antimony	mg/kg (ppm)	20	<10	90	94	75-125	4
Arsenic	mg/kg (ppm)	10	9.57	85	94	75-125	10
Cadmium	mg/kg (ppm)	10	<5	92	96	75-125	4
Chromium	mg/kg (ppm)	50	15.5	88	91	75-125	3
Cobalt	mg/kg (ppm)	20	5.05	86	91	75-125	6
Copper	mg/kg (ppm)	50	33.9	58 b	62 b	75-125	7 b
Lead	mg/kg (ppm)	50	12.5	80	82	75-125	2
Manganese	mg/kg (ppm	20	223	98 b	69 b	75-125	35 b
Nickel	mg/kg (ppm)	25	20.1	89	89	75-125	0
Zinc	mg/kg (ppm)	50	49.8	66 b	71 b	75-125	7 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Antimony	mg/kg (ppm)	20	97	80-120
Arsenic	mg/kg (ppm)	10	82	80-120
Cadmium	mg/kg (ppm)	10	95	80-120
Chromium	mg/kg (ppm)	50	101	80-120
Cobalt	mg/kg (ppm)	20	99	80-120
Copper	mg/kg (ppm)	50	99	80-120
Lead	mg/kg (ppm)	50	88	80-120
Manganese	mg/kg (ppm)	20	94	80-120
Nickel	mg/kg (ppm)	25	99	80-120
Zinc	mg/kg (ppm)	50	89	80-120

Date of Report: 06/22/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456

**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)
Antimony	ug/L (ppb)	20	107	103	80-120	4
Arsenic	ug/L (ppb)	10	102	101	80-120	1
Cadmium	ug/L (ppb)	5	99	95	80-120	4
Chromium	ug/L (ppb)	20	109	100	80-120	9
Cobalt	ug/L (ppb)	20	101	96	80-120	5
Copper	ug/L (ppb)	20	104	95	80-120	9
Iron	ug/L (ppb)	100	104	98	80-120	6
Lead	ug/L (ppb)	10	99	93	80-120	6
Manganese	ug/L (ppb)	20	104	98	80-120	6
Nickel	ug/L (ppb)	20	103	96	80-120	7
Zinc	ug/L (ppb)	50	99	92	80-120	7

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 06/22/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456

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

Laboratory Code: 106114-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Antimony	mg/kg (ppm)	20	<1	92	90	75-125	2
Arsenic	mg/kg (ppm)	10	5.76	73 b	79 b	75-125	8 b
Cadmium	mg/kg (ppm)	10	<1	93	92	75-125	1
Chromium	mg/kg (ppm)	50	16.9	100	98	75-125	2
Cobalt	mg/kg (ppm)	20	4.73	83	77	75-125	7
Copper	mg/kg (ppm)	50	12.5	78	76	75-125	3
Lead	mg/kg (ppm)	50	9.27	83	83	75-125	0
Manganese	mg/kg (ppm	20	200	365 b	10 b	75-125	189 b
Nickel	mg/kg (ppm)	25	16.7	84	78	75-125	7
Zinc	mg/kg (ppm)	50	20.5	71 b	69 b	75-125	3 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Antimony	mg/kg (ppm)	20	100	80-120
Arsenic	mg/kg (ppm)	10	82	80-120
Cadmium	mg/kg (ppm)	10	98	80-120
Chromium	mg/kg (ppm)	50	115	80-120
Cobalt	mg/kg (ppm)	20	105	80-120
Copper	mg/kg (ppm)	50	100	80-120
Lead	mg/kg (ppm)	50	95	80-120
Manganese	mg/kg (ppm)	20	108	80-120
Nickel	mg/kg (ppm)	25	104	80-120
Zinc	mg/kg (ppm)	50	94	80-120

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.

105456

SAMPLE CHAIN OF CUSTODY

ME 05/25/21 [redacted]

[redacted] Report To R. Jones | G. Hainsworth

Company Crete Consulting, Inc.

Address 108 S. Washington, Ste 300

City, State, ZIP Seattle, WA 98104

Phone ______ Email ______

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME MARALCO

PO #

REMARKS Metals List: Antimony, Aluminum, Ag, Cd, Chrom, Cobalt, Cu, Pb, Fe, Ni, Manganese, Zn

Project specific RLs? - Yes / No

INVOICE TO

Page # 1 of 4 VS3

TURNAROUND TIME VW1

☒ Standard turnaround EU3

☐ RUSH ______ BZ4

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	Chlorides / Fluorides	Metals (see List)			Notes
																	● - per RJ
DPT-1 5-6'	01 A-F	5/24/21	0905	Soil	6	X	X	X									6/7/21 ME
DPT-1 6-7'	02		0910		6												
DPT-1 9-10'	03		0920		6												
DPT-1-0521	04		0935	Water	6	X	X	X					X	●			w/ + w/ SGC
DPT-2 5-6'	05		1015	Soil	6												
DPT-2 6-7.5'	06		1020		6	X	X	X				X					
DPT-2 9.5-10'	07		1025		6												
DPT-2-0521	08		1040	Water	6	X	X	X					X	●			w/ + w/ SGC
DPT-3 2.5-3'	09		1115	Soil	1												
DPT-3 4.5'	10		1120		1												

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	5.25.21	1026
Received by: [illegible]	Liz Webber-Bruya	F&B	5/25/21	1026
Relinquished by:				
Received by:		Samples received at 2 °C		

105456 [redacted]

SAMPLE CHAIN OF CUSTODY ME 05/25/21 [redacted]

Report To See Page 1

Company

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R Jones

PROJECT NAME MARALCO

PO #

REMARKS Metals List: Sb, Al, As, Cd, Cr, Co, Cu, Fe, Mn, Pb, Ni, Zn

Project specific RLs? - Yes / No

INVOICE TO

Page # 2 of 4 VW1 VS3

TURNAROUND TIME

☒ Standard turnaround EDB

☐ RUSH

Rush charges authorized by: BDU

SAMPLE DISPOSAL

☐ Archive samples

☐ Other

Default: Dispose after 30 days

ANALYSES REQUESTED

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	Metals (see list)				Notes
DPT-3 6.5'	11	5.24.21	1125	SOIL	1												
DPT-4 1.5-2.0'	12		1140		1												
DPT-4 4.5-5'	13		1145		1												
DPT-4 6.1-7.6'	14		1150		1												
DPT-5 0.3-0.9'	15		1205		1								X				
DPT-5 3.8-4.2'	16		1210		1												
DPT-5 4.2-5'	17		1215		1												
DPT-6 1.5-2'	18		1235		1								X				
DPT-6 2.6-3.1'	19		1240		1								●				
DPT-6 4.3-5'	20	↓	1245	↓	1												

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	5.25.21	1026
Received by: [signature]	Liz Webber-Bruya	F&B	5/25/21	1026
Relinquished by:				
Received by:		Samples received at 3 °C		

105456

SAMPLE CHAIN OF CUSTODY ME 05/25/21

Report To: See Page 1

Company:

Address:

City, State, ZIP:

Phone: Email:

SAMPLERS (signature): Rusty Jones R. Jones

PROJECT NAME: MARALCO

PO #:

REMARKS: Metals List: Sb, Al, As, Cd, Cr, Co, Cu, Fe, Mn, Pb, Ni, Zn

INVOICE TO:

Page # 3 of 4 VWL

TURNAROUND TIME
- ☒ Standard Turnaround
- ☐ RUSH
- Rush charges authorized by: BJ4

SAMPLE DISPOSAL
- ☐ Dispose after 30 days
- ☐ Archive Samples
- ☐ Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	Metals (see List)				Notes
DPT-7 11.7-12.2'	21	5.24.21	1305	Soil	1												
DPT-7 14.3-15'	22		1310		1												
DPT-8 8.2-8.4'	23		1325		1								X				
DPT-8 9.4-10'	24		1330		1												
DPT-8 11.7-12.2'	25		1335		1												
DPT-9 ~~8.2-8.8~~ 13.2-13.6	26		1400		1								X				
DPT-9 ~~9.5-10~~ 14.5-15'	27		1405		1												
DPT-11 2.1-3.1'	28		1500		1								X				
DPT-11 4.5-5'	29		1505		1												
DPT-12 8.6-9.2'	30		1525		1								X				

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	CRETE	5.25.21	1026
Received by:	[signature]	Liz Weber-Bruya	F&B	5/25/21	1026
Relinquished by:					
Received by:			Samples received at 3 °C		

105456
[redacted]

SAMPLE CHAIN OF CUSTODY

ME 05/25/21 [redacted]

Page # 4 of 4 VW1 VS3

Report To: See Page 1

Company:

Address:

City, State, ZIP:

Phone: Email:

SAMPLERS (signature): Rusty Jones R. Jones

PROJECT NAME: MARALCO

PO #:

REMARKS: Metals List: Sb, Al, As, Cd, Cr, Co, Cu, Fe, Mn, Pb, Ni, ~~Zn~~

INVOICE TO:

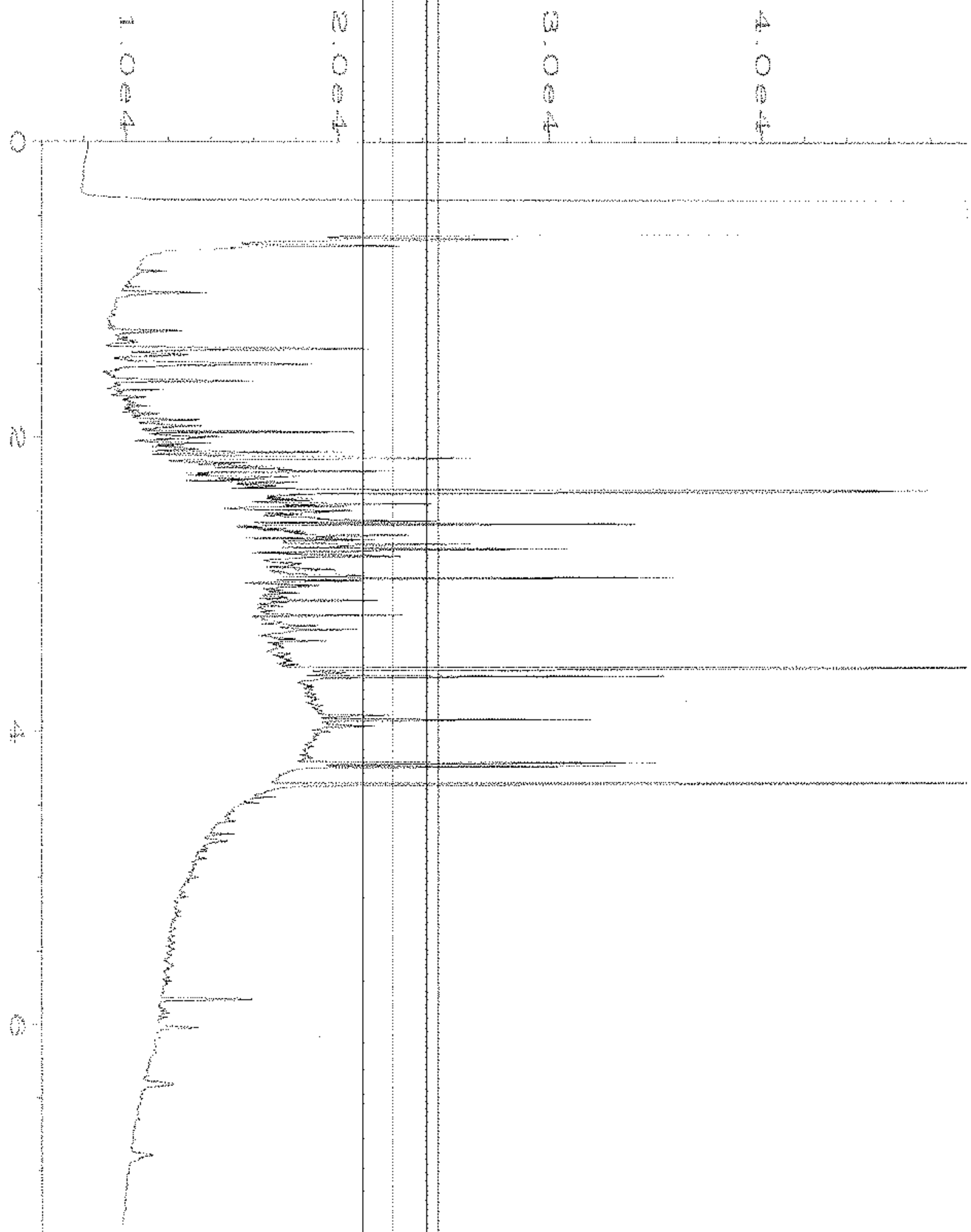
TURNAROUND TIME
☒ Standard Turnaround FJB
☐ RUSH BDY
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Dispose after 30 days
☐ Archive Samples
☐ Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	Metals (see List)	DOT 4.3	Dangerous when wet		Notes
DPT-13 7.2-8.2'	31	5/24/21	1550	Soil	1								X				
DPT-13 9.3-10'	32	↓	1555	↓	1								●				
DC-052421	33 A-D	5/24/21	1600	Soil	4										(X)		※ added at lab (NP) 5/25/21
																	(X) per RS 6/3/21 MG

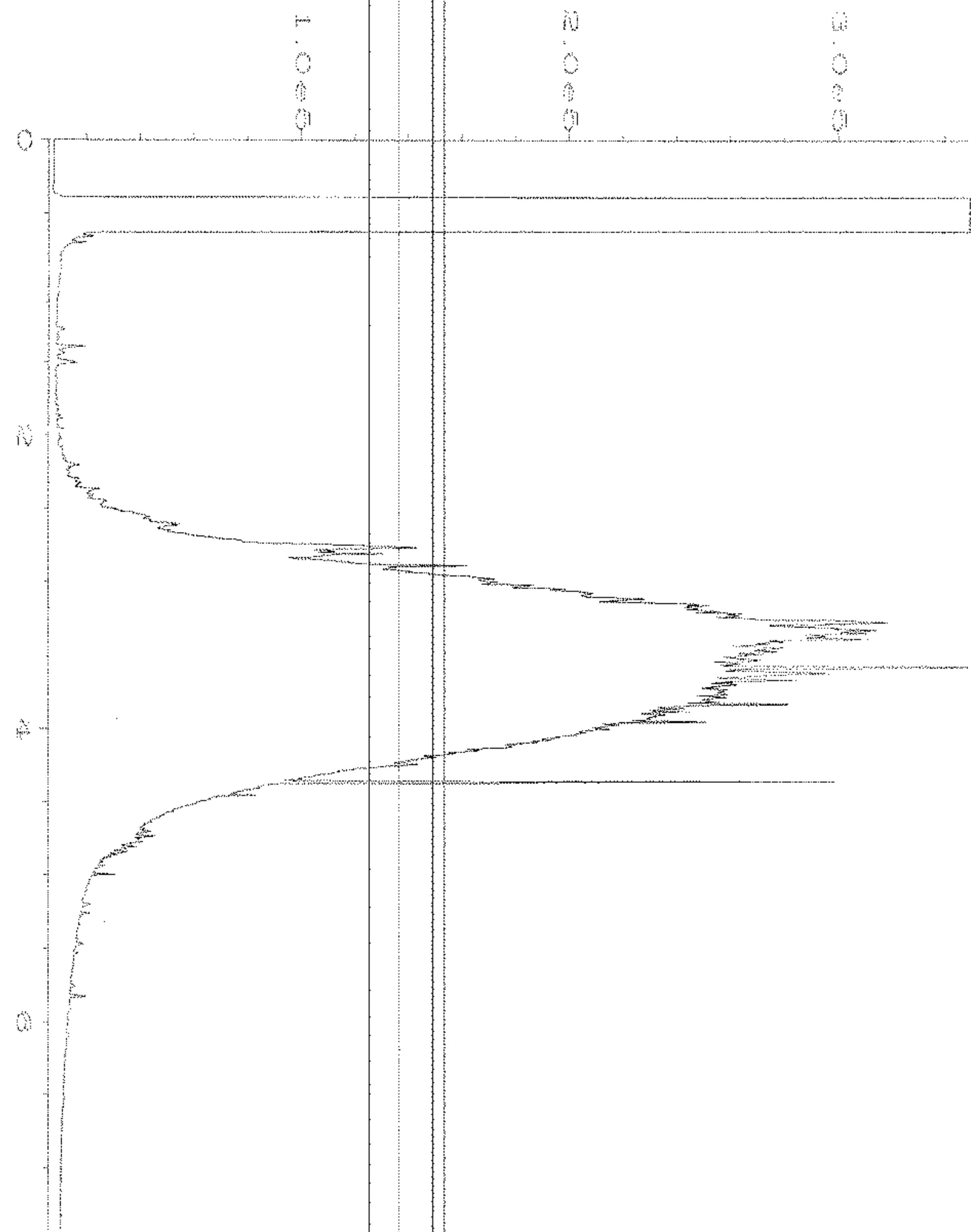
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	5.25.21	1026
Received by: [signature]	Liz Webber-Bruya	F&B	5/25/21	1026
Relinquished by:				
Received by:		Samples received at 2 °C		



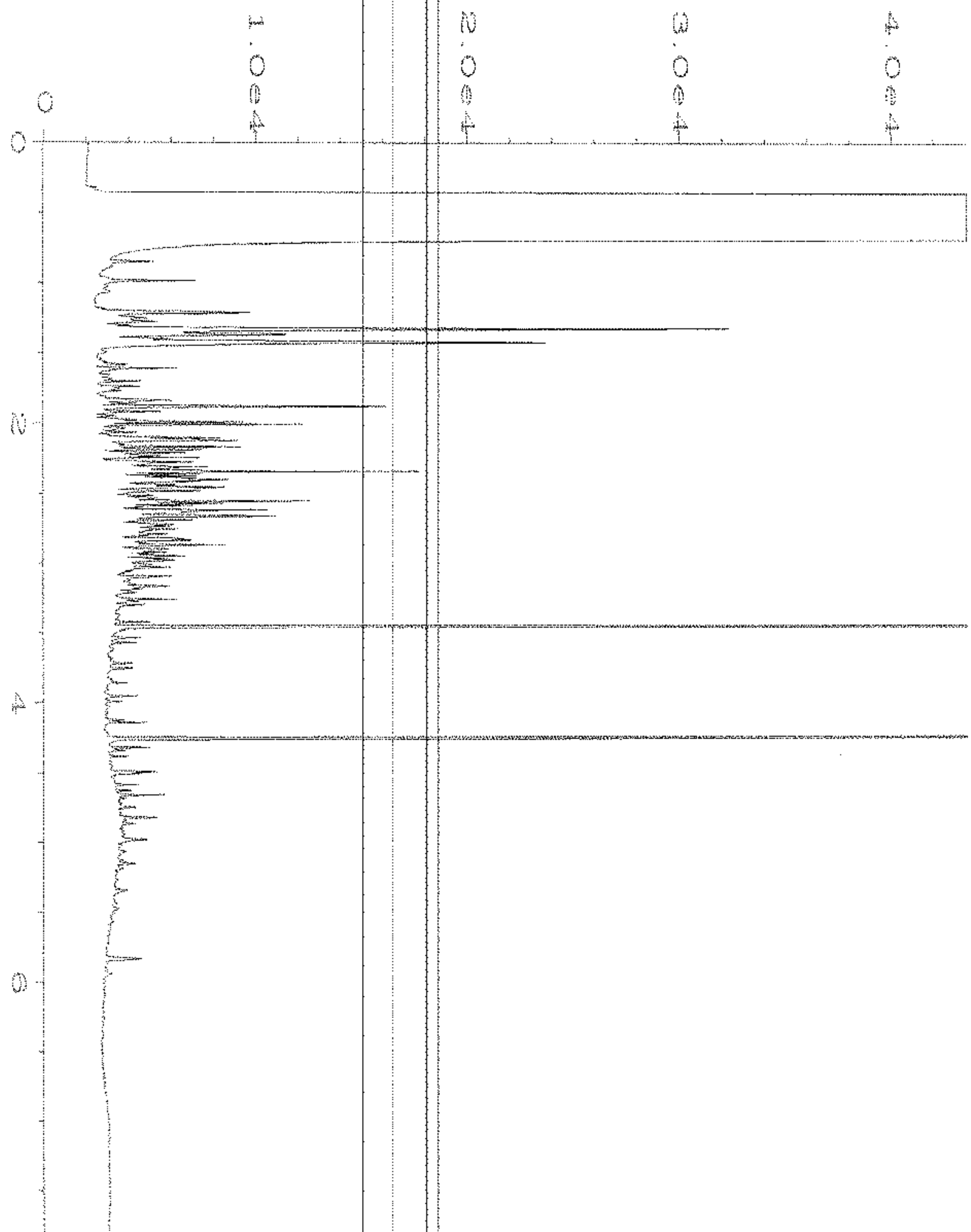
Data File Name   : C:\HPCHEM\1\DATA\05-26-21\022F0601.D
Operator   : TL
Instrument   : GC1
Sample Name   : 105456-04
Run Time Bar Code:
Acquired on   : 26 May 21   03:04 PM
Report Created on: 27 May 21   09:38 AM

Page Number   : 1
Vial Number   : 22
Injection Number : 1
Sequence Line   : 6
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH



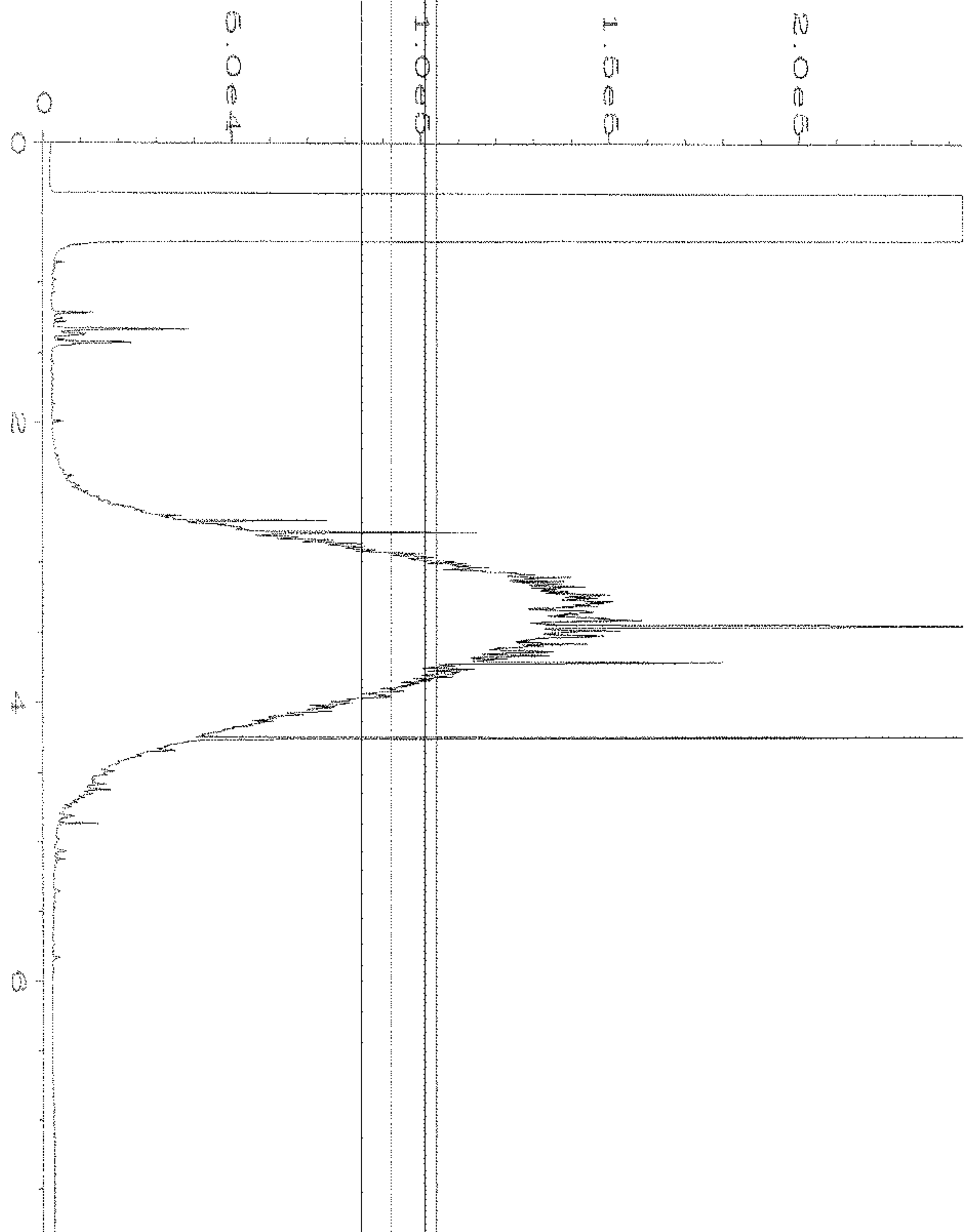
Data File Name   : C:\HPCHEM\1\DATA\05-26-21\023F0601.D
Operator   : TL
Instrument   : GC1
Sample Name   : 105456-08
Run Time Bar Code:
Acquired on   : 26 May 21   03:16 PM
Report Created on: 27 May 21   09:38 AM

Page Number   : 1
Vial Number   : 23
Injection Number : 1
Sequence Line   : 6
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH



Data File Name : C:\HPCHEM\4\DATA\05-26-21\036F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 105456-04 sg
Run Time Bar Code:
Acquired on : 26 May 21 05:58 PM
Report Created on: 27 May 21 08:26 AM

Page Number : 1
Vial Number : 36
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



Data File Name : C:\HPCHEM\4\DATA\05-26-21\037F0701.D
Operator : TL
Instrument : GC#4
Sample Name : 105456-08 sg
Run Time Bar Code:
Acquired on : 26 May 21 06:10 PM
Report Created on: 27 May 21 08:26 AM

Page Number : 1
Vial Number : 37
Injection Number : 1
Sequence Line : 7
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

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

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 105456
Work Order Number: 2106117

June 11, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 5 sample(s) on 6/8/2021 for the analyses presented in the following report.

Sample Moisture (Percent Moisture)
Total Metals by EPA Method 6020B

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

Date: *06/11/2021*

CLIENT:	Friedman & Bruya
Project:	105456
Work Order:	2106117

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2106117-001	DPT-6 2.6-3.1'	05/24/2021 12:40 PM	06/08/2021 9:51 AM
2106117-002	DPT-8 9.4-10'	05/24/2021 1:30 PM	06/08/2021 9:51 AM
2106117-003	DPT-9 14.5-15'	05/24/2021 2:05 PM	06/08/2021 9:51 AM
2106117-004	DPT-11 4.5-5'	05/24/2021 1:05 PM	06/08/2021 9:51 AM
2106117-005	DPT-13 9.3-10'	05/24/2021 3:58 PM	06/08/2021 9:51 AM

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

Original

Case Narrative

WO#: **2106117**

Date: **6/11/2021**

CLIENT: Friedman & Bruya

Project: 105456

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

Analytical Report

Work Order: **2106117**
Date Reported: **6/11/2021**

CLIENT: Friedman & Bruya
Project: 105456

Lab ID: 2106117-001 **Collection Date:** 5/24/2021 12:40:00 PM
Client Sample ID: **DPT-6 2.6-3.1'** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32600		Analyst: EH
Aluminum	10,800	970	D	mg/Kg-dry	100	6/11/2021 12:39:34 PM
Iron	11,200	970	D	mg/Kg-dry	100	6/11/2021 12:39:34 PM
Sample Moisture (Percent Moisture)				Batch ID: R67782		Analyst: OK
Percent Moisture	18.8	0.500		wt%	1	6/8/2021 3:02:40 PM

Lab ID: 2106117-002 **Collection Date:** 5/24/2021 1:30:00 PM
Client Sample ID: **DPT-8 9.4-10'** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32600		Analyst: EH
Aluminum	37,500	972	D	mg/Kg-dry	100	6/11/2021 12:45:08 PM
Iron	37,300	972	D	mg/Kg-dry	100	6/11/2021 12:45:08 PM
Sample Moisture (Percent Moisture)				Batch ID: R67782		Analyst: OK
Percent Moisture	19.6	0.500		wt%	1	6/8/2021 3:02:40 PM

Lab ID: 2106117-003 **Collection Date:** 5/24/2021 2:05:00 PM
Client Sample ID: **DPT-9 14.5-15'** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32600		Analyst: EH
Aluminum	15,400	1,110	D	mg/Kg-dry	100	6/11/2021 12:50:43 PM
Iron	21,700	1,110	D	mg/Kg-dry	100	6/11/2021 12:50:43 PM
Sample Moisture (Percent Moisture)				Batch ID: R67782		Analyst: OK
Percent Moisture	27.2	0.500		wt%	1	6/8/2021 3:02:40 PM

Analytical Report

Work Order: **2106117**
Date Reported: **6/11/2021**

CLIENT: Friedman & Bruya
Project: 105456

Lab ID: 2106117-004 **Collection Date:** 5/24/2021 1:05:00 PM
Client Sample ID: **DPT-11 4.5-5'** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32600		Analyst: EH
Aluminum	15,400	884	D	mg/Kg-dry	100	6/11/2021 12:33:59 PM
Iron	16,500	884	D	mg/Kg-dry	100	6/11/2021 12:33:59 PM
Sample Moisture (Percent Moisture)				Batch ID: R67782		Analyst: OK
Percent Moisture	10.9	0.500		wt%	1	6/8/2021 3:02:40 PM

Lab ID: 2106117-005 **Collection Date:** 5/24/2021 3:58:00 PM
Client Sample ID: **DPT-13 9.3-10'** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32600		Analyst: EH
Aluminum	11,800	1,040	D	mg/Kg-dry	100	6/11/2021 12:56:17 PM
Iron	9,420	1,040	D	mg/Kg-dry	100	6/11/2021 12:56:17 PM
Sample Moisture (Percent Moisture)				Batch ID: R67782		Analyst: OK
Percent Moisture	23.4	0.500		wt%	1	6/8/2021 3:02:40 PM

Fremont Analytical

Date: *6/11/2021*

Work Order: 2106117
CLIENT: Friedman & Bruya
Project: 105456

QC SUMMARY REPORT

Total Metals by EPA Method 6020B

Sample ID: **MB-32600** SampType: **MBLK** Units: **mg/Kg** Prep Date: **6/9/2021** RunNo: **67848**
Client ID: **MBLKS** Batch ID: **32600** Analysis Date: **6/10/2021** SeqNo: **1368947**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	7.87									
Iron	ND	7.87									

Sample ID: **LCS-32600** SampType: **LCS** Units: **mg/Kg** Prep Date: **6/9/2021** RunNo: **67848**
Client ID: **LCSS** Batch ID: **32600** Analysis Date: **6/10/2021** SeqNo: **1368948**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	390	7.81	390.6	0	99.9	80	120				
Iron	380	7.81	390.6	0	97.2	80	120				

Sample ID: **2106117-004AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **6/9/2021** RunNo: **67848**
Client ID: **DPT-11 4.5-5'** Batch ID: **32600** Analysis Date: **6/10/2021** SeqNo: **1368953**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	18,800	8.70	435.2	16,820	460	75	125				ES
Iron	20,400	8.70	435.2	18,710	390	75	125				ES

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

Sample ID: **2106117-004AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **6/9/2021** RunNo: **67848**
Client ID: **DPT-11 4.5-5'** Batch ID: **32600** Analysis Date: **6/10/2021** SeqNo: **1368954**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	16,800	8.98	449.2	16,820	4.10	75	125	18,820	11.1	20	ES
Iron	19,400	8.98	449.2	18,710	156	75	125	20,410	5.01	20	ES

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

Work Order: 2106117
CLIENT: Friedman & Bruya
Project: 105456

QC SUMMARY REPORT

Total Metals by EPA Method 6020B

Sample ID: **2106117-004APDS** SampType: **PDS** Units: **mg/Kg-dry** Prep Date: **6/9/2021** RunNo: **67848**
Client ID: **DPT-11 4.5-5'** Batch ID: **32600** Analysis Date: **6/10/2021** SeqNo: **1368955**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	18,600	8.84	442	16,800	403	75	125				ES
Iron	20,200	8.84	442	18,700	347	75	125				ES

NOTES:
S - Spike recovery indicates a possible matrix effect. The method is in control as indicated by the Laboratory Control Sample (LCS).

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**2106117**
Logged by:	**Clare Griggs**	Date Received:	**6/8/2021 9:51:00 AM**

Chain of Custody

1. Is Chain of Custody complete? — Yes ☑ No ☐ Not Present ☐
2. How was the sample delivered? — FedEx

Log In

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

Special Handling (if applicable)

18. 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: ______

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample	5.3

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

Original

SUBCONTRACT SAMPLE CHAIN OF COSTODY

2106117

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont	
PROJECT NAME/NO. 105456	PO # B-286
REMARKS Please Email Results	

Page # 1 of 1

TURNAROUND TIME
- ☐ Standard TAT
- ☑ RUSH 3-Day

Rush charges authorized by:

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Al + Fe							Notes
DPT-6 2.6-3.1'		5/24/21	1240	Soil	1				x							
DPT-8 9.4-10'			1330		1				x							
DPT-9 14.5-15'			1405		1				x							
DPT-11 4.5-5'			1505		1				x							
DPT-13 9.3-10'			1558		1				x							

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	6/8/21	0817
Received by:	Claire Anderson	FAT	6/8/21	0957
Relinquished 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
3012 16th Ave. W.
Seattle, WA 98119

RE: 105456
Work Order Number: 2105396

June 11, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 9 sample(s) on 5/25/2021 for the analyses presented in the following report.

Ion Chromatography by EPA Method 300.0
Sample Moisture (Percent Moisture)
Total Metals by EPA Method 200.8
Total Metals by EPA Method 6020B

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

CC:
Grant Hainsworth
Rusty Jones

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

CLIENT:	Friedman & Bruya
Project:	105456
Work Order:	2105396

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2105396-001	DPT-1-0521	05/24/2021 9:35 AM	05/25/2021 2:29 PM
2105396-002	DPT-2-0521	05/24/2021 10:40 AM	05/25/2021 2:29 PM
2105396-003	DPT-5 0.3-0.9'	05/24/2021 12:05 PM	05/25/2021 2:29 PM
2105396-004	DPT-6 1.5-2'	05/24/2021 12:35 PM	05/25/2021 2:29 PM
2105396-005	DPT-8 8.2-8.4'	05/24/2021 1:25 PM	05/25/2021 2:29 PM
2105396-006	DPT-9 13.2-13.8'	05/24/2021 2:00 PM	05/25/2021 2:29 PM
2105396-007	DPT-11 2.1-3.1'	05/24/2021 3:00 PM	05/25/2021 2:29 PM
2105396-008	DPT-12 8.6-9.2'	05/24/2021 3:25 PM	05/25/2021 2:29 PM
2105396-009	DPT-13 7.2-8.2'	05/24/2021 3:50 PM	05/25/2021 2:29 PM

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

Case Narrative

WO#: **2105396**

Date: **6/11/2021**

CLIENT: Friedman & Bruya
Project: 105456

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.

Revision 1 includes additional analyses requested by the client.

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

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Project: 105456
Lab ID: 2105396-001
Client Sample ID: **DPT-1-0521**

Collection Date: 5/24/2021 9:35:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32507		Analyst: SS
Fluoride	ND	0.800	D	mg/L	10	6/1/2021 11:41:00 PM
Chloride	224	10.0	D	mg/L	100	6/2/2021 10:41:00 AM
NOTES: Diluted due to matrix.						
Total Metals by EPA Method 200.8				Batch ID: 32582		Analyst: EH
Aluminum	405	100		µg/L	1	6/11/2021 3:25:54 PM

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Project: 105456
Lab ID: 2105396-002
Client Sample ID: **DPT-2-0521**

Collection Date: 5/24/2021 10:40:00 AM
Matrix: Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32507		Analyst: SS
Fluoride	1.38	0.800	D	mg/L	10	6/2/2021 12:04:00 AM
Chloride	51.6	2.00	D	mg/L	20	6/2/2021 11:04:00 AM
Total Metals by EPA Method 200.8				Batch ID: 32582		Analyst: EH
Aluminum	1,160	100		µg/L	1	6/11/2021 3:31:28 PM

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Collection Date: 5/24/2021 12:05:00 PM
Project: 105456
Lab ID: 2105396-003
Matrix: Soil
Client Sample ID: DPT-5 0.3-0.9'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	7,460	950	D	mg/Kg-dry	100	5/27/2021 5:08:00 PM
Iron	9,000	950	D	mg/Kg-dry	100	5/27/2021 5:08:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	19.6	0.500		wt%	1	6/1/2021 2:59:23 PM

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Project: 105456
Lab ID: 2105396-004
Client Sample ID: DPT-6 1.5-2'

Collection Date: 5/24/2021 12:35:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	14,500	954	D	mg/Kg-dry	100	5/27/2021 5:13:34 PM
Iron	12,400	954	D	mg/Kg-dry	100	5/27/2021 5:13:34 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	21.2	0.500		wt%	1	6/1/2021 2:59:23 PM

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Project: 105456
Lab ID: 2105396-005
Client Sample ID: DPT-8 8.2-8.4'

Collection Date: 5/24/2021 1:25:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	17,400	905	D	mg/Kg-dry	100	5/27/2021 5:19:08 PM
Iron	15,300	905	D	mg/Kg-dry	100	5/27/2021 5:19:08 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	16.9	0.500		wt%	1	6/1/2021 2:59:23 PM

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Project: 105456
Lab ID: 2105396-006
Client Sample ID: DPT-9 13.2-13.8'

Collection Date: 5/24/2021 2:00:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	48,100	982	D	mg/Kg-dry	100	5/27/2021 5:24:42 PM
Iron	19,600	982	D	mg/Kg-dry	100	5/27/2021 5:24:42 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	23.4	0.500		wt%	1	6/1/2021 2:59:23 PM

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Project: 105456
Lab ID: 2105396-007
Client Sample ID: **DPT-11 2.1-3.1'**

Collection Date: 5/24/2021 3:00:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	17,100	889	D	mg/Kg-dry	100	5/27/2021 5:30:17 PM
Iron	18,600	889	D	mg/Kg-dry	100	5/27/2021 5:30:17 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	9.28	0.500		wt%	1	6/1/2021 2:59:23 PM

Analytical Report

Work Order: **2105396**
Date Reported: **6/11/2021**

Client: Friedman & Bruya
Project: 105456
Lab ID: 2105396-008
Client Sample ID: DPT-12 8.6-9.2'

Collection Date: 5/24/2021 3:25:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	16,500	891	D	mg/Kg-dry	100	5/27/2021 5:35:52 PM
Iron	18,200	891	D	mg/Kg-dry	100	5/27/2021 5:35:52 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	9.52	0.500		wt%	1	6/1/2021 2:59:23 PM

Client: Friedman & Bruya
Collection Date: 5/24/2021 3:50:00 PM
Project: 105456
Lab ID: 2105396-009
Matrix: Soil
Client Sample ID: DPT-13 7.2-8.2'

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 6020B				Batch ID: 32448		Analyst: EH
Aluminum	14,700	886	D	mg/Kg-dry	100	5/27/2021 5:41:26 PM
Iron	16,400	886	D	mg/Kg-dry	100	5/27/2021 5:41:26 PM
Sample Moisture (Percent Moisture)				Batch ID: R67631		Analyst: OK
Percent Moisture	9.70	0.500		wt%	1	6/1/2021 2:59:23 PM

Fremont Analytical

Date: *6/11/2021*

Work Order: 2105396
CLIENT: Friedman & Bruya
Project: 105456

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-32507** SampType: **MBLK** Units: **mg/L** Prep Date: **6/1/2021** RunNo: **67663**
Client ID: **MBLKW** Batch ID: **32507** Analysis Date: **6/1/2021** SeqNo: **1364754**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.0800									
Chloride	ND	0.100									

Sample ID: **LCS-32507** SampType: **LCS** Units: **mg/L** Prep Date: **6/1/2021** RunNo: **67663**
Client ID: **LCSW** Batch ID: **32507** Analysis Date: **6/1/2021** SeqNo: **1364755**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	0.531	0.0800	0.5000	0	106	90	110				
Chloride	0.707	0.100	0.7500	0	94.3	90	110				

Sample ID: **2105395-001AMS** SampType: **MS** Units: **mg/L** Prep Date: **6/1/2021** RunNo: **67663**
Client ID: **BATCH** Batch ID: **32507** Analysis Date: **6/1/2021** SeqNo: **1364758**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	4.96	0.800	5.000	0	99.2	80	120				D
Chloride	18.2	1.00	7.500	10.42	103	80	120				D

Sample ID: **2105395-001AMSD** SampType: **MSD** Units: **mg/L** Prep Date: **6/1/2021** RunNo: **67663**
Client ID: **BATCH** Batch ID: **32507** Analysis Date: **6/1/2021** SeqNo: **1364759**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	4.89	0.800	5.000	0	97.8	80	120	4.960	1.42	20	D
Chloride	18.0	1.00	7.500	10.42	101	80	120	18.18	0.829	20	D

Fremont Analytical

Date: *6/11/2021*

Work Order: 2105396
CLIENT: Friedman & Bruya
Project: 105456

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2105420-001ADUP**	SampType: **DUP**			Units: **mg/L**		Prep Date: **6/1/2021**			RunNo: **67663**		
Client ID: **BATCH**	Batch ID: **32507**					Analysis Date: **6/2/2021**			SeqNo: **1364773**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	8.00						0		20	D
Chloride	90.1	10.0						84.60	6.30	20	D

Sample ID: **2105420-001AMS**	SampType: **MS**			Units: **mg/L**		Prep Date: **6/1/2021**			RunNo: **67663**		
Client ID: **BATCH**	Batch ID: **32507**					Analysis Date: **6/2/2021**			SeqNo: **1364774**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	47.9	8.00	50.00	0	95.8	80	120				D
Chloride	203	10.0	75.00	84.60	158	80	120				DS

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Date: *6/11/2021*

Work Order: 2105396
CLIENT: Friedman & Bruya
Project: 105456

QC SUMMARY REPORT

Total Metals by EPA Method 200.8

Sample ID: **MB-32582** SampType: **MBLK** Units: **µg/L** Prep Date: **6/8/2021** RunNo: **67806**
Client ID: **MBLKW** Batch ID: **32582** Analysis Date: **6/9/2021** SeqNo: **1367906**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	100									

Sample ID: **2106098-001EDUP** SampType: **DUP** Units: **µg/L** Prep Date: **6/8/2021** RunNo: **67806**
Client ID: **BATCH** Batch ID: **32582** Analysis Date: **6/9/2021** SeqNo: **1367909**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	100						220.5	86.6	30	R

NOTES:
R - High RPD observed due to low analyte concentration. High RPDs may be expected in this range.

Sample ID: **2106098-001EMS** SampType: **MS** Units: **µg/L** Prep Date: **6/8/2021** RunNo: **67806**
Client ID: **BATCH** Batch ID: **32582** Analysis Date: **6/9/2021** SeqNo: **1367910**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	5,090	100	5,000	220.5	97.4	70	130				

Sample ID: **2106098-001EMSD** SampType: **MSD** Units: **µg/L** Prep Date: **6/8/2021** RunNo: **67806**
Client ID: **BATCH** Batch ID: **32582** Analysis Date: **6/9/2021** SeqNo: **1367911**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	5,430	100	5,000	220.5	104	70	130	5,089	6.56	30	

Sample ID: **LCS-32582** SampType: **LCS** Units: **µg/L** Prep Date: **6/8/2021** RunNo: **67806**
Client ID: **LCSW** Batch ID: **32582** Analysis Date: **6/11/2021** SeqNo: **1369682**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	1,050	100	1,000	0	105	85	115				

Date: *6/11/2021*

Work Order: 2105396
CLIENT: Friedman & Bruya
Project: 105456

QC SUMMARY REPORT

Total Metals by EPA Method 6020B

Sample ID: **MB-32448** SampType: **MBLK** Units: **mg/Kg** Prep Date: **5/26/2021** RunNo: **67547**
Client ID: **MBLKS** Batch ID: **32448** Analysis Date: **5/26/2021** SeqNo: **1362250**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	7.87									
Iron	ND	7.87									

Sample ID: **LCS-32448** SampType: **LCS** Units: **mg/Kg** Prep Date: **5/26/2021** RunNo: **67547**
Client ID: **LCSS** Batch ID: **32448** Analysis Date: **5/26/2021** SeqNo: **1362251**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	415	7.87	393.7	0	105	80	120				
Iron	403	7.87	393.7	0	102	80	120				

Sample ID: **2105343-003AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **5/26/2021** RunNo: **67547**
Client ID: **BATCH** Batch ID: **32448** Analysis Date: **5/26/2021** SeqNo: **1362254**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	15,400	8.20	410.1	16,210	-192	75	125				ES
Iron	24,500	8.20	410.1	24,830	-73.1	75	125				ES

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Sample ID: **2105343-003AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **5/26/2021** RunNo: **67547**
Client ID: **BATCH** Batch ID: **32448** Analysis Date: **5/26/2021** SeqNo: **1362255**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	16,800	8.20	410.1	16,210	142	75	125	15,420	8.49	20	ES
Iron	27,100	8.20	410.1	24,830	565	75	125	24,530	10.1	20	ES

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**2105396**
Logged by:	**Clare Griggs**	Date Received:	**5/25/2021 2:29:00 PM**

Chain of Custody

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

Log In

3. Coolers are present? — Yes ☑ No ☐ NA ☐
4. Shipping container/cooler in good condition? — Yes ☑ No ☐
5. Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact) — Yes ☐ No ☐ Not Present ☑
6. Was an attempt made to cool the samples? — Yes ☑ No ☐ NA ☐
7. Were all items received at a temperature of >2°C to 6°C * — Yes ☑ No ☐ NA ☐
8. Sample(s) in proper container(s)? — Yes ☑ No ☐
9. Sufficient sample volume for indicated test(s)? — Yes ☑ No ☐
10. Are samples properly preserved? — Yes ☑ No ☐
11. Was preservative added to bottles? — Yes ☑ No ☐ NA ☐
    HNO3 to 001B & 002B
12. Is there headspace in the VOA vials? — Yes ☐ No ☐ NA ☑
13. Did all samples containers arrive in good condition(unbroken)? — Yes ☑ No ☐
14. Does paperwork match bottle labels? — Yes ☑ No ☐
15. Are matrices correctly identified on Chain of Custody? — Yes ☑ No ☐
16. Is it clear what analyses were requested? — Yes ☑ No ☐
17. Were all holding times able to be met? — Yes ☑ No ☐

Special Handling (if applicable)

18. 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:			

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample	3.8

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

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2105390

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont	
PROJECT NAME/NO. 105456	PO # B-255
REMARKS Please Email Results	

Page # ____ of ____

TURNAROUND TIME
- ☐ Standard TAT
- ☐ RUSH____

Rush charges authorized by: ____

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

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Chloride / Fluoride	Iron, Aluminium						Notes
DPT-1-0521		5/24/21	935	Water	1				X							
DPT-2-0521			1040	Water	1				X							
DPT-5 0.3-0.9'			1205	Soil	1					X						
DPT-6 1.5-2'			1235	Soil	1					X						
DPT-8 8.2-8.4'			1325	Soil	1					X						
DPT-9 13.2-13.8'			1400	Soil	1					X						
DPT-11 2.1-3.1'			1500	Soil	1					X						
DPT-12 8.6-9.2'			1525	Soil	1					X						
DPT-13 7.2-8.2'			1550	Soil	1					X						

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: D.W.E.	Michael Erdahl	Friedman & Bruya	5/25/21	
Received by:	Carter Johnson	FAI	5/25/21	1429
Relinquished by:				
Received by:				

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2105396

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont

PROJECT NAME/NO. 105456

PO # B-255

REMARKS

Please Email Results

Page # ____ of ____

TURNAROUND TIME
- ☐ Standard TAT
- ☐ RUSH____

Rush charges authorized by:

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED: Dioxins/Furans	EPH	VPH	Chloride / Fluoride	Iron, Aluminum	Aluminum					Notes
																X = run per ME, Std TAT, 6/7/21 -CG
DPT-1-0521		5/24/21	935	Water	1				X		X					
DPT-2-0521			1040	Water	1				X		X					
DPT-5 0.3-0.9'			1205	Soil	1					X						
DPT-6 1.5-2'			1235	Soil	1					X						
DPT-8 8.2-8.4'			1325	Soil	1					X						
DPT-9 13.2-13.8'			1400	Soil	1					X						
DPT-11 2.1-3.1'			1500	Soil	1					X						
DPT-12 8.6-9.2'			1525	Soil	1					X						
DPT-13 7.2-8.2'			1550	Soil	1					X						

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: [signature]	Michael Erdahl	Friedman & Bruya	5/25/21	
Received by: [signature]	Carter Johnson	FAI	5/25/21	1429
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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

September 29, 2021

Jamie Stevens, Project Manager
Crete Consulting
108 S. Washington St., Suite 300
Seattle, WA 98104

Dear Ms Stevens:

Included are the additional results from the testing of material submitted on May 25, 2021 from the Maralco, F&BI 105456 project. There are 13 pages included in this report.

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

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Rusty Jones, Grant Hainsworth
CTC0929R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on May 25, 2020 by Friedman & Bruya, Inc. from the Crete Consulting Maralco, F&BI 105456 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
105456 -01	DPT-1 5-6'
105456 -02	DPT-1 6-7'
105456 -03	DPT-1 9-10'
105456 -04	DPT-1-0521
105456 -05	DPT-2 5-6'
105456 -06	DPT-2 6-7.5'
105456 -07	DPT-2 8.5-10'
105456 -08	DPT-2-0521
105456 -09	DPT-3 2.5-3'
105456 -10	DPT-3 4.5'
105456 -11	DPT-3 6.5'
105456 -12	DPT-4 1.5-2.0'
105456 -13	DPT-4 4.5-5'
105456 -14	DPT-4 6.1-7.6'
105456 -15	DPT-5 0.3-0.9'
105456 -16	DPT-5 3.8-4.2'
105456 -17	DPT-5 4.2-5'
105456 -18	DPT-6 1.5-2'
105456 -19	DPT-6 2.6-3.1'
105456 -20	DPT-6 4.3-5'
105456 -21	DPT-7 11.7-12.2'
105456 -22	DPT-7 14.3-15'
105456 -23	DPT-8 8.2-8.4'
105456 -24	DPT-8 9.4-10'
105456 -25	DPT-8 11.7-12.2'
105456 -26	DPT-9 13.2-13.8'
105456 -27	DPT-9 14.5-15'
105456 -28	DPT-11 2.1-3.1'
105456 -29	DPT-11 4.5-5'
105456 -30	DPT-12 8.6-9.2'
105456 -31	DPT-13 7.2-8.2'
105456 -32	DPT-13 9.3-10'
105456 -33	DC-052421

The 1311/6020 analysis was requested outside of the holding time for mercury. The data were flagged accordingly.

All other quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-8 8.2-8.4’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-23
Date Analyzed:	05/26/21	Data File:	105456-23.154
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Barium	54.8
Silver	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-9 13.2-13.8'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-26
Date Analyzed:	05/26/21	Data File:	105456-26.155
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Barium	67.3
Silver	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-12 8.6-9.2'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-30
Date Analyzed:	05/26/21	Data File:	105456-30.157
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Barium	38.2
Cadmium	<1
Lead	5.72
Mercury	<1
Selenium	<1
Silver	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-12 8.6-9.2'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	105456-30 x5
Date Analyzed:	05/27/21	Data File:	105456-30 x5.098
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<5
Chromium	18.4

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 105456
Date Extracted:	05/26/21	Lab ID:	I1-335 mb
Date Analyzed:	05/26/21	Data File:	I1-335 mb.103
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Lead	<1
Mercury	<1
Selenium	<1
Silver	<1

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	DPT-8 8.2-8.4’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	09/23/21	Lab ID:	105456-23
Date Analyzed:	09/24/21	Data File:	105456-23.086
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1 ht	0.2
Selenium	<1	1.0
Silver	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	DPT-9 13.2-13.8'	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	09/23/21	Lab ID:	105456-26
Date Analyzed:	09/24/21	Data File:	105456-26.089
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1 ht	0.2
Selenium	<1	1.0
Silver	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	DPT-12 8.6-9.2’	Client:	Crete Consulting
Date Received:	05/25/21	Project:	Maralco, F&BI 105456
Date Extracted:	09/23/21	Lab ID:	105456-30
Date Analyzed:	09/24/21	Data File:	105456-30.090
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1 ht	0.2
Selenium	<1	1.0
Silver	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 105456
Date Extracted:	09/23/21	Lab ID:	I1-597 mb
Date Analyzed:	09/24/21	Data File:	I1-597 mb.084
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1	0.2
Selenium	<1	1.0
Silver	<1	5.0

Date of Report: 09/29/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456

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

Laboratory Code: 105471-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	19.7	90 b	65 b	75-125	32 b
Barium	mg/kg (ppm)	50	79.0	96 b	73 b	75-125	27 b
Cadmium	mg/kg (ppm)	10	<5	91	92	75-125	1
Chromium	mg/kg (ppm)	50	19.7	90	89	75-125	1
Lead	mg/kg (ppm)	50	588	203 b	0 b	75-125	200 b
Mercury	mg/kg (ppm	5	<5	83	94	75-125	12
Selenium	mg/kg (ppm)	5	<5	85	90	75-125	6
Silver	mg/kg (ppm)	10	<5	92	94	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	96	80-120
Barium	mg/kg (ppm)	50	94	80-120
Cadmium	mg/kg (ppm)	10	95	80-120
Chromium	mg/kg (ppm)	50	103	80-120
Lead	mg/kg (ppm)	50	96	80-120
Mercury	mg/kg (ppm)	5	100	80-120
Selenium	mg/kg (ppm)	5	94	80-120
Silver	mg/kg (ppm)	10	100	80-120

Date of Report: 09/29/21
Date Received: 05/25/21
Project: Maralco, F&BI 105456

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL/SOLID SAMPLES
FOR TCLP METALS USING
EPA METHODS 6020B AND 1311**

Laboratory Code: 105456-23 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/L (ppm)	1.0	<1	92	89	75-125	3
Barium	mg/L (ppm)	5.0	<1	96	93	75-125	3
Cadmium	mg/L (ppm)	0.5	<1	97	95	75-125	2
Chromium	mg/L (ppm)	2.0	<1	95	95	75-125	0
Lead	mg/L (ppm)	1.0	<1	91	89	75-125	2
Mercury	mg/L (ppm)	1.0	<0.1	103	100	75-125	3
Selenium	mg/L (ppm)	0.5	<1	98	94	75-125	4
Silver	mg/L (ppm)	0.5	<1	88	92	75-125	4

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/L (ppm)	1.0	94	80-120
Barium	mg/L (ppm)	5.0	97	80-120
Cadmium	mg/L (ppm)	0.5	98	80-120
Chromium	mg/L (ppm)	2.0	98	80-120
Lead	mg/L (ppm)	1.0	94	80-120
Mercury	mg/L (ppm)	1.0	103	80-120
Selenium	mg/L (ppm)	0.5	103	80-120
Silver	mg/L (ppm)	0.5	99	80-120

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.

105456

SAMPLE CHAIN OF CUSTODY

ME 05/25/21

VS3 / 4/1

Report To R Jones | G. Hainsworth

Company Crete Consulting, Inc.

Address 108 S. Washington, Ste 300

City, State, ZIP Seattle, WA 98104

Phone ______ Email ______

SAMPLERS (signature) Rusty Jones R Jones

PROJECT NAME MARALCO

PO #

REMARKS Metals List: Antimony, Aluminum, Ag, Cd, Chrom, Cobalt, Cu, Pb, Fe, Ni, Manganese, Zn

Project specific RLs? - Yes / No

INVOICE TO

Page # 1 of 4

TURNAROUND TIME

☒ Standard turnaround EB3

☐ RUSH BD4

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	Chlorides/Fluorides	Metals (see List)			Notes
																	● - per RJ 6/7/21 MK
DPT-1 5-6'	01 A-F	5/24/21	0905	SOIL	6	X	X	X									
DPT-1 6-7'	02		0910		6												
DPT-1 9-10'	03		0920		6												
DPT-1-0521	04		0935	WATER	6	X	X	X					X	●			w/ 4 w/ SGC
DPT-2 5-6'	05		1015	SOIL	6												
DPT-2 6-7.5'	06		1020		6	X	X	X				X					
DPT-2 9.5-10'	07		1025		6												
DPT-2-0521	08		1040	WATER	6	X	X	X					X	●			w/ 4 w/ SGC
DPT-3 2.5-3'	09		1115	SOIL	1												
DPT-3 4.5'	10		1120		1												

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	5.25.21	1026
Received by: [signature]	Liz Webber-Bruya	F&B	5/25/21	1026
Relinquished by:				
Received by:		Samples received at 3 °C		

105456

SAMPLE CHAIN OF CUSTODY ME 05/25/21 VM1

Page # 2 of 4 VS3

Report To: See Page 1

Company

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R Jones

PROJECT NAME: MARALCO

PO #

REMARKS: Metals List: Sb, Al, As, Cd, Cr, Co, Cu, Fe, Mn, Pb, Ni, Zn

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME

☒ Standard turnaround ODB

☐ RUSH

Rush charges authorized by: BDU

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	Metals (see list)				Notes
DPT-3 6.5'	11	5.24.21	1125	Soil	1												
DPT-4 1.5-2.0'	12	↓	1140	↓	1												
DPT-4 4.5-5'	13		1145		1												
DPT-4 6.1-7.6'	14		1150		1												
DPT-5 0.3-0.9'	15		1205		1								X				
DPT-5 3.8-4.2'	16		1210		1												
DPT-5 4.2-5'	17		1215		1												
DPT-6 1.5-2'	18		1235		1								X				
DPT-6 2.6-3.1'	19		1240		1								●				
DPT-6 4.3-5'	20	↓	1245	↓	1												

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

SIGNATURE		PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	CRETE	5.25.21	1026
Received by:	[signature]	Liz Webber-Bruya	F&B	5/25/21	1026
Relinquished by:					
Received by:			Samples received at 3 °C		

105456

SAMPLE CHAIN OF CUSTODY ME 05/25/21

Report To: See Page 1
Company:
Address:
City, State, ZIP:
Phone: Email:

SAMPLERS (signature): Rusty Jones R. Jones [redacted]

PROJECT NAME: MARALCO

PO #:

REMARKS: Metals List: Sb, Al, As, Cd, Cr, Co, Cu, Fe, Mn, Pb, Ni, Zn

INVOICE TO:

Page # 3 of 4 VW/ME

TURNAROUND TIME
- X Standard Turnaround
- ☐ RUSH
- Rush charges authorized by: BTH

SAMPLE DISPOSAL
- ☐ Dispose after 30 days
- ☐ Archive Samples
- ☐ Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	Metals (see list)	TCLP RCRA	Barium+Silver	RCRA	Notes
DPT-7 11.7-12.2'	21	5.24.21	1305	Soil	1												X pers 9/22/21 ME
DPT-7 14.3-15'	22		1310		1												
DPT-8 8.2-8.4'	23		1325		1								X	X	X		
DPT-8 9.4-10'	24		1330		1								●				
DPT-8 11.7-12.2'	25		1335		1												
DPT-9 ~~8.2-8.8~~ 13.2-13.6	26		1400		1								X	X	X		
DPT-9 ~~9.5-10~~ 14.5-15'	27		1405		1								●				
DPT-11 2.1-3.1'	28		1500		1								X				
DPT-11 4.5-5'	29		1505		1								●				
DPT-12 8.6-9.2'	30		1525		1								X	X		X	

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	5.25.21	1026
Received by: [signature]	Liz Webber-Bruya	F&B	5/25/21	1026
Relinquished by:				
Received by:		Samples received at 3 °C		

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

105456

SAMPLE CHAIN OF CUSTODY

ME 05/25/21 [redacted]

Report To: See Page 1

Company

Address

City, State, ZIP

Phone Email

SAMPLERS (signature): Rusty Jones R. Jones

PROJECT NAME: MARALCO

PO #

REMARKS: Metals List: Sb, Al, As, Cd, Cr, Co, Cu, Fe, Mn, Pb, Ni, ~~Zn~~

INVOICE TO

Page # 4 of 4 VW1/VS3

TURNAROUND TIME
- ☒ Standard Turnaround
- ☐ RUSH
- Rush charges authorized by:

FWB

BEN

SAMPLE DISPOSAL
- ☐ Dispose after 30 days
- ☐ Archive Samples
- ☐ Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	Metals (see list)	DOT 4.3	Dangerous when wet	TCLP RCRA	Notes
DPT-13 7.2-8.2′	31	5/24/21	1550	Soil	1								X				
DPT-13 9.3-10′	32	↓	1555	↓	1								●				
DC-052421	33 A-D	5/24/21	1600	Soil	4										X	*	Added at lab NP 5/25/21
																	V per RS 6/3/21 MQ

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	5.25.21	1026
Received by: [signature]	Liz Webber-Bruya	F&B	5/25/21	1026
Relinquished by:				
Received by:		Samples received at 7 °C		

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

3012 16th Avenue West
Seattle, WA 98119-2029
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fbi@isomedia.com
www.friedmanandbruya.com

June 11, 2021

Grant Hainsworth, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Hainsworth:

Included are the results from the testing of material submitted on June 3, 2021 from the Maralco Kent WA, F&BI 106055 project. There are 25 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Rusty Jones, James Stevens
CTC0611R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on June 3, 2021 by Friedman & Bruya, Inc. from the Crete Consulting Maralco Kent WA, F&BI 106055 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
106055 -01	MW5A-0621
106055 -02	MW4A-0621
106055 -03	MW6-0621
106055 -04	MW3A-0621
106055 -05	Dup-0621
106055 -06	Sed-01-0621

The samples were sent to Fremont for fluoride, chloride, and aluminum testing. In addition, sample Sed-01-0621 was sent to Fremont for iron testing. The report will be forwarded upon receipt.

All quality control requirements were acceptable.

Date of Report: 06/11/21
Date Received: 06/03/21
Project: Maralco Kent WA, F&BI 106055
Date Extracted: 06/09/21
Date Analyzed: 06/09/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE USING METHOD NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 51-134)
MW4A-0621 106055-02	<100	107
MW6-0621 106055-03	<100	109
Dup-0621 106055-05	<100	107
Method Blank 01-1298 MB	<100	109

Date of Report: 06/11/21
Date Received: 06/03/21
Project: Maralco Kent WA, F&BI 106055
Date Extracted: 06/04/21
Date Analyzed: 06/07/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx
Sample Extracts Passed Through a Silica Gel Column Prior to Analysis
Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 47-140)
MW4A-0621 106055-02	<50	<250	122
MW6-0621 106055-03	<50	<250	110
Dup-0621 106055-05	<50	<250	119
Method Blank 01-1351 MB2	<50	<250	114

Date of Report: 06/11/21
Date Received: 06/03/21
Project: Maralco Kent WA, F&BI 106055
Date Extracted: 06/04/21
Date Analyzed: 06/04/21

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
MW4A-0621 106055-02	200 x	<250	95
MW6-0621 106055-03	<50	<250	83
Dup-0621 106055-05	210 x	<250	87
Method Blank 01-1351 MB2	<50	<250	94

Analysis For Total Metals By EPA Method 6020B

Client ID:	Sed-01-0621	Client:	Crete Consulting
Date Received:	06/03/21	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	106055-06
Date Analyzed:	06/04/21	Data File:	106055-06.115
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	8.79
Arsenic	4.32
Cadmium	5.37
Chromium	68.4
Cobalt	6.10
Copper	627
Lead	158
Manganese	193
Nickel	35.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	Sed-01-0621	Client:	Crete Consulting
Date Received:	06/03/21	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	106055-06 x10
Date Analyzed:	06/07/21	Data File:	106055-06 x10.108
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Zinc	957

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	NA	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	I1-352 mb
Date Analyzed:	06/04/21	Data File:	I1-352 mb.082
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Manganese	<1
Nickel	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW5A-0621	Client:	Crete Consulting
Date Received:	06/03/21	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	106055-01
Date Analyzed:	06/04/21	Data File:	106055-01.113
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Lead	53.7

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW5A-0621	Client:	Crete Consulting
Date Received:	06/03/21	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	106055-01 x2
Date Analyzed:	06/07/21	Data File:	106055-01 x2.109
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Antimony	<4
Arsenic	60.5
Cadmium	4.60

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW5A-0621	Client:	Crete Consulting
Date Received:	06/03/21	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	106055-01 x10
Date Analyzed:	06/04/21	Data File:	106055-01 x10.112
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Antimony	<20
Arsenic	73.2
Cadmium	<10
Chromium	98.6
Cobalt	34.6
Copper	589
Manganese	2,510
Nickel	76.7
Zinc	431

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW5A-0621	Client:	Crete Consulting
Date Received:	06/03/21	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	106055-01 x100
Date Analyzed:	06/07/21	Data File:	106055-01 x100.110
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	157,000

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW4A-0621	Client:	Crete Consulting
Date Received:	06/03/21	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	106055-02
Date Analyzed:	06/04/21	Data File:	106055-02.122
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Antimony	<2
Arsenic	9.45
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	8.56
Lead	<1
Nickel	1.06
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW4A-0621	Client:	Crete Consulting
Date Received:	06/03/21	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	106055-02 x100
Date Analyzed:	06/07/21	Data File:	106055-02 x100.111
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	62,900
Manganese	2,660

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW6-0621	Client:	Crete Consulting
Date Received:	06/03/21	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	106055-03
Date Analyzed:	06/04/21	Data File:	106055-03.123
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Antimony	<2
Arsenic	18.3
Cadmium	<1
Chromium	2.13
Cobalt	2.77
Copper	19.0
Lead	<1
Nickel	2.71
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW6-0621	Client:	Crete Consulting
Date Received:	06/03/21	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	106055-03 x100
Date Analyzed:	06/07/21	Data File:	106055-03 x100.113
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	47,700
Manganese	1,590

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW3A-0621	Client:	Crete Consulting
Date Received:	06/03/21	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	106055-04
Date Analyzed:	06/04/21	Data File:	106055-04.124
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Antimony	<2
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	6.73
Iron	304
Lead	<1
Manganese	37.5
Nickel	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	Dup-0621	Client:	Crete Consulting
Date Received:	06/03/21	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	106055-05
Date Analyzed:	06/04/21	Data File:	106055-05.125
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Antimony	<2
Arsenic	9.37
Cadmium	<1
Chromium	1.01
Cobalt	<1
Copper	9.51
Lead	<1
Nickel	1.06
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	Dup-0621	Client:	Crete Consulting
Date Received:	06/03/21	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	106055-05 x100
Date Analyzed:	06/07/21	Data File:	106055-05 x100.114
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	64,500
Manganese	2,750

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	NA	Project:	Maralco Kent WA, F&BI 106055
Date Extracted:	06/04/21	Lab ID:	I1-351 mb2
Date Analyzed:	06/04/21	Data File:	I1-351 mb2.111
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Antimony	<2
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Iron	<50
Lead	<1
Manganese	<1
Nickel	<1
Zinc	<5

Date of Report: 06/11/21
Date Received: 06/03/21
Project: Maralco Kent WA, F&BI 106055

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TPH AS GASOLINE USING METHOD NWTPH-Gx

Laboratory Code: 106093-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	97	69-134

Date of Report: 06/11/21
Date Received: 06/03/21
Project: Maralco Kent WA, F&BI 106055

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample Silica Gel

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	116	124	61-133	7

Date of Report: 06/11/21
Date Received: 06/03/21
Project: Maralco Kent WA, F&BI 106055

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	100	112	63-142	11

Date of Report: 06/11/21
Date Received: 06/03/21
Project: Maralco Kent WA, F&BI 106055

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

Laboratory Code: 106058-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Antimony	mg/kg (ppm)	20	<5	100	95	75-125	5
Arsenic	mg/kg (ppm)	10	<5	97	93	75-125	4
Cadmium	mg/kg (ppm)	10	<5	102	99	75-125	3
Chromium	mg/kg (ppm)	50	16.9	96	98	75-125	2
Cobalt	mg/kg (ppm)	20	6.52	92	89	75-125	3
Copper	mg/kg (ppm)	50	<25	97	93	75-125	4
Lead	mg/kg (ppm)	50	<5	91	88	75-125	3
Manganese	mg/kg (ppm	20	264	28 b	154 b	75-125	138 b
Nickel	mg/kg (ppm)	25	19.2	94	99	75-125	5
Zinc	mg/kg (ppm)	50	<25	89	90	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Antimony	mg/kg (ppm)	20	99	80-120
Arsenic	mg/kg (ppm)	10	93	80-120
Cadmium	mg/kg (ppm)	10	99	80-120
Chromium	mg/kg (ppm)	50	110	80-120
Cobalt	mg/kg (ppm)	20	94	80-120
Copper	mg/kg (ppm)	50	99	80-120
Lead	mg/kg (ppm)	50	93	80-120
Manganese	mg/kg (ppm)	20	97	80-120
Nickel	mg/kg (ppm)	25	99	80-120
Zinc	mg/kg (ppm)	50	90	80-120

Date of Report: 06/11/21
Date Received: 06/03/21
Project: Maralco Kent WA, F&BI 106055

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

Laboratory Code: 106052-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Antimony	ug/L (ppb)	20	<20	85	80	75-125	6
Arsenic	ug/L (ppb)	10	<10	93	89	75-125	4
Cadmium	ug/L (ppb)	5	<10	96	94	75-125	2
Chromium	ug/L (ppb)	20	<10	95	92	75-125	3
Cobalt	ug/L (ppb)	20	<10	92	90	75-125	2
Copper	ug/L (ppb)	20	<50	98	96	75-125	2
Iron	ug/L (ppb)	100	5,110	180 b	218 b	75-125	19
Lead	ug/L (ppb)	10	<10	98	95	75-125	3
Manganese	ug/L (ppb)	20	480	66 b	31 b	75-125	72 b
Nickel	ug/L (ppb)	20	<10	96	93	75-125	3
Zinc	ug/L (ppb)	50	<50	89	87	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Antimony	ug/L (ppb)	20	102	80-120
Arsenic	ug/L (ppb)	10	95	80-120
Cadmium	ug/L (ppb)	5	97	80-120
Chromium	ug/L (ppb)	20	94	80-120
Cobalt	ug/L (ppb)	20	95	80-120
Copper	ug/L (ppb)	20	98	80-120
Iron	ug/L (ppb)	100	95	80-120
Lead	ug/L (ppb)	10	96	80-120
Manganese	ug/L (ppb)	20	91	80-120
Nickel	ug/L (ppb)	20	96	80-120
Zinc	ug/L (ppb)	50	90	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. 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.

106055

SAMPLE CHAIN OF CUSTODY

06-03-21 AI2/E03/VW1

Page # 1 of 1

Report To R. Jones, G. Hainsworth

Company Crete Consulting, Inc

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME MARALCO, Kent, WA

PO #

REMARKS Metals List: Sb, Al, As, Cd, Cr, Co, Cu, Fe, Mn, Pb, Ni, Zn

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME

X Standard turnaround

☐ RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

☐ Archive samples

☐ Other

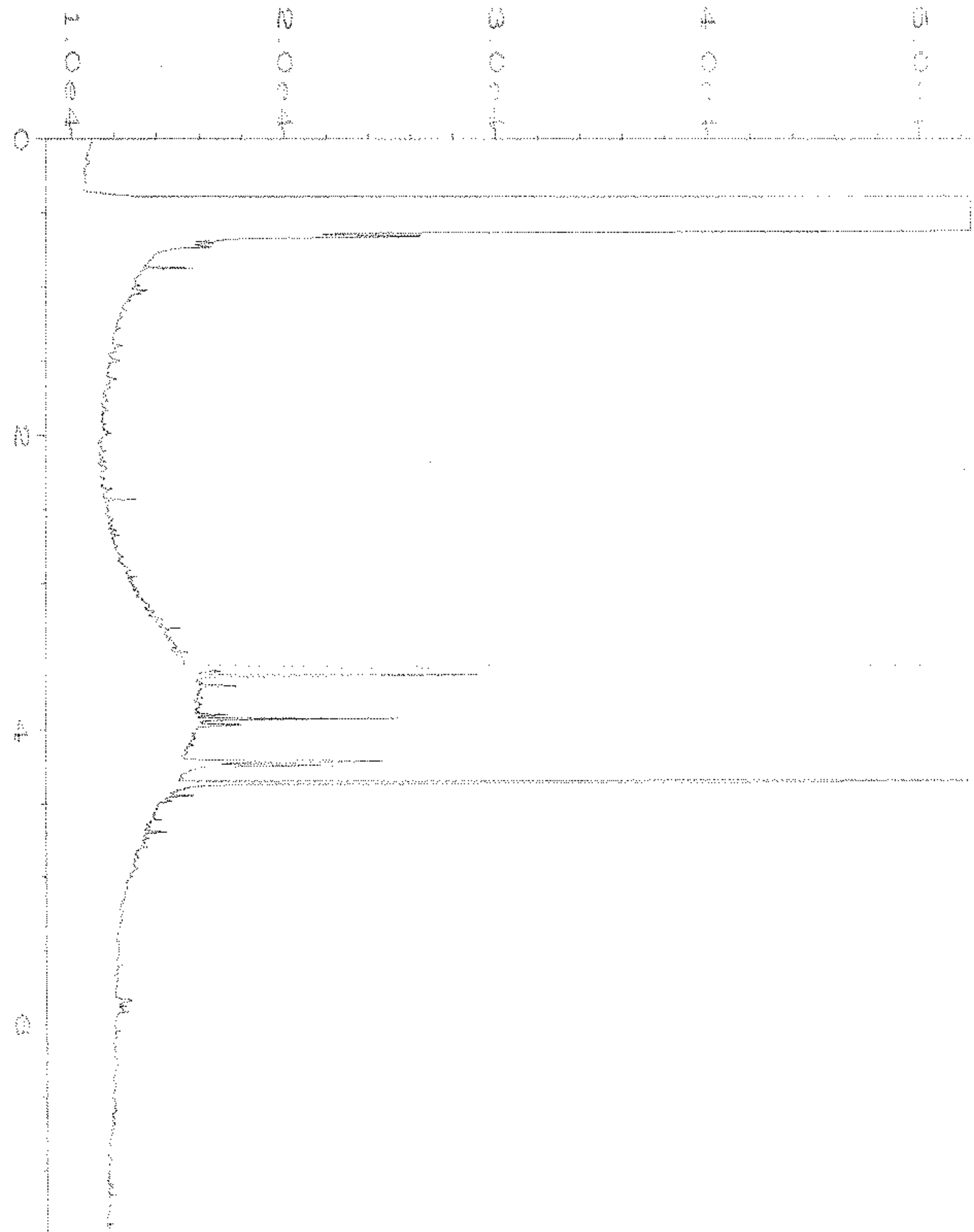
Default: Dispose after 30 days

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	METALs (see List)	Cl⁻ F⁻			Notes
MW5A-0621	01 A-C	6.3.2021	0840	WATER	3								X	X			
MW4A-0621	02 A-G	↓	0945	↓	7	X	X						X	X			with & without SGC
MW6-0621	03 A-G	↓	1116	↓	7	X	X						X	X			↓ ↓
MW3A-0621	04 A-C	↓	1214	↓	3								X	X			
DUP-0621	05 A-G	↓	0800	↓	7	X	X						X	X			with & without SGC
SED-01-0621	06 A-C	↓	1345	SOIL	3								X	X			

Samples received at 3 °C

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	Crete Consulting	6.3.21	1543
Received by: [signature]	Michael Erdahl	FtBm	6.3.21	1543
Relinquished by:				
Received by:				



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Data File Name    : C:\HPCHEM\1\DATA\06-04-21\009F0301.D
Operator          : TL                          Page Number      : 1
Instrument        : GC1                         Vial Number      : 9
Sample Name       : 106055-02                   Injection Number : 1
Run Time Bar Code:                              Sequence Line    : 3
Acquired on       : 04 Jun 21   10:59 AM        Instrument Method: DX.MTH
Report Created on: 07 Jun 21   09:29 AM         Analysis Method  : DEFAULT.MTH
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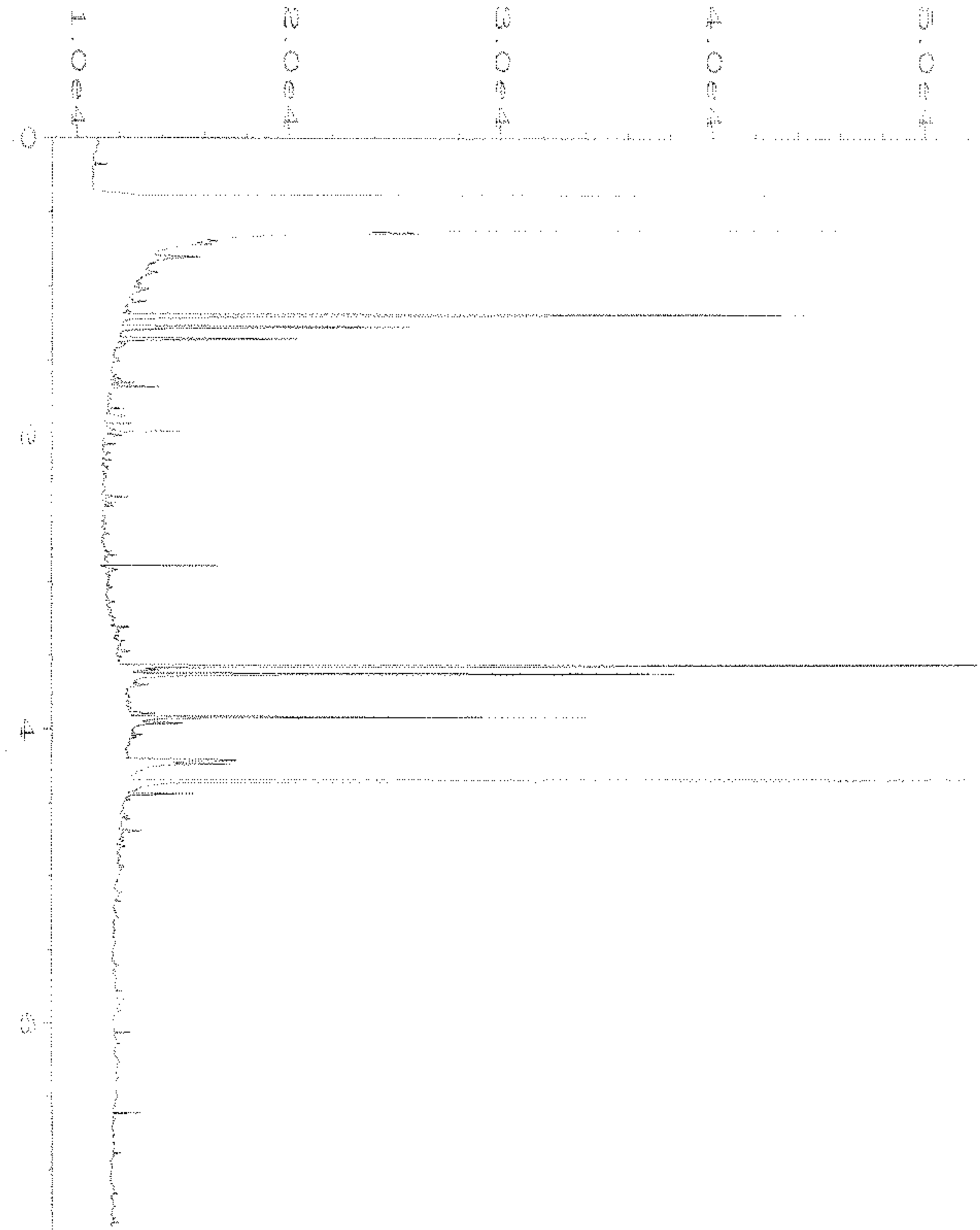
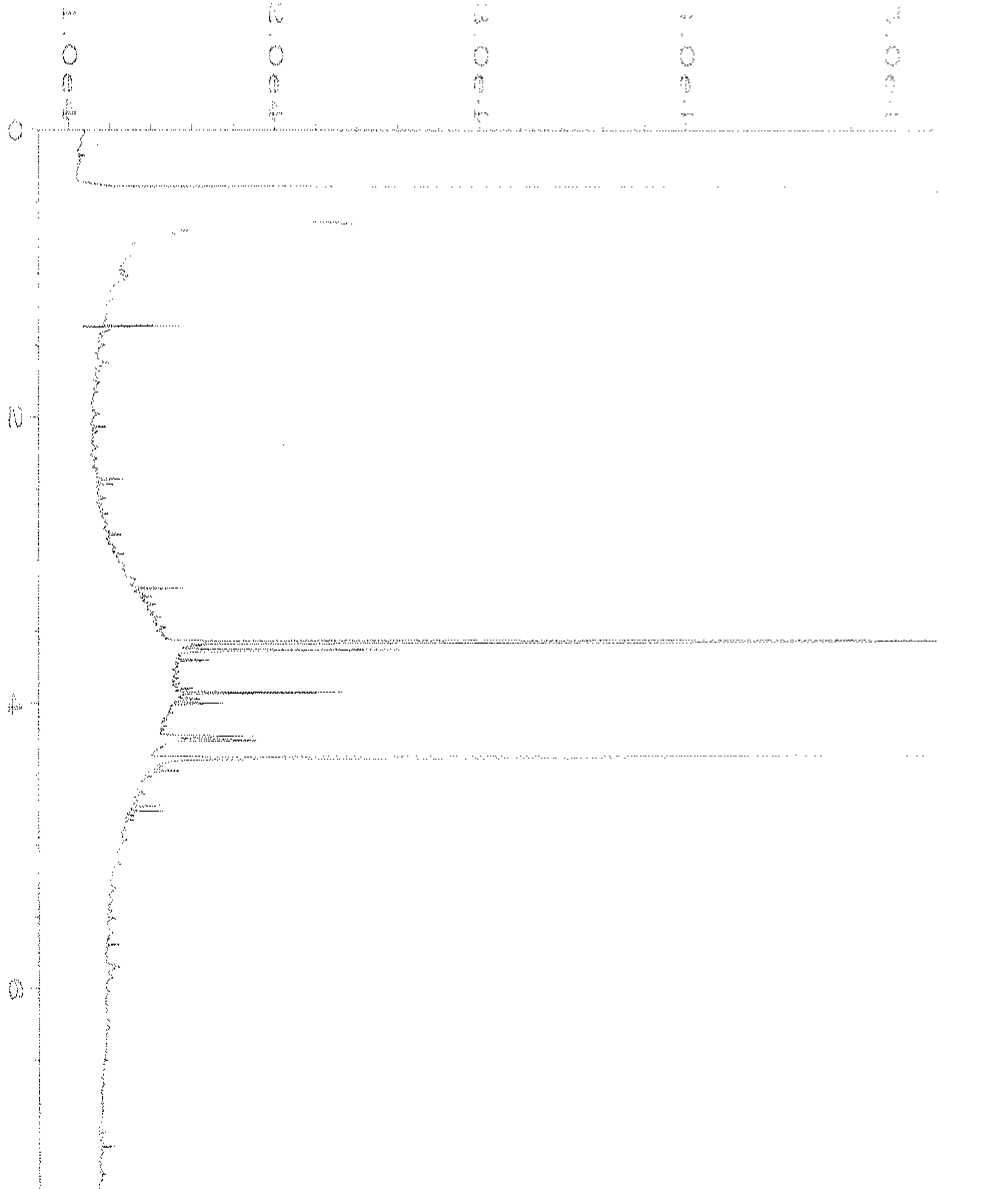


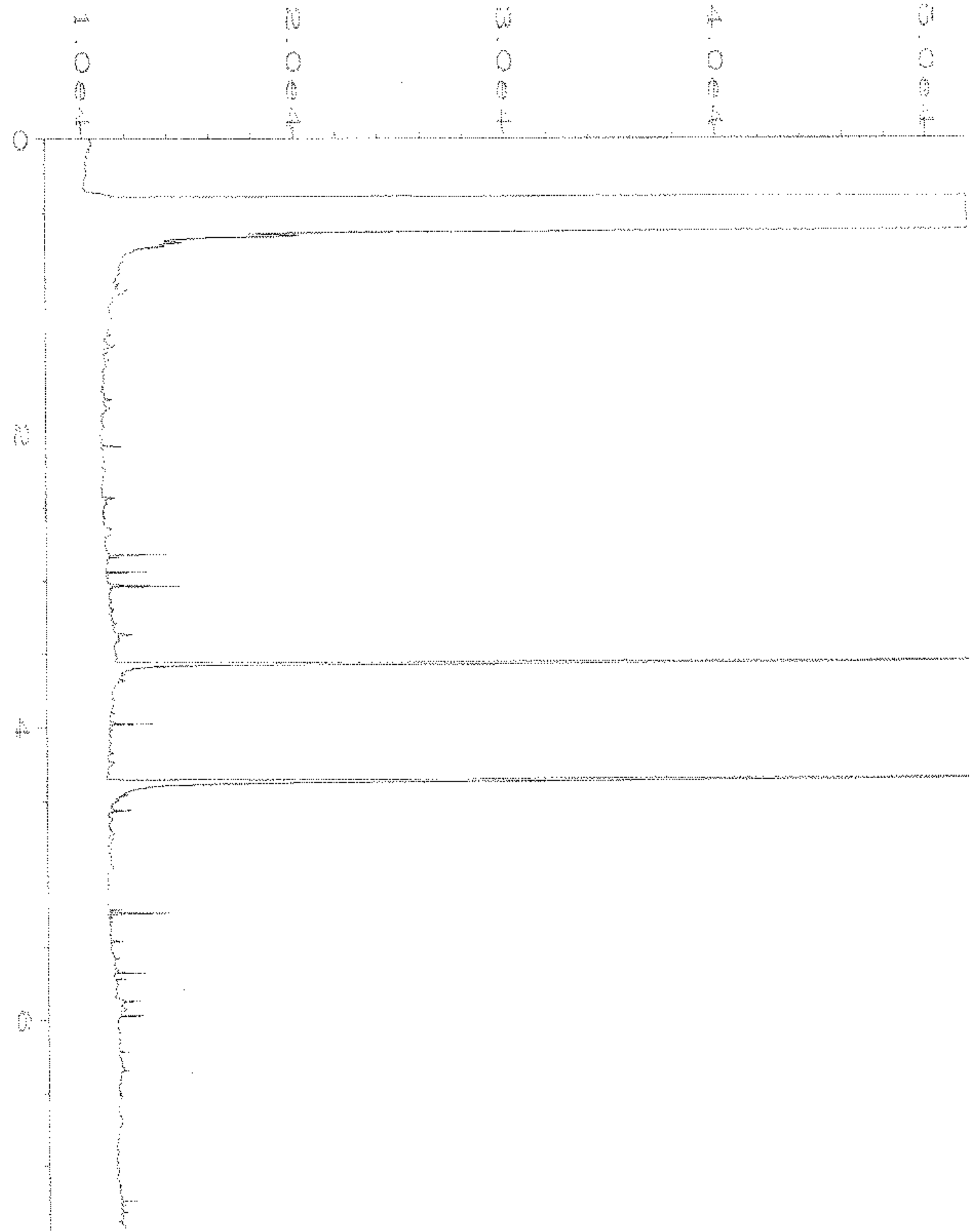
Data File Name : C:\HPCHEM\1\DATA\06-04-21\010F0301.D
Operator : TL
Instrument : GC1
Sample Name : 106055-03
Run Time Bar Code:
Acquired on : 04 Jun 21 11:10 AM
Report Created on: 07 Jun 21 09:29 AM

Page Number : 1
Vial Number : 10
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



Data File Name : C:\HPCHEM\1\DATA\06-04-21\011F0301.D
Operator : TL
Instrument : GC1
Sample Name : 106055-05
Run Time Bar Code:
Acquired on : 04 Jun 21 11:22 AM
Report Created on: 07 Jun 21 09:29 AM

Page Number : 1
Vial Number : 11
Injection Number : 1
Sequence Line : 3
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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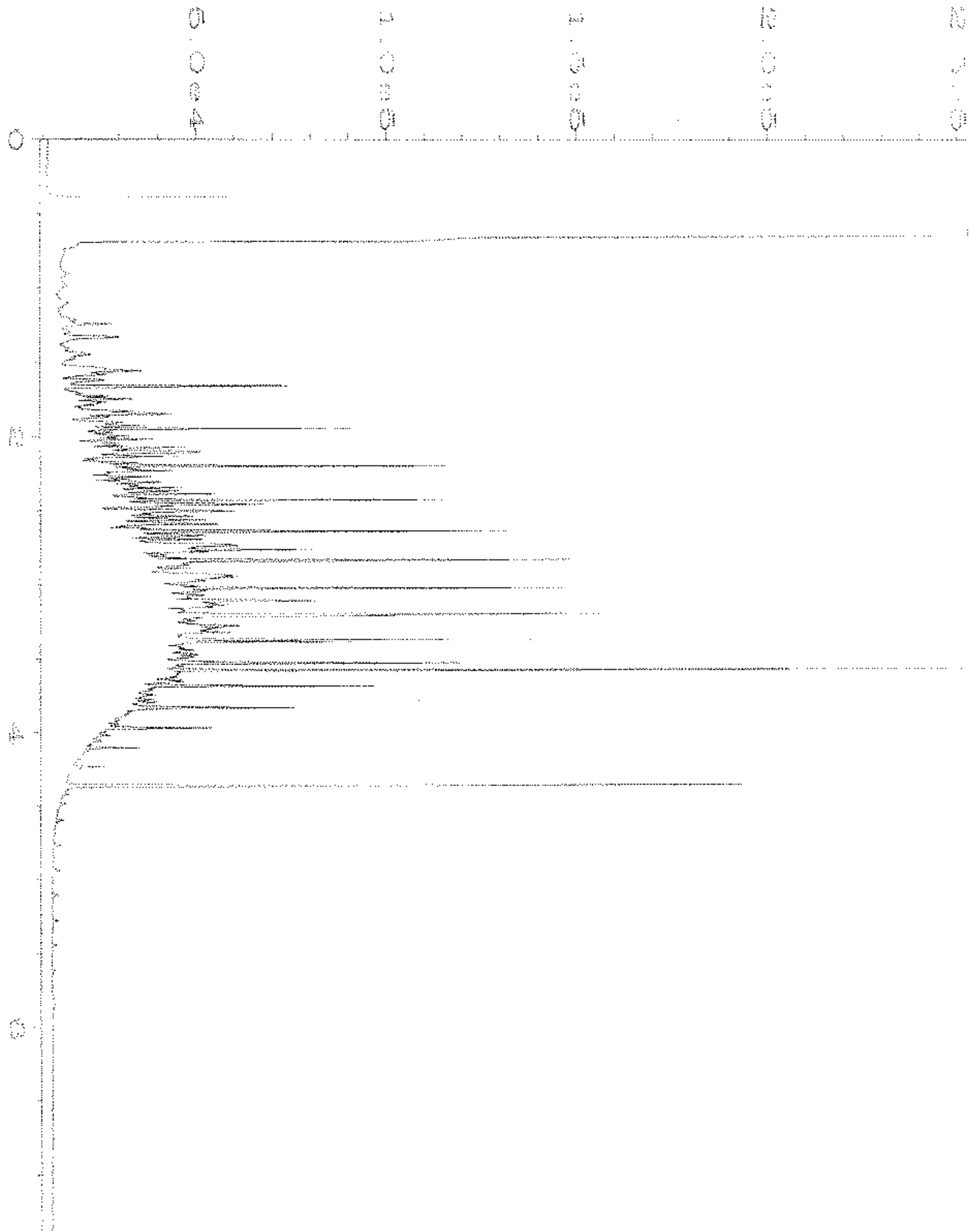
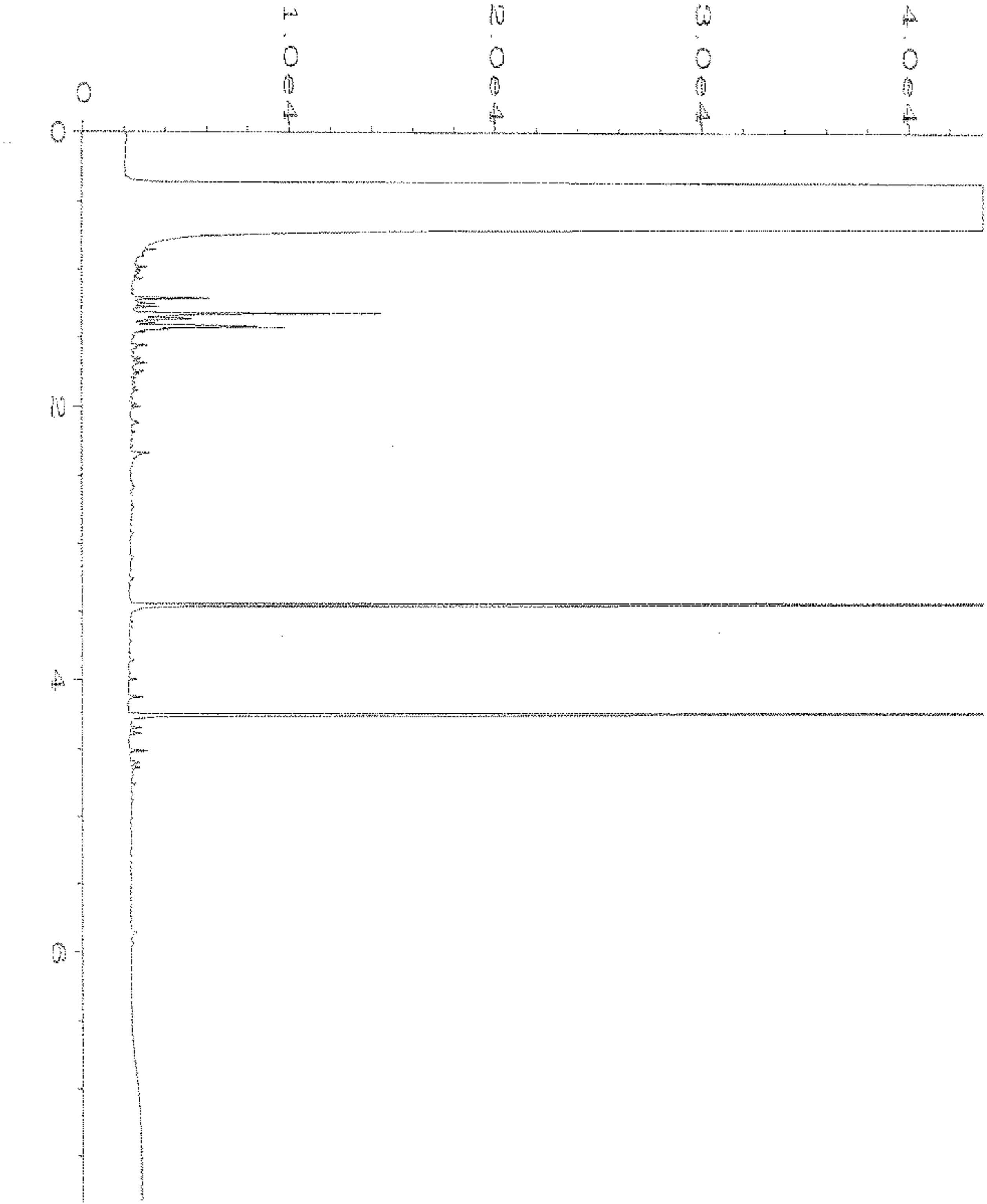
Operator	: TL	Page Number	: 1
Instrument	: GC1	Vial Number	: 6
Sample Name	: 01-1351 mb2	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 3
Acquired on	: 04 Jun 21 10:26 AM	Instrument Method:	DX.MTH
Report Created on:	07 Jun 21 09:29 AM	Analysis Method	: DEFAULT.MTH

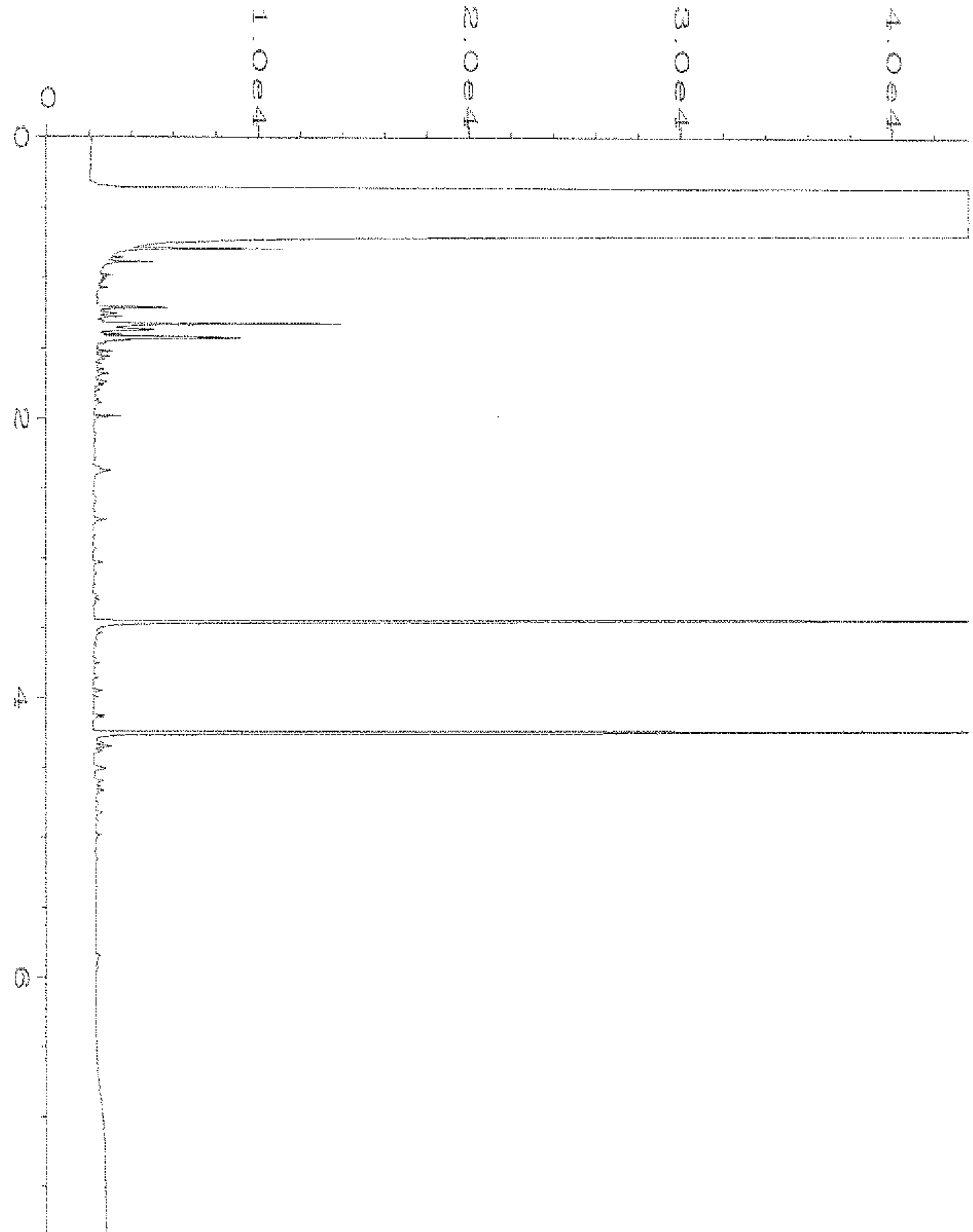


Data File Name	: C:\HPCHEM\1\DATA\06-04-21\003F0201.D		
Operator	: TL	Page Number	: 1
Instrument	: GC1	Vial Number	: 3
Sample Name	: 500 Dx 62-142D	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 2
Acquired on	: 04 Jun 21 05:47 AM	Instrument Method:	DX.MTH
Report Created on:	07 Jun 21 09:29 AM	Analysis Method	: DEFAULT.MTH



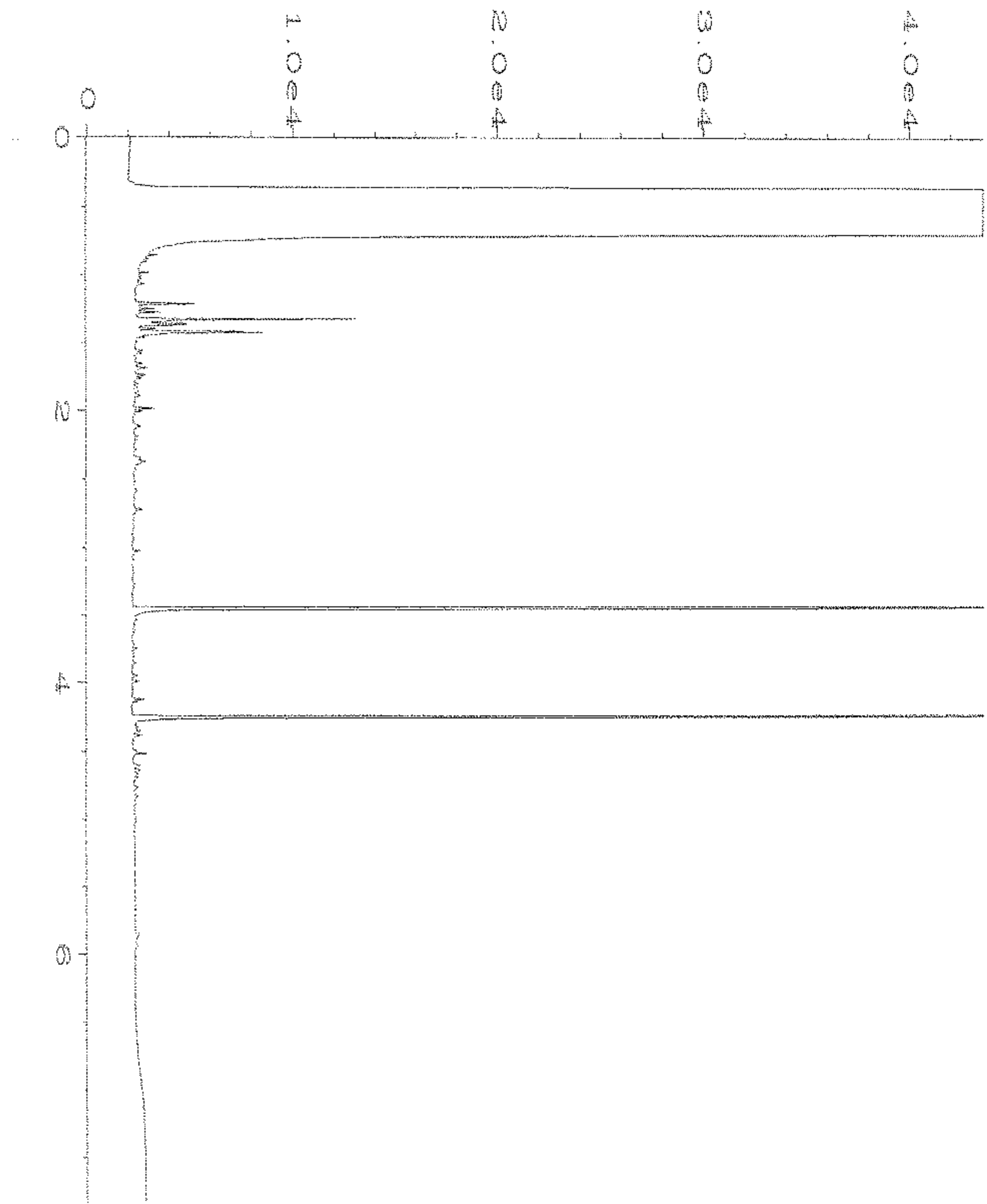
Data File Name : C:\HPCHEM\4\DATA\06-07-21\025F0401.D
Operator : TL
Instrument : GC#4
Sample Name : 106055-02 sg
Run Time Bar Code:
Acquired on : 07 Jun 21 12:49 PM
Report Created on: 08 Jun 21 09:12 AM

Page Number : 1
Vial Number : 25
Injection Number : 1
Sequence Line : 4
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



Data File Name : C:\HPCHEM\4\DATA\06-07-21\026F0401.D
Operator : TL
Instrument : GC#4
Sample Name : 106055-03 sg
Run Time Bar Code:
Acquired on : 07 Jun 21 01:01 PM
Report Created on: 08 Jun 21 09:12 AM

Page Number : 1
Vial Number : 26
Injection Number : 1
Sequence Line : 4
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



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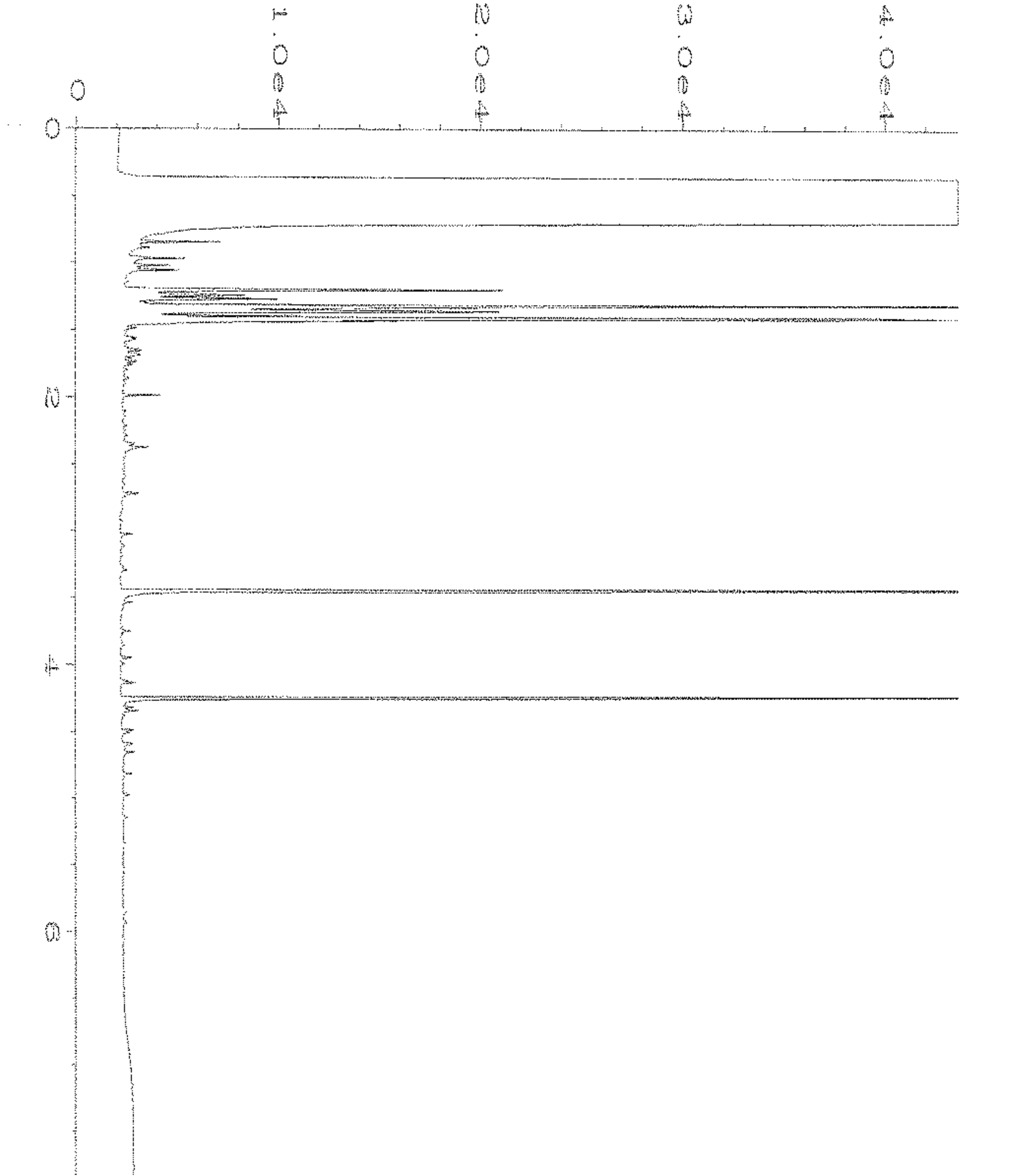
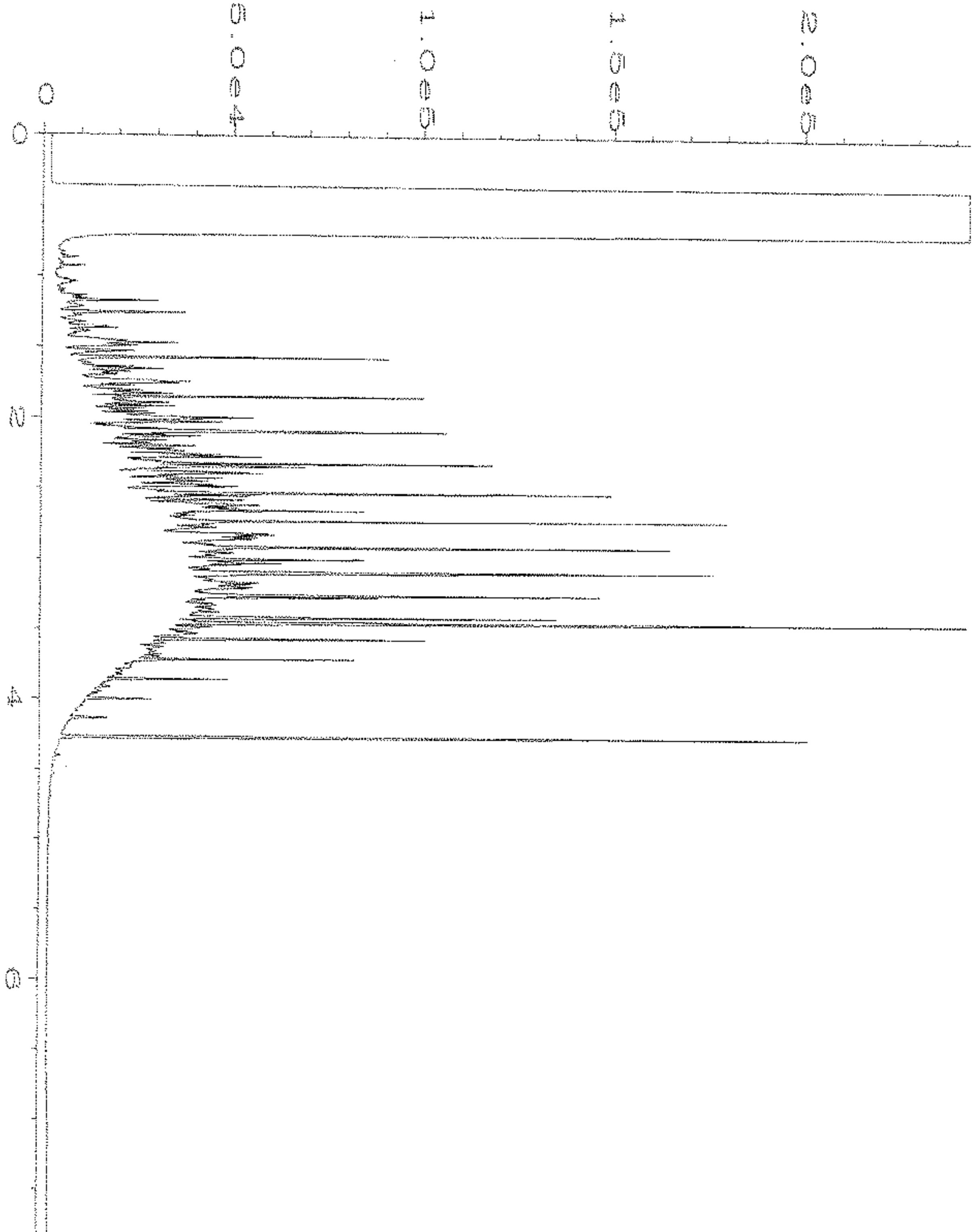
Operator          : TL                              Page Number      : 1
Instrument        : GC#4                            Vial Number      : 27
Sample Name       : 106055-05 sg                    Injection Number : 1
Run Time Bar Code:                                  Sequence Line    : 4
Acquired on       : 07 Jun 21   01:14 PM            Instrument Method: DX.MTH
Report Created on: 08 Jun 21   09:12 AM             Analysis Method  : DEFAULT.MTH
```



Data File Name : C:\HPCHEM\4\DATA\06-07-21\022F0401.D
Operator : TL
Instrument : GC#4
Sample Name : 01-135~~8~~ mb2 sg
1 JZ 06.08
Run Time Bar Code:
Acquired on : 07 Jun 21 12:11 PM
Report Created on: 08 Jun 21 09:12 AM

Page Number : 1
Vial Number : 22
Injection Number : 1
Sequence Line : 4
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



Data File Name   : C:\HPCHEM\4\DATA\06-07-21\003F0701.D
Operator   : TL
Instrument   : GC#4
Sample Name   : 500 Dx 62-142D
Run Time Bar Code:
Acquired on   : 07 Jun 21   03:39 PM
Report Created on: 08 Jun 21   09:13 AM

Page Number   : 1
Vial Number   : 3
Injection Number : 1
Sequence Line   : 7
Instrument Method: DX.MTH
Analysis Method   : DEFAULT.MTH

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

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 106055
Work Order Number: 2106075

June 11, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 6 sample(s) on 6/4/2021 for the analyses presented in the following report.

Ion Chromatography by EPA Method 300.0
Sample Moisture (Percent Moisture)
Total Metals by EPA Method 200.8
Total Metals by EPA Method 6020B

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

CC:
Grant Hainsworth
Rusty Jones

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

CLIENT:	Friedman & Bruya
Project:	106055
Work Order:	2106075

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2106075-001	MW5A-0621	06/03/2021 8:40 AM	06/04/2021 2:45 PM
2106075-002	MW4A-0621	06/03/2021 9:45 AM	06/04/2021 2:45 PM
2106075-003	MW6-0621	06/03/2021 11:16 AM	06/04/2021 2:45 PM
2106075-004	MW3A-0621	06/03/2021 12:14 PM	06/04/2021 2:45 PM
2106075-005	DUP-0621	06/03/2021 8:00 AM	06/04/2021 2:45 PM
2106075-006	SED-1-0621	06/03/2021 1:45 PM	06/04/2021 2:45 PM

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

CLIENT: Friedman & Bruya

Project: 106055

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

Analytical Report

Work Order: **2106075**
Date Reported: **6/11/2021**

CLIENT: Friedman & Bruya
Project: 106055

Lab ID: 2106075-001 **Collection Date:** 6/3/2021 8:40:00 AM
Client Sample ID: **MW5A-0621** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32597		Analyst: SS
Fluoride	1.92	0.800	D	mg/L	10	6/8/2021 7:28:00 PM
Chloride	81.3	5.00	D	mg/L	50	6/9/2021 10:31:00 AM
Total Metals by EPA Method 200.8				Batch ID: 32572		Analyst: EH
Aluminum	32,200	1,000	D	µg/L	10	6/10/2021 4:15:30 PM

Lab ID: 2106075-002 **Collection Date:** 6/3/2021 9:45:00 AM
Client Sample ID: **MW4A-0621** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32597		Analyst: SS
Fluoride	ND	0.800	D	mg/L	10	6/8/2021 7:51:00 PM
Chloride	275	20.0	D	mg/L	200	6/9/2021 10:54:00 AM
Total Metals by EPA Method 200.8				Batch ID: 32572		Analyst: EH
Aluminum	ND	100		µg/L	1	6/9/2021 10:34:34 PM

Lab ID: 2106075-003 **Collection Date:** 6/3/2021 11:16:00 AM
Client Sample ID: **MW6-0621** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32597		Analyst: SS
Fluoride	16.0	0.800	D	mg/L	10	6/8/2021 9:01:00 PM
Chloride	207	10.0	D	mg/L	100	6/9/2021 11:17:00 AM
Total Metals by EPA Method 200.8				Batch ID: 32598		Analyst: EH
Aluminum	273	100		µg/L	1	6/10/2021 8:21:21 PM

Original

Analytical Report

Work Order:	**2106075**
Date Reported:	**6/11/2021**

CLIENT: Friedman & Bruya
Project: 106055

Lab ID: 2106075-004 **Collection Date:** 6/3/2021 12:14:00 PM
Client Sample ID: **MW3A-0621** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32597		Analyst: SS
Fluoride	19.8	1.60	D	mg/L	20	6/9/2021 11:40:00 AM
Chloride	14.2	1.00	D	mg/L	10	6/8/2021 9:24:00 PM
Total Metals by EPA Method 200.8				Batch ID: 32572		Analyst: EH
Aluminum	2,160	100		µg/L	1	6/11/2021 12:11:41 PM

Lab ID: 2106075-005 **Collection Date:** 6/3/2021 8:00:00 AM
Client Sample ID: **DUP-0621** **Matrix:** Water

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32597		Analyst: SS
Fluoride	ND	0.800	D	mg/L	10	6/8/2021 9:47:00 PM
Chloride	280	20.0	D	mg/L	200	6/9/2021 12:04:00 PM

NOTES:
Diluted due to matrix.

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Total Metals by EPA Method 200.8				Batch ID: 32572		Analyst: EH
Aluminum	ND	100		µg/L	1	6/10/2021 2:07:54 AM

Analytical Report

Fremont Analytical

Work Order: **2106075**
Date Reported: **6/11/2021**

CLIENT: Friedman & Bruya
Project: 106055

Lab ID: 2106075-006 **Collection Date:** 6/3/2021 1:45:00 PM
Client Sample ID: **SED-1-0621** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32615		Analyst: SS
Fluoride	45.1	2.10		mg/Kg-dry	1	6/11/2021 10:56:00 AM
Chloride	49.4	4.59		mg/Kg-dry	1	6/10/2021 6:20:00 PM
Total Metals by EPA Method 6020B				Batch ID: 32565		Analyst: EH
Aluminum	46,900	411	D	mg/Kg-dry	20	6/10/2021 4:55:13 PM
Iron	12,200	411	D	mg/Kg-dry	20	6/8/2021 7:28:22 PM
Sample Moisture (Percent Moisture)				Batch ID: R67761		Analyst: OK
Percent Moisture	61.9	0.500		wt%	1	6/7/2021 3:56:29 PM

Date: *6/11/2021*

Work Order: 2106075
CLIENT: Friedman & Bruya
Project: 106055

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-32597** SampType: **MBLK** Units: **mg/L** Prep Date: **6/8/2021** RunNo: **67812**
Client ID: **MBLKW** Batch ID: **32597** Analysis Date: **6/8/2021** SeqNo: **1368031**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.0800									
Chloride	ND	0.100									

Sample ID: **LCS-32597** SampType: **LCS** Units: **mg/L** Prep Date: **6/8/2021** RunNo: **67812**
Client ID: **LCSW** Batch ID: **32597** Analysis Date: **6/8/2021** SeqNo: **1368032**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	0.524	0.0800	0.5000	0	105	90	110				
Chloride	0.712	0.100	0.7500	0	94.9	90	110				

Sample ID: **2106016-002ADUP** SampType: **DUP** Units: **mg/L** Prep Date: **6/8/2021** RunNo: **67812**
Client ID: **BATCH** Batch ID: **32597** Analysis Date: **6/8/2021** SeqNo: **1368035**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	1.62	0.160						1.644	1.22	20	D
Chloride	9.20	0.200						9.098	1.14	20	DE

Sample ID: **2106016-002AMS** SampType: **MS** Units: **mg/L** Prep Date: **6/8/2021** RunNo: **67812**
Client ID: **BATCH** Batch ID: **32597** Analysis Date: **6/8/2021** SeqNo: **1368036**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	2.70	0.160	1.000	1.644	106	80	120				D
Chloride	10.9	0.200	1.500	9.098	120	80	120				DE

Date: *6/11/2021*

Work Order: 2106075
CLIENT: Friedman & Bruya
Project: 106055

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2106016-002AMSD** SampType: **MSD** Units: **mg/L** Prep Date: **6/8/2021** RunNo: **67812**
Client ID: **BATCH** Batch ID: **32597** Analysis Date: **6/8/2021** SeqNo: **1368037**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	2.71	0.160	1.000	1.644	106	80	120	2.702	0.148	20	D
Chloride	10.9	0.200	1.500	9.098	121	80	120	10.90	0.165	20	DES

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Sample ID: **2106088-001BDUP** SampType: **DUP** Units: **mg/L** Prep Date: **6/8/2021** RunNo: **67812**
Client ID: **BATCH** Batch ID: **32597** Analysis Date: **6/8/2021** SeqNo: **1368046**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.0800						0		20	
Chloride	1.36	0.100						1.360	0.147	20	

Sample ID: **2106088-001BMS** SampType: **MS** Units: **mg/L** Prep Date: **6/8/2021** RunNo: **67812**
Client ID: **BATCH** Batch ID: **32597** Analysis Date: **6/8/2021** SeqNo: **1368047**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	0.497	0.0800	0.5000	0.06200	87.0	80	120				
Chloride	2.14	0.100	0.7500	1.360	103	80	120				

Work Order: 2106075
CLIENT: Friedman & Bruya
Project: 106055

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-32615** SampType: **MBLK** Units: **mg/Kg** Prep Date: **6/10/2021** RunNo: **67872**
Client ID: **MBLKS** Batch ID: **32615** Analysis Date: **6/10/2021** SeqNo: **1369479**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.800									
Chloride	ND	1.75									

Sample ID: **LCS-32615** SampType: **LCS** Units: **mg/Kg** Prep Date: **6/10/2021** RunNo: **67872**
Client ID: **LCSS** Batch ID: **32615** Analysis Date: **6/10/2021** SeqNo: **1369480**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	5.12	0.800	5.000	0	102	90	110				
Chloride	7.28	1.75	7.500	0	97.1	90	110				

Sample ID: **2106075-006ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **6/10/2021** RunNo: **67872**
Client ID: **SED-1-0621** Batch ID: **32615** Analysis Date: **6/10/2021** SeqNo: **1369482**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	92.1	2.10						90.64	1.65	30	E
Chloride	49.2	4.60						49.36	0.347	30	

Sample ID: **2106075-006AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **6/10/2021** RunNo: **67872**
Client ID: **SED-1-0621** Batch ID: **32615** Analysis Date: **6/10/2021** SeqNo: **1369483**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	93.0	2.10	13.16	90.64	18.0	80	120				SE
Chloride	72.6	4.60	19.73	49.36	118	80	120				

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Work Order: 2106075
CLIENT: Friedman & Bruya
Project: 106055

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2106075-006AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **6/10/2021** RunNo: **67872**
Client ID: **SED-1-0621** Batch ID: **32615** Analysis Date: **6/10/2021** SeqNo: **1369484**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	97.5	2.10	13.11	90.64	52.0	80	120	93.01	4.68	30	SE
Chloride	69.1	4.59	19.67	49.36	101	80	120	72.59	4.87	30	

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Work Order: 2106075
CLIENT: Friedman & Bruya
Project: 106055

QC SUMMARY REPORT

Total Metals by EPA Method 200.8

Sample ID: **MB-32572** SampType: **MBLK** Units: **µg/L** Prep Date: **6/7/2021** RunNo: **67824**
Client ID: **MBLKW** Batch ID: **32572** Analysis Date: **6/9/2021** SeqNo: **1368411**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	100									

Sample ID: **2106075-002BDUP** SampType: **DUP** Units: **µg/L** Prep Date: **6/7/2021** RunNo: **67824**
Client ID: **MW4A-0621** Batch ID: **32572** Analysis Date: **6/9/2021** SeqNo: **1368416**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	100						0		30	

Sample ID: **2106075-002BMS** SampType: **MS** Units: **µg/L** Prep Date: **6/7/2021** RunNo: **67824**
Client ID: **MW4A-0621** Batch ID: **32572** Analysis Date: **6/10/2021** SeqNo: **1368419**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	6,540	100	5,000	33.75	130	70	130				

Sample ID: **2106075-002BMSD** SampType: **MSD** Units: **µg/L** Prep Date: **6/7/2021** RunNo: **67824**
Client ID: **MW4A-0621** Batch ID: **32572** Analysis Date: **6/10/2021** SeqNo: **1368420**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	7,130	100	5,000	33.75	142	70	130	6,544	8.57	30	S

NOTES:
S - Outlying spike recovery(ies) observed.

Sample ID: **MB-32598** SampType: **MBLK** Units: **µg/L** Prep Date: **6/9/2021** RunNo: **67832**
Client ID: **MBLKW** Batch ID: **32598** Analysis Date: **6/10/2021** SeqNo: **1368649**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	100									

Work Order: 2106075
CLIENT: Friedman & Bruya
Project: 106055

QC SUMMARY REPORT
Total Metals by EPA Method 200.8

Sample ID: **LCS-32598** SampType: **LCS** Units: **µg/L** Prep Date: **6/9/2021** RunNo: **67832**
Client ID: **LCSW** Batch ID: **32598** Analysis Date: **6/10/2021** SeqNo: **1368650**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	954	100	1,000	0	95.4	85	115				

Sample ID: **2106101-001CDUP** SampType: **DUP** Units: **µg/L** Prep Date: **6/9/2021** RunNo: **67832**
Client ID: **BATCH** Batch ID: **32598** Analysis Date: **6/10/2021** SeqNo: **1368652**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	100						0		30	

Sample ID: **2106101-001CMS** SampType: **MS** Units: **µg/L** Prep Date: **6/9/2021** RunNo: **67832**
Client ID: **BATCH** Batch ID: **32598** Analysis Date: **6/10/2021** SeqNo: **1368653**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	5,110	100	5,000	17.67	102	70	130				

Sample ID: **2106101-001CMSD** SampType: **MSD** Units: **µg/L** Prep Date: **6/9/2021** RunNo: **67832**
Client ID: **BATCH** Batch ID: **32598** Analysis Date: **6/10/2021** SeqNo: **1368654**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	5,080	100	5,000	17.67	101	70	130	5,107	0.452	30	

Sample ID: **LCS-32572** SampType: **LCS** Units: **µg/L** Prep Date: **6/7/2021** RunNo: **67824**
Client ID: **LCSW** Batch ID: **32572** Analysis Date: **6/10/2021** SeqNo: **1369164**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	1,060	100	1,000	0	106	85	115				

Fremont Analytical

Date: *6/11/2021*

Work Order: 2106075
CLIENT: Friedman & Bruya
Project: 106055

QC SUMMARY REPORT

Total Metals by EPA Method 200.8

Sample ID: **2106075-002BDUP** SampType: **DUP** Units: **µg/L** Prep Date: **6/7/2021** RunNo: **67824**
Client ID: **MW4A-0621** Batch ID: **32572** Analysis Date: **6/10/2021** SeqNo: **1369166**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	100						0		30	

Date: *6/11/2021*

Work Order: 2106075
CLIENT: Friedman & Bruya
Project: 106055

QC SUMMARY REPORT

Total Metals by EPA Method 6020B

Sample ID: **MB-32565** SampType: **MBLK** Units: **mg/Kg** Prep Date: **6/7/2021** RunNo: **67775**
Client ID: **MBLKS** Batch ID: **32565** Analysis Date: **6/7/2021** SeqNo: **1367248**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	8.13									
Iron	ND	8.13									

Sample ID: **LCS-32565** SampType: **LCS** Units: **mg/Kg** Prep Date: **6/7/2021** RunNo: **67775**
Client ID: **LCSS** Batch ID: **32565** Analysis Date: **6/7/2021** SeqNo: **1367249**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Iron	433	7.87	393.7	0	110	80	120				

Sample ID: **2106053-002AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **6/7/2021** RunNo: **67775**
Client ID: **BATCH** Batch ID: **32565** Analysis Date: **6/7/2021** SeqNo: **1367252**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	69,400	9.29	464.5	73,130	-805	75	125				ES
Iron	40,500	9.29	464.5	52,650	-2,620	75	125				ES

Sample ID: **2106053-002AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **6/7/2021** RunNo: **67775**
Client ID: **BATCH** Batch ID: **32565** Analysis Date: **6/7/2021** SeqNo: **1367253**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	77,300	9.36	467.9	73,130	896	75	125	69,400	10.8	20	ES
Iron	54,100	9.36	467.9	52,650	315	75	125	40,490	28.8	20	ERS

NOTES:
R - High RPD observed. The method is in control as indicated by the LCS.

Work Order: 2106075
CLIENT: Friedman & Bruya
Project: 106055

QC SUMMARY REPORT

Total Metals by EPA Method 6020B

Sample ID: **LCS-32565**	SampType: **LCS**			Units: **mg/Kg**		Prep Date: **6/7/2021**			RunNo: **67775**		
Client ID: **LCSS**	Batch ID: **32565**					Analysis Date: **6/10/2021**			SeqNo: **1369177**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	410	7.87	393.7	0	104	80	120				

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**2106075**
Logged by:	**Gabrielle Coeuille**	Date Received:	**6/4/2021 2:45:00 PM**

Chain of Custody

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

Log In

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

Special Handling (if applicable)

18.	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: ______

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample 1	1.9

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

SUBCONTRACT SAMPLE CHAIN OF COSTODY

2106075

Page # 1 of 1

Report To: Michael Erdahl

Company: Friedman and Bruya, Inc.

Address: 3012 16th Ave W

City, State, ZIP: Seattle, WA 98119

Phone: (206) 285-8282 Email: merdahl@friedmanandbruya.com

SUBCONTRACTOR Fremont	
PROJECT NAME/NO. 106055	PO # B-277
REMARKS Email Report	

TURNAROUND TIME
X Standard (1 Week)
RUSH
Rush charges authorized by:
SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Containers	Cl^- F^-	Aluminum	Iron
MW5A-0621		6.3.2021	0840	Water	X2	X	x	
MW4A-0621			0945		X2	X	x	
MW6-0621			1116		X2	X	x	
MW3A-0621			1214		X2	X	x	
DUP-0621			0800		X2	X	x	
SED-1-0621			1345	Soil	1	X	x	x

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:		Ann Webber-Bruya	F&B	6/4/21	
Received by:		Claire Anderson	FAI	6/4/21	1445
Relinquished by:					
Received by:					

FORMS\COC\Subcontract COCML.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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

June 15, 2021

Grant Hainsworth, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Hainsworth:

Included are the results from the testing of material submitted on June 9, 2021 from the Maralco, Kent WA, F&BI 106138 project. There are 12 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Rusty Jones
CTC0615R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on June 9, 2021 by Friedman & Bruya, Inc. from the Crete Consulting Maralco, Kent WA, F&BI 106138 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
106138 -01	SED-02-0621 0-0.5'
106138 -02	SED-02-0621 0.5-1'
106138 -03	SED-03-0621 0-0.5'
106138 -04	SED-03-0621 0.5-1'

The samples were sent to Fremont Analytical for chloride, fluoride, aluminum, and iron testing. The report is enclosed.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-02-0621 0-0.5'	Client:	Crete Consulting
Date Received:	06/09/21	Project:	Maralco, Kent WA, F&BI 106138
Date Extracted:	06/10/21	Lab ID:	106138-01
Date Analyzed:	06/10/21	Data File:	106138-01.116
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Arsenic	3.79
Cadmium	<1
Lead	10.4

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-02-0621 0-0.5’	Client:	Crete Consulting
Date Received:	06/09/21	Project:	Maralco, Kent WA, F&BI 106138
Date Extracted:	06/10/21	Lab ID:	106138-01 x2
Date Analyzed:	06/11/21	Data File:	106138-01 x2.134
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	11.6
Cobalt	4.21
Copper	41.2
Manganese	222
Nickel	10.7
Zinc	109

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-02-0621 0.5-1'	Client:	Crete Consulting
Date Received:	06/09/21	Project:	Maralco, Kent WA, F&BI 106138
Date Extracted:	06/10/21	Lab ID:	106138-02
Date Analyzed:	06/10/21	Data File:	106138-02.117
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Arsenic	2.18
Cadmium	<1
Chromium	10.1
Cobalt	2.85
Copper	20.2
Lead	8.24
Manganese	80.3
Nickel	7.54
Zinc	58.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-03-0621 0-0.5’	Client:	Crete Consulting
Date Received:	06/09/21	Project:	Maralco, Kent WA, F&BI 106138
Date Extracted:	06/10/21	Lab ID:	106138-03
Date Analyzed:	06/11/21	Data File:	106138-03.142
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<8
Arsenic	19.2
Cadmium	<2
Lead	40.2

Reporting limits may be raised due to high moisture content.

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-03-0621 0-0.5'	Client:	Crete Consulting
Date Received:	06/09/21	Project:	Maralco, Kent WA, F&BI 106138
Date Extracted:	06/10/21	Lab ID:	106138-03 x5
Date Analyzed:	06/11/21	Data File:	106138-03 x5.135
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	31.4
Cobalt	<10
Copper	159
Manganese	321
Nickel	25.5
Zinc	325

Reporting limits may be raised due to high moisture content.

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-03-0621 0.5-1'	Client:	Crete Consulting
Date Received:	06/09/21	Project:	Maralco, Kent WA, F&BI 106138
Date Extracted:	06/10/21	Lab ID:	106138-04
Date Analyzed:	06/10/21	Data File:	106138-04.119
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	55.4
Arsenic	7.21
Cadmium	11.8
Lead	189

Reporting limits may be raised due to high moisture content.

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-03-0621 0.5-1'	Client:	Crete Consulting
Date Received:	06/09/21	Project:	Maralco, Kent WA, F&BI 106138
Date Extracted:	06/10/21	Lab ID:	106138-04 x5
Date Analyzed:	06/11/21	Data File:	106138-04 x5.143
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	208
Cobalt	<10
Copper	1,410
Manganese	346
Nickel	64.2

Reporting limits may be raised due to high moisture content.

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-03-0621 0.5-1'	Client:	Crete Consulting
Date Received:	06/09/21	Project:	Maralco, Kent WA, F&BI 106138
Date Extracted:	06/10/21	Lab ID:	106138-04 x25
Date Analyzed:	06/14/21	Data File:	106138-04 x25.062
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Zinc	2,190

Reporting limits may be raised due to high moisture content.

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, Kent WA, F&BI 106138
Date Extracted:	06/10/21	Lab ID:	I1-361 mb
Date Analyzed:	06/10/21	Data File:	I1-361 mb.067
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<2
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Manganese	<1
Nickel	<1
Zinc	<5

Date of Report: 06/15/21
Date Received: 06/09/21
Project: Maralco, Kent WA, F&BI 106138

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

Laboratory Code: 106139-04 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Antimony	mg/kg (ppm)	20	<5	83	76	75-125	9
Arsenic	mg/kg (ppm)	10	<5	83	82	75-125	1
Cadmium	mg/kg (ppm)	10	<5	94	93	75-125	1
Chromium	mg/kg (ppm)	50	19.3	92	87	75-125	6
Cobalt	mg/kg (ppm)	20	8.29	87	84	75-125	4
Copper	mg/kg (ppm)	50	<25	90	87	75-125	3
Lead	mg/kg (ppm)	50	<5	88	87	75-125	1
Manganese	mg/kg (ppm	20	177	13 b	0 b	75-125	200 b
Nickel	mg/kg (ppm)	25	34.1	82 b	74 b	75-125	10 b
Zinc	mg/kg (ppm)	50	30.5	81	81	75-125	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Antimony	mg/kg (ppm)	20	101	80-120
Arsenic	mg/kg (ppm)	10	91	80-120
Cadmium	mg/kg (ppm)	10	96	80-120
Chromium	mg/kg (ppm)	50	101	80-120
Cobalt	mg/kg (ppm)	20	97	80-120
Copper	mg/kg (ppm)	50	97	80-120
Lead	mg/kg (ppm)	50	93	80-120
Manganese	mg/kg (ppm)	20	99	80-120
Nickel	mg/kg (ppm)	25	98	80-120
Zinc	mg/kg (ppm)	50	88	80-120

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.

106138

SAMPLE CHAIN OF CUSTODY ME 6/9/21 BI 1

Page # 1 of 1

Report To R. Jones, G. Hainsworth

Company Crete Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME MARALCO, Kent WA

PO #

REMARKS Metals List: Sb, Al, As, Cd, Cr, Co, Cu, Fe, Mn, Pb, Ni, Zn

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
☐ Standard turnaround
☒ RUSH 72 Hour
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	Select Metals	Cl⁻/F⁻			Notes
SED-02-0621 0-0.5'	01 A-B	6.9.21	1225	SEDIMENT	2								X	X			
SED-02-0621 0.5-1'	02		1230		2								X	X			
SED-03-0621 0-0.5'	03		1255		2								X	X			
SED-03-0621 0.5-1'	04		1305		2								X	X			

Samples received at 2 °C

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	Crete Consulting	6.9.21	1355
Received by:	Hong	HONG NGUYEN	FBI	6/9/21	15:05
Relinquished by:					
Received by:					

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

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

Friedman & Bruya
Michael Erdahl
3012 16th Ave. W.
Seattle, WA 98119

RE: 106138
Work Order Number: 2106155

June 14, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 4 sample(s) on 6/9/2021 for the analyses presented in the following report.

Ion Chromatography by EPA Method 300.0
Sample Moisture (Percent Moisture)
Total Metals by EPA Method 6020B

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

CLIENT: Friedman & Bruya
Project: 106138
Work Order: 2106155

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2106155-001	SED-02-0621 0-0.5'	06/09/2021 12:25 PM	06/09/2021 4:53 PM
2106155-002	SED-02-0621 0.5-1'	06/09/2021 12:30 PM	06/09/2021 4:53 PM
2106155-003	SED-03-0621 0-0.5'	06/09/2021 12:55 PM	06/09/2021 4:53 PM
2106155-004	SED-03-0621 0.5-1'	06/09/2021 1:05 PM	06/09/2021 4:53 PM

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

Case Narrative

WO#: **2106155**

Date: **6/14/2021**

CLIENT: Friedman & Bruya

Project: 106138

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

Analytical Report

Work Order: **2106155**
Date Reported: **6/14/2021**

CLIENT: Friedman & Bruya
Project: 106138

Lab ID: 2106155-001 **Collection Date:** 6/9/2021 12:25:00 PM
Client Sample ID: **SED-02-0621 0-0.5'** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32615		Analyst: SS
Fluoride	6.28	1.24		mg/Kg-dry	1	6/11/2021 11:19:00 AM
Chloride	17.0	2.71		mg/Kg-dry	1	6/11/2021 11:19:00 AM
Total Metals by EPA Method 6020B				Batch ID: 32600		Analyst: EH
Aluminum	12,000	1,210	D	mg/Kg-dry	100	6/11/2021 4:27:36 PM
Iron	19,000	1,210	D	mg/Kg-dry	100	6/11/2021 4:27:36 PM
Sample Moisture (Percent Moisture)				Batch ID: R67823		Analyst: OK
Percent Moisture	35.6	0.500		wt%	1	6/10/2021 10:24:22 AM

Lab ID: 2106155-002 **Collection Date:** 6/9/2021 12:30:00 PM
Client Sample ID: **SED-02-0621 0.5-1'** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32615		Analyst: SS
Fluoride	4.73	1.09		mg/Kg-dry	1	6/11/2021 11:42:00 AM
Chloride	24.6	2.39		mg/Kg-dry	1	6/11/2021 11:42:00 AM
Total Metals by EPA Method 6020B				Batch ID: 32600		Analyst: EH
Aluminum	12,100	1,080	D	mg/Kg-dry	100	6/11/2021 4:33:10 PM
Iron	16,500	1,080	D	mg/Kg-dry	100	6/11/2021 4:33:10 PM
Sample Moisture (Percent Moisture)				Batch ID: R67823		Analyst: OK
Percent Moisture	26.8	0.500		wt%	1	6/10/2021 10:24:22 AM

CLIENT: Friedman & Bruya
Project: 106138

Lab ID: 2106155-003 **Collection Date:** 6/9/2021 12:55:00 PM
Client Sample ID: **SED-03-0621 0-0.5'** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32615		Analyst: SS
Fluoride	6.99	1.53		mg/Kg-dry	1	6/11/2021 12:05:00 PM
Chloride	45.7	3.34		mg/Kg-dry	1	6/11/2021 12:05:00 PM
Total Metals by EPA Method 6020B				Batch ID: 32600		Analyst: EH
Aluminum	23,200	1,480	D	mg/Kg-dry	100	6/11/2021 4:38:44 PM
Iron	81,800	1,480	D	mg/Kg-dry	100	6/11/2021 4:38:44 PM
Sample Moisture (Percent Moisture)				Batch ID: R67823		Analyst: OK
Percent Moisture	47.6	0.500		wt%	1	6/10/2021 10:24:22 AM

Lab ID: 2106155-004 **Collection Date:** 6/9/2021 1:05:00 PM
Client Sample ID: **SED-03-0621 0.5-1'** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 32615		Analyst: SS
Fluoride	31.8	1.45		mg/Kg-dry	1	6/11/2021 12:28:00 PM
Chloride	40.6	3.18		mg/Kg-dry	1	6/11/2021 12:28:00 PM
Total Metals by EPA Method 6020B				Batch ID: 32600		Analyst: EH
Aluminum	115,000	1,440	D	mg/Kg-dry	100	6/11/2021 4:44:18 PM
Iron	29,000	1,440	D	mg/Kg-dry	100	6/11/2021 4:44:18 PM
Sample Moisture (Percent Moisture)				Batch ID: R67823		Analyst: OK
Percent Moisture	45.0	0.500		wt%	1	6/10/2021 10:24:22 AM

Fremont Analytical

Date: *6/14/2021*

Work Order: 2106155
CLIENT: Friedman & Bruya
Project: 106138

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-32615** SampType: **MBLK** Units: **mg/Kg** Prep Date: **6/10/2021** RunNo: **67872**
Client ID: **MBLKS** Batch ID: **32615** Analysis Date: **6/10/2021** SeqNo: **1369479**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.800									
Chloride	ND	1.75									

Sample ID: **LCS-32615** SampType: **LCS** Units: **mg/Kg** Prep Date: **6/10/2021** RunNo: **67872**
Client ID: **LCSS** Batch ID: **32615** Analysis Date: **6/10/2021** SeqNo: **1369480**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	5.12	0.800	5.000	0	102	90	110				
Chloride	7.28	1.75	7.500	0	97.1	90	110				

Sample ID: **2106075-006ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **6/10/2021** RunNo: **67872**
Client ID: **BATCH** Batch ID: **32615** Analysis Date: **6/10/2021** SeqNo: **1369482**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	92.1	2.10						90.64	1.65	30	E
Chloride	49.2	4.60						49.36	0.347	30	

Sample ID: **2106075-006AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **6/10/2021** RunNo: **67872**
Client ID: **BATCH** Batch ID: **32615** Analysis Date: **6/10/2021** SeqNo: **1369483**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	93.0	2.10	13.16	90.64	18.0	80	120				ES
Chloride	72.6	4.60	19.73	49.36	118	80	120				

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Date: *6/14/2021*

Work Order: 2106155
CLIENT: Friedman & Bruya
Project: 106138

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2106075-006AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **6/10/2021** RunNo: **67872**
Client ID: **BATCH** Batch ID: **32615** Analysis Date: **6/10/2021** SeqNo: **1369484**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	97.5	2.10	13.11	90.64	52.0	80	120	93.01	4.68	30	ES
Chloride	69.1	4.59	19.67	49.36	101	80	120	72.59	4.87	30	

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Fremont Analytical

Date: *6/14/2021*

Work Order: 2106155
CLIENT: Friedman & Bruya
Project: 106138

QC SUMMARY REPORT

Total Metals by EPA Method 6020B

Sample ID: **MB-32600** SampType: **MBLK** Units: **mg/Kg** Prep Date: **6/9/2021** RunNo: **67848**
Client ID: **MBLKS** Batch ID: **32600** Analysis Date: **6/10/2021** SeqNo: **1368947**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	7.87									
Iron	ND	7.87									

Sample ID: **LCS-32600** SampType: **LCS** Units: **mg/Kg** Prep Date: **6/9/2021** RunNo: **67848**
Client ID: **LCSS** Batch ID: **32600** Analysis Date: **6/10/2021** SeqNo: **1368948**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	390	7.81	390.6	0	99.9	80	120				
Iron	380	7.81	390.6	0	97.2	80	120				

Sample ID: **2106117-004AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **6/9/2021** RunNo: **67848**
Client ID: **BATCH** Batch ID: **32600** Analysis Date: **6/10/2021** SeqNo: **1368953**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	18,800	8.70	435.2	16,820	460	75	125				ES
Iron	20,400	8.70	435.2	18,710	390	75	125				ES

NOTES:
S - Analyte concentration was too high for accurate spike recovery (Al, Fe).

Sample ID: **2106117-004AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **6/9/2021** RunNo: **67848**
Client ID: **BATCH** Batch ID: **32600** Analysis Date: **6/10/2021** SeqNo: **1368954**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	16,800	8.98	449.2	16,820	4.10	75	125	18,820	11.1	20	ES
Iron	19,400	8.98	449.2	18,710	156	75	125	20,410	5.01	20	ES

NOTES:
S - Analyte concentration was too high for accurate spike recovery (Al, Fe).

Work Order: 2106155
CLIENT: Friedman & Bruya
Project: 106138

QC SUMMARY REPORT

Total Metals by EPA Method 6020B

Sample ID: **2106117-004APDS**	SampType: **PDS**	Units: **mg/Kg-dry**	Prep Date: **6/9/2021**	RunNo: **67848**
Client ID: **BATCH**	Batch ID: **32600**		Analysis Date: **6/10/2021**	SeqNo: **1368955**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	18,600	8.84	442	16,800	403	75	125				ES
Iron	20,200	8.84	442	18,700	347	75	125				ES

NOTES:

S - Analyte concentration was too high for accurate spike recovery (Al, Fe).

Fremont Analytical

Sample Log-In Check List

Client Name:	**FB**	Work Order Number:	**2106155**
Logged by:	**Gabrielle Coeuille**	Date Received:	**6/9/2021 4:53:00 PM**

Chain of Custody

#	Question	Yes	No	NA / Not Present
1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

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

Special Handling (if applicable)

#	Question	Yes	No	NA
18.	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:

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample 1	1.4

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

SUBCONTRACT SAMPLE CHAIN OF CUSTODY 2106155

Page # 1 of 1

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont

PROJECT NAME/NO.	PO #
106138	B-286

REMARKS

Please Email Results

TURNAROUND TIME
- ☐ Standard TAT
- ☒ RUSH 3-Day TAT

Rush charges authorized by: ME

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Chloride	Fluoride	Al + Fe					Notes
SED-02-0621 0-0.5'		6/9/21	1225	Soil	1				x	x	x					
SED-02-0621 0.5-1'		|	~~13~~ 1230	|	1				x	x	x					
SED-03-0621 0-0.5'		|	1255	|	1				x	x	x					
SED-03-0621 0.5-1'		|	1305	|	1				x	x	x					

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: [signature]	Michael Erdahl	Friedman & Bruya	6/9/21	1515
Received by: [signature]	Olmerkov	FAI	6/9/21	1653
Relinquished by:				
Received by:				

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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

September 3, 2021

Grant Hainsworth, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Hainsworth:

Included are the results from the testing of material submitted on August 26, 2021 from the Bridge Maralco, F&BI 108413 project. There are 8 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
CTC0903R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on August 26, 2021 by Friedman & Bruya, Inc. from the Crete Consulting Bridge Maralco, F&BI 108413 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
108413 -01	KCDD-N-0.5-1
108413 -02	KCDD-S-0.5-1

The samples were sent to Fremont Analytical for fluoride, chloride, and aluminum analyses. The report will be forwarded upon receipt.

All quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	KCDD-N-0.5-1	Client:	Crete Consulting
Date Received:	08/26/21	Project:	Bridge Maralco, F&BI 108413
Date Extracted:	08/27/21	Lab ID:	108413-01
Date Analyzed:	08/27/21	Data File:	108413-01.098
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	2.95
Arsenic	10.8
Cadmium	2.01
Lead	54.7
Silver	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	KCDD-N-0.5-1	Client:	Crete Consulting
Date Received:	08/26/21	Project:	Bridge Maralco, F&BI 108413
Date Extracted:	08/27/21	Lab ID:	108413-01 x5
Date Analyzed:	08/27/21	Data File:	108413-01 x5.102
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	23.1
Cobalt	5.27
Copper	98.6
Manganese	201
Nickel	14.7

Analysis For Total Metals By EPA Method 6020B

Client ID:	KCDD-S-0.5-1	Client:	Crete Consulting
Date Received:	08/26/21	Project:	Bridge Maralco, F&BI 108413
Date Extracted:	08/27/21	Lab ID:	108413-02
Date Analyzed:	08/27/21	Data File:	108413-02.100
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	2.89
Arsenic	18.9
Cadmium	<2
Lead	60.6
Silver	<2

The reporting limits are raised due to high moisture content.

Analysis For Total Metals By EPA Method 6020B

Client ID:	KCDD-S-0.5-1	Client:	Crete Consulting
Date Received:	08/26/21	Project:	Bridge Maralco, F&BI 108413
Date Extracted:	08/27/21	Lab ID:	108413-02 x5
Date Analyzed:	08/27/21	Data File:	108413-02 x5.103
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	38.7
Cobalt	6.81
Copper	64.6
Manganese	295
Nickel	20.8

The reporting limits are raised due to high moisture content.

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Bridge Maralco, F&BI 108413
Date Extracted:	08/27/21	Lab ID:	I1-531 mb2
Date Analyzed:	08/27/21	Data File:	I1-531 mb2.055
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Manganese	<1
Nickel	<1
Silver	<1

Date of Report: 09/03/21
Date Received: 08/26/21
Project: Bridge Maralco, F&BI 108413

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

Laboratory Code: 108412-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Antimony	mg/kg (ppm)	20	<5	87	92	75-125	6
Arsenic	mg/kg (ppm)	10	<5	88	96	75-125	9
Cadmium	mg/kg (ppm)	10	<5	97	104	75-125	7
Chromium	mg/kg (ppm)	50	26.2	85	95	75-125	11
Cobalt	mg/kg (ppm)	20	6.44	87	95	75-125	9
Copper	mg/kg (ppm)	50	<25	88	95	75-125	8
Lead	mg/kg (ppm)	50	<5	94	101	75-125	7
Manganese	mg/kg (ppm	20	181	41 b	91 b	75-125	76 b
Nickel	mg/kg (ppm)	25	34.1	84	99	75-125	16
Silver	mg/kg (ppm)	10	<5	94	102	75-125	8

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Antimony	mg/kg (ppm)	20	96	80-120
Arsenic	mg/kg (ppm)	10	92	80-120
Cadmium	mg/kg (ppm)	10	96	80-120
Chromium	mg/kg (ppm)	50	100	80-120
Cobalt	mg/kg (ppm)	20	96	80-120
Copper	mg/kg (ppm)	50	96	80-120
Lead	mg/kg (ppm)	50	96	80-120
Manganese	mg/kg (ppm)	20	99	80-120
Nickel	mg/kg (ppm)	25	97	80-120
Silver	mg/kg (ppm)	10	99	80-120

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.

108413

SAMPLE CHAIN OF CUSTODY

ME 08/26/21

[redacted] Grant Hainsworth

Company Crete

Address 16300 Christensen Rd, Ste 214

City, State, ZIP Tukwila, WA 98188

Phone 253-797-6323 Email grant.hainsworth@cretesconsulting.com

SAMPLERS (signature)

PROJECT NAME Bridge Maralco

PO #

REMARKS

INVOICE TO

Project specific RLs? - Yes / No

[redacted]age # 1 of 1 BT

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	Metals *	Aluminum	Fluoride	Chloride	Notes
KCDD-N-0.5-1	01 AB	8/24/21	1610	Soil	2								✓	✓	✓	✓	* Metals =
KCDD-S-0.5-1	02 AB	"	1615	"	2								✓	✓	✓	✓	As, Cd, Cr,
																	Co, Cu, Mn,
																	Ni, Pb,
																	antimony,
																	& silver
																Samples received at	5 °C

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Grant Hainsworth	CRETE	8/26/21	11:00
Received by:	Will Radford	F&BI	8/26/21	11:00
Relinquished 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
3012 16th Ave. W.
Seattle, WA 98119

RE: 108413
Work Order Number: 2108377

September 03, 2021

Attention Michael Erdahl:

Fremont Analytical, Inc. received 2 sample(s) on 8/26/2021 for the analyses presented in the following report.

Ion Chromatography by EPA Method 300.0
Sample Moisture (Percent Moisture)
Total Metals by EPA Method 6020B

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

Date: *09/03/2021*

CLIENT: Friedman & Bruya
Project: 108413
Work Order: 2108377

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2108377-001	KCDD-N-0.5-1	08/24/2021 4:10 PM	08/26/2021 2:18 PM
2108377-002	KCDD-S-0.5-1	08/24/2021 4:15 PM	08/26/2021 2:18 PM

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

Original

Case Narrative

WO#: **2108377**

Date: **9/3/2021**

CLIENT: Friedman & Bruya
Project: 108413

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

Fremont Analytical

Analytical Report

Work Order: **2108377**
Date Reported: **9/3/2021**

Client: Friedman & Bruya
Project: 108413
Lab ID: 2108377-001
Client Sample ID: **KCDD-N-0.5-1**

Collection Date: 8/24/2021 4:10:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33514		Analyst: TN
Fluoride	22.8	1.06		mg/Kg-dry	1	9/1/2021 6:54:00 AM
Chloride	155	23.1	D	mg/Kg-dry	10	9/1/2021 1:03:00 PM
Total Metals by EPA Method 6020B				Batch ID: 33549		Analyst: EH
Aluminum	23,600	231	D	mg/Kg-dry	20	9/3/2021 11:32:01 AM
Sample Moisture (Percent Moisture)				Batch ID: R69599		Analyst: ALB
Percent Moisture	31.8	0.500		wt%	1	8/31/2021 10:34:37 AM

Analytical Report

Work Order: **2108377**
Date Reported: **9/3/2021**

Client: Friedman & Bruya
Project: 108413
Lab ID: 2108377-002
Client Sample ID: KCDD-S-0.5-1

Collection Date: 8/24/2021 4:15:00 PM
Matrix: Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 33514		Analyst: TN
Fluoride	6.08	1.68		mg/Kg-dry	1	9/1/2021 7:17:00 AM
Chloride	9.72	3.68		mg/Kg-dry	1	9/1/2021 7:17:00 AM
Total Metals by EPA Method 6020B				Batch ID: 33549		Analyst: EH
Aluminum	18,400	326	D	mg/Kg-dry	20	9/3/2021 11:37:36 AM
Sample Moisture (Percent Moisture)				Batch ID: R69599		Analyst: ALB
Percent Moisture	53.1	0.500		wt%	1	8/31/2021 10:34:37 AM

Date: *9/3/2021*

Work Order: 2108377
CLIENT: Friedman & Bruya
Project: 108413

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-33514** SampType: **MBLK** Units: **mg/Kg** Prep Date: **8/26/2021** RunNo: **69632**
Client ID: **MBLKS** Batch ID: **33514** Analysis Date: **9/1/2021** SeqNo: **1411516**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	0.800									
Chloride	ND	1.75									

Sample ID: **LCS-33514** SampType: **LCS** Units: **mg/Kg** Prep Date: **8/26/2021** RunNo: **69632**
Client ID: **LCSS** Batch ID: **33514** Analysis Date: **9/1/2021** SeqNo: **1411517**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	4.92	0.800	5.000	0	98.4	90	110				
Chloride	7.12	1.75	7.500	0	94.9	90	110				

Sample ID: **2108369-010ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **8/26/2021** RunNo: **69632**
Client ID: **BATCH** Batch ID: **33514** Analysis Date: **9/1/2021** SeqNo: **1411519**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	8.80						0		30	D
Chloride	36.7	19.2						35.57	3.18	30	D

Sample ID: **2108369-010AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **8/26/2021** RunNo: **69632**
Client ID: **BATCH** Batch ID: **33514** Analysis Date: **9/1/2021** SeqNo: **1411520**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	9.01	5.632	5.211	43.5	80	120				SD
Chloride	42.9	19.7	8.448	35.57	87.0	80	120				D

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Date: *9/3/2021*

Work Order: 2108377
CLIENT: Friedman & Bruya
Project: 108413

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **2108369-010AMSD**	SampType: **MSD**				Units: **mg/Kg-dry**		Prep Date: **8/26/2021**		RunNo: **69632**		
Client ID: **BATCH**	Batch ID: **33514**						Analysis Date: **9/1/2021**		SeqNo: **1411521**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	9.06	5.664	5.211	46.0	80	120	0		30	SD
Chloride	43.2	19.8	8.496	35.57	89.3	80	120	42.92	0.568	30	D

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Sample ID: **2108392-003ADUP**	SampType: **DUP**				Units: **mg/Kg-dry**		Prep Date: **8/26/2021**		RunNo: **69632**		
Client ID: **BATCH**	Batch ID: **33514**						Analysis Date: **9/1/2021**		SeqNo: **1411536**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	ND	8.12						0		30	D
Chloride	ND	17.8						0		30	D

Sample ID: **2108392-003AMS**	SampType: **MS**				Units: **mg/Kg-dry**		Prep Date: **8/26/2021**		RunNo: **69632**		
Client ID: **BATCH**	Batch ID: **33514**						Analysis Date: **9/1/2021**		SeqNo: **1411537**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluoride	8.39	8.18	5.115	5.207	62.2	80	120				SD
Chloride	ND	17.9	7.672	9.087	76.2	80	120				SD

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Date: *9/3/2021*

Work Order: 2108377
CLIENT: Friedman & Bruya
Project: 108413

QC SUMMARY REPORT

Total Metals by EPA Method 6020B

Sample ID: **MB-33549**	SampType: **MBLK**			Units: **mg/Kg**		Prep Date: **8/31/2021**			RunNo: **69685**		
Client ID: **MBLKS**	Batch ID: **33549**					Analysis Date: **9/2/2021**			SeqNo: **1412547**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	ND	8.00									

Sample ID: **LCS-33549**	SampType: **LCS**			Units: **mg/Kg**		Prep Date: **8/31/2021**			RunNo: **69685**		
Client ID: **LCSS**	Batch ID: **33549**					Analysis Date: **9/2/2021**			SeqNo: **1412548**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	380	7.81	390.6	0	97.4	80	120				

Sample ID: **2108402-014AMS**	SampType: **MS**			Units: **mg/Kg-dry**		Prep Date: **8/31/2021**			RunNo: **69685**		
Client ID: **BATCH**	Batch ID: **33549**					Analysis Date: **9/2/2021**			SeqNo: **1412551**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	13,000	8.08	404.1	12,280	168	75	125				ES

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Sample ID: **2108402-014AMSD**	SampType: **MSD**			Units: **mg/Kg-dry**		Prep Date: **8/31/2021**			RunNo: **69685**		
Client ID: **BATCH**	Batch ID: **33549**					Analysis Date: **9/2/2021**			SeqNo: **1412552**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	13,600	8.27	413.4	12,280	325	75	125	12,960	5.00	20	ES

NOTES:
S - Analyte concentration was too high for accurate spike recovery(ies).

Sample ID: **2108402-014APDS**	SampType: **PDS**			Units: **mg/Kg-dry**		Prep Date: **8/31/2021**			RunNo: **69685**		
Client ID: **BATCH**	Batch ID: **33549**					Analysis Date: **9/2/2021**			SeqNo: **1412553**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aluminum	12,800	8.67	433	12,300	111	75	125				E

Sample Log-In Check List

Client Name: **FB** | Work Order Number: **2108377**
Logged by: **Gabrielle Coeuille** | Date Received: **8/26/2021 2:18:00 PM**

Chain of Custody

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

Log In

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

Special Handling (if applicable)

18. 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:

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample 1	4.8

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

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

2108377

Page # 1 of 1

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Fremont	
PROJECT NAME/NO. 108413	PO # B-382
REMARKS	

TURNAROUND TIME
X Standard TAT
☐ RUSH
Rush charges authorized by:
SAMPLE DISPOSAL
☐ Dispose after 30 days
☐ Return samples
☐ Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Aluminum	Fluoride	Chloride					Notes
KCDD-N-0.5-1		8/24/21	1610	Soil	1				X	X	X					
KCDD-S-0.5-1		↓	1615	Soil	1				X	X	X					

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: [signature]	Michael Erdahl	Friedman & Bruya	8/26/21	
Received by: [signature]	Justine Mantz	FAI	8/26/21	14:18
Relinquished by:				
Received by:				

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Report Transmission Cover Page

Bill To:	Crete Consulting Inc.	Project ID:	Maralco	Lot ID:	**1540363**
	16300 Christensen Road, Suite	Project Name:	Maralco	Control Number:	
	Tukwila, WA, United States	Project Location:	Kent, WA, US	Date Received:	Dec 3, 2021
	98188	LSD:		Date Reported:	Jan 4, 2022
Attn:	Grant Hainsworth	P.O.:	1540363	Report Number:	2699893
Sampled By:	Rusty Jones	Proj. Acct. code:			
Company:	CRETE Consulting				

Contact	Company	Address
Grant Hainsworth	**Crete Consulting Inc.**	16300 Christensen Road, Suite 214 Tukwila, WA 98188 Phone: (206) 491-7554 Fax: Email: grant.hainsworth@creteconsulting.

Delivery	Format	Deliverables
Email - Single Report	PDF	Invoice
Email - Single Report	PDF	Test Report

Contact	Company	Address
Rusty Jones	**Crete Consulting Inc.**	16300 Christensen Road, Suite 214 Tukwila, WA 98188 Phone: (000) 000-0000 Fax: Email: rusty.jones@creteconsulting.com

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Merge Reports	PDF	COC / Test Report

Notes To Clients:

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Analytical Report

Bill To:	Crete Consulting Inc. 16300 Christensen Road, Suite Tukwila, WA, United States 98188	Project ID:	Maralco	Lot ID:	**1540363**
		Project Name:	Maralco	Control Number:	
		Project Location:	Kent, WA, US	Date Received:	Dec 3, 2021
		LSD:		Date Reported:	Jan 4, 2022
Attn:	Grant Hainsworth	P.O.:	1540363	Report Number:	2699893
Sampled By:	Rusty Jones	Proj. Acct. code:			
Company:	CRETE Consulting				

		Reference Number	1540363-1	1540363-2	1540363-3	
		Sample Date	Nov 30, 2021	Nov 30, 2021	Nov 30, 2021	
		Sample Time	08:45	08:45	08:45	
		Sample Location				
		Sample Description	Maralco / Pile-A / 2.6°C	Maralco / Pile-E / 2.6°C	Maralco / Pile-Outdoor-Washed / 2.6°C	
		Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Mono-Aromatic Hydrocarbons - Soil						
Benzene	Dry Weight	µg/g	<0.005	<0.005	0.017	0.005
Toluene	Dry Weight	µg/g	<0.02	0.04	<0.02	0.02
Ethylbenzene	Dry Weight	µg/g	<0.005	<0.005	<0.005	0.005
Total Xylenes (m,p,o)	Dry Weight	µg/g	<0.03	0.06	<0.03	0.03
Styrene	Dry Weight	µg/g	<0.01	<0.01	<0.01	0.01
Methyl t-Butyl Ether	Dry Weight	µg/g	<0.01	<0.01	<0.01	0.01
4-Bromofluorobenzene	Surrogate	%	109	109	118	60-140
Toluene-d8	Surrogate	%	102	106	117	60-140
Methanol Field Preservation			Yes	Yes	Yes	
Volatile Petroleum Hydrocarbons - Soil						
VHs6-10	Dry Weight	µg/g	<50	<50	<50	50
VPHs (VHs6-10 minus BTEX)	Dry Weight	µg/g	<50	<50	<50	50
Extractable Petroleum Hydrocarbons - Soil						
EPHs10-19	Dry Weight	µg/g	<20	20	<20	20
EPHs19-32	Dry Weight	µg/g	212	519	95	20
LEPHs	Dry Weight	µg/g	<20	<20	<20	20
HEPHs	Dry Weight	µg/g	212	519	95	20
2-Methylnonane	Surrogate	%	89	85	84	60-140
Soil % Moisture						
Moisture	Soil % Moisture	% by weight	30.80	20.00	50.20	
Polycyclic Aromatic Hydrocarbons - Soil						
Acenaphthene	Dry Weight	µg/g	<0.02	<0.02	<0.02	0.02
Acenaphthylene	Dry Weight	µg/g	<0.02	<0.02	<0.02	0.02
Anthracene	Dry Weight	µg/g	<0.02	<0.02	<0.02	0.02
Benzo(a)anthracene	Dry Weight	µg/g	0.04	0.02	<0.02	0.02
Benzo(a)pyrene	Dry Weight	µg/g	0.03	<0.02	<0.02	0.02
Benzo(b)fluoranthene	Dry Weight	µg/g	0.08	0.03	<0.02	0.02
Benzo(b+j)fluoranthene	Dry Weight	µg/g	0.12	<0.04	<0.04	0.04
Benzo(g,h,i)perylene	Dry Weight	µg/g	0.08	<0.02	<0.02	0.02
Benzo(k)fluoranthene	Dry Weight	µg/g	0.03	<0.02	<0.02	0.02
Chrysene	Dry Weight	µg/g	0.05	0.03	<0.02	0.02
Dibenzo(a,h)anthracene	Dry Weight	µg/g	<0.02	<0.02	<0.02	0.02
Fluoranthene	Dry Weight	µg/g	0.09	0.10	<0.02	0.02
Fluorene	Dry Weight	µg/g	<0.02	<0.02	<0.02	0.02
Indeno(1,2,3-c,d)pyrene	Dry Weight	µg/g	0.05	<0.02	<0.02	0.02
1-Methylnaphthalene	Dry Weight	µg/g	0.02	0.05	<0.02	0.02
2-Methylnaphthalene	Dry Weight	µg/g	0.04	0.10	<0.02	0.02

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Analytical Report

Bill To:	Crete Consulting Inc. 16300 Christensen Road, Suite Tukwila, WA, United States 98188	Project ID:	Maralco	Lot ID:	**1540363**
Attn:	Grant Hainsworth	Project Name:	Maralco	Control Number:	
Sampled By:	Rusty Jones	Project Location:	Kent, WA, US	Date Received:	Dec 3, 2021
Company:	CRETE Consulting	LSD:		Date Reported:	Jan 4, 2022
		P.O.:	1540363	Report Number:	2699893
		Proj. Acct. code:			

		Reference Number	1540363-1	1540363-2	1540363-3	
		Sample Date	Nov 30, 2021	Nov 30, 2021	Nov 30, 2021	
		Sample Time	08:45	08:45	08:45	
		Sample Location				
		Sample Description	Maralco / Pile-A / 2.6°C	Maralco / Pile-E / 2.6°C	Maralco / Pile-Outdoor-Washed / 2.6°C	
		Matrix	Soil	Soil	Soil	
Analyte		**Units**	**Results**	**Results**	**Results**	Nominal Detection Limit
Polycyclic Aromatic Hydrocarbons - Soil - Continued						
Naphthalene	Dry Weight	µg/g	0.03	0.08	0.02	0.01
Phenanthrene	Dry Weight	µg/g	0.06	0.09	<0.02	0.02
Pyrene	Dry Weight	µg/g	0.09	0.09	<0.02	0.02
Quinoline	Dry Weight	µg/g	<0.02	<0.02	<0.02	0.02
PAH - Soil - Surrogate Recovery						
2-Fluorobiphenyl	PAH - Surrogate	%	96	107	101	50-140
Naphthalene-d8	PAH - Surrogate	%	81.2	89.5	85.7	50-140
Quinoline-d7	PAH - Surrogate	%	82.5	94.9	84.3	50-140
p-Terphenyl-d14	PAH - Surrogate	%	93.5	92.4	83.9	50-140

Approved by:

Jimmy Tran
Operations Manager

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Methodology and Notes

Bill To:	Crete Consulting Inc. 16300 Christensen Road, Suite Tukwila, WA, United States 98188	Project ID:	Maralco	Lot ID:	**1540363**
Attn:	Grant Hainsworth	Project Name:	Maralco	Control Number:	
Sampled By:	Rusty Jones	Project Location:	Kent, WA, US	Date Received:	Dec 3, 2021
Company:	CRETE Consulting	LSD:		Date Reported:	Jan 4, 2022
		P.O.:	1540363	Report Number:	2699893
		Proj. Acct. code:			

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
BTEX-VPH - Soil (CLG)	BCELM	*	Calculation of Volatile Petroleum Hydrocarbons in Solids, Waters, or Air (Vapour) – VPH (June 26, 2009), VPH	Dec 10, 2021	Element Calgary
BTEX-VPH - Soil (CLG)	BCELM	*	Volatile Hydrocarbons in Soil by GC/FID, VH Soil	Dec 10, 2021	Element Calgary
EPH - Soil (CLG)	BCELM		Calculation of Light and Heavy Extractable Petroleum Hydrocarbons in Solids or Waters (LEPH & HEPH)., LEPH/HEPH Calculation	Dec 10, 2021	Element Calgary
EPH - Soil (CLG)	BCELM	*	Extractable Petroleum Hydrocarbons (EPH) in Solids by GC/FID, EPH Solids	Dec 10, 2021	Element Calgary
PAH - Soil (FSJ)	BCELM	*	Polycyclic Aromatic Hydrocarbons in Solids by GC/MS - PBM, PAH Solids	Dec 11, 2021	Element Calgary

** Reference Method Modified*

References

BCELM B.C. Environmental Laboratory Manual

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www.Element.com

Project Information

Project ID: MARALCO
Project Name: MARALCO
Project Location: Kent, WA, US
Legal Location:
PO/AFE#:
Proj. Acct. Code:
Quote #:

Invoice To

Company: CRETE Consulting
Address: Tukwila, WA
Attention: Grant Hainsworth
Phone:
Cell:
E-mail:
Government Funded Work YES / NO (NO circled)
SRP #
Agreement ID:

Report To

Company: CRETE Consulting
Address: 16300 Christensen Rd, Ste 214, Tukwila, WA 98188
Attention: Grant Hainsworth
Phone:
Cell:
Fax:
E-mail 1:
E-mail 2:
Copy of Invoice: YES (circled) / NO

Additional Reports to

1) Name: Grant Hainsworth
E-mail: grant.hainsworth@creteconsulting.com
2) Name: Rusty Jones
E-mail: rusty.jones@creteconsulting.com

Sample Custody

Sampled by: Rusty Jones
Company: CRETE Consulting
I authorize Element to proceed with the work indicated on this form:
Signature: R. Jones
Date/Time: 11/30/2021 1700

RUSH Priority

- ☐ Same Day (200%)
- ☐ Next Day/Two Day (100%)
- ☐ Three or Four Days (50%)
- ☒ 5 to 7 Days (Regular TAT)

Date Required

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Report Results

- ☒ Email
- ☐ Online
- ☐ Fax
- ☒ QA/QC
- ☒ PDF
- ☒ Excel

Requirements

- ☐ HCDWQ
- ☐ AB Tier 1
- ☐ SPIGEC
- ☐ BCCSR

Other (list below)

Special Instructions/Comments (please include contact information including phone number if different from above).

	Site I.D.	Sample Description	Depth start	Depth end (in cm m)	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	EPH (LEPH/HEPH)
1	MARALCO	PILE-A			11.30.2021 0845	SOLIDS	GRAB	3	✓	✓
2	↓	PILE-E			11.30.2021 0915	↓	↓	3	✓	✓
3	↓	PILE-OUTDOOR-WASHED			11.30.2021 1100	↓	↓	3	✓	✓
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										

Enter tests above (✓ relevant samples below)

Please indicate any potentially hazardous samples

Page 1 of 1 Control #

ED 120-06

Indicate lot # or affix barcode here

Lot: 1540363 COC

Temp. received: 2.6 °C
Date/Time stamp: DEC 3 '21 AM9:15
Delivery Method: FEDEX EXPRESS INTL
Waybill:
Received by:

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7217 Roper Road NW
Edmonton, Alberta
T6B 3J4, Canada

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F: +1 (780) 434-8586
E: info.Edmonton@element.com
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Report Transmission Cover Page

Bill To:	CRETE Consulting	Project ID:	Maralco	Lot ID:	**1541083**
	Edmonton, AB, Canada	Project Name:	Maralco	Control Number:	
Attn:	Grant Hainsworth	Project Location:	Kent, WA, USA	Date Received:	Dec 7, 2021
Sampled By:	Rusty Jones	LSD:		Date Reported:	Dec 16, 2021
Company:	CRETE Consulting	P.O.:	1541083	Report Number:	2701322
		Proj. Acct. code:			

Contact	Company	Address
Grant Hainsworth	**Cash Account**	
		Edmonton, AB null
		Phone: (780) 438-5522 Fax:
		Email: grant.hainsworth@creteconsulting.

Delivery	Format	Deliverables
Email - Merge Reports	PDF	COC / COA
Email - Merge Reports	PDF	COC / Test Report
Email - Merge Reports	PDF	Invoice

Notes To Clients:

- Dec 16, 2021 - Reduction of analytical volume was necessary for metals to bring results within the analytical range for sample 1541083. Detection limits are adjusted accordingly.

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Analytical Report

Bill To:	CRETE Consulting	Project ID:	Maralco	Lot ID:	**1541083**
	Edmonton, AB, Canada	Project Name:	Maralco	Control Number:	
Attn:	Grant Hainsworth	Project Location:	Kent, WA, USA	Date Received:	Dec 7, 2021
Sampled By:	Rusty Jones	LSD:		Date Reported:	Dec 16, 2021
Company:	CRETE Consulting	P.O.:	1541083	Report Number:	2701322
		Proj. Acct. code:			

Reference Number	1541083-1
Sample Date	December 06, 2021
Sample Time	08:10
Sample Location	
Sample Description	Pile-A / Maralco
Sample Matrix	Solids

Analyte		Units	Result	Nominal Detection Limit
Classification				
Carbon	Total Organic	%	1.10	0.04
Leachate Inorganic - TCLP				
Antimony	TCLP Leachate	mg/L	<0.005	0.005
Arsenic	TCLP Leachate	mg/L	<0.002	0.002
Barium	TCLP Leachate	mg/L	0.09	0.05
Beryllium	TCLP Leachate	mg/L	0.004	0.001
Boron	TCLP Leachate	mg/L	3.9	0.2
Cadmium	TCLP Leachate	mg/L	0.010	0.001
Chromium	TCLP Leachate	mg/L	0.018	0.005
Cobalt	TCLP Leachate	mg/L	0.010	0.001
Copper	TCLP Leachate	mg/L	5.2	0.1
Iron	TCLP Leachate	mg/L	0.1	0.1
Lead	TCLP Leachate	mg/L	<0.05	0.05
Mercury	TCLP Leachate	mg/L	<0.001	0.001
Nickel	TCLP Leachate	mg/L	0.28	0.050
Selenium	TCLP Leachate	mg/L	0.003	0.002
Silver	TCLP Leachate	mg/L	<0.005	0.05
Thallium	TCLP Leachate	mg/L	<0.0005	0.0005
Uranium	TCLP Leachate	mg/L	<0.005	0.005
Vanadium	TCLP Leachate	mg/L	0.02	0.01
Zinc	TCLP Leachate	mg/L	8.3	0.1
Zirconium	TCLP Leachate	mg/L	<0.01	0.01
pH	Initial		8.7	
pH	Final		5.8	
Metals Strong Acid Digestion				
Aluminum	Strong Acid Extractable	mg/kg	151000	20
Antimony	Strong Acid Extractable	mg/kg	21	0.2
Arsenic	Strong Acid Extractable	mg/kg	8	0.2
Barium	Strong Acid Extractable	mg/kg	115	1
Beryllium	Strong Acid Extractable	mg/kg	3	0.1
Bismuth	Strong Acid Extractable	mg/kg	10	0.5
Cadmium	Strong Acid Extractable	mg/kg	4.4	0.01
Chromium	Strong Acid Extractable	mg/kg	231	0.5
Calcium	Strong Acid Extractable	mg/kg	11600	200
Cobalt	Strong Acid Extractable	mg/kg	4	0.1
Copper	Strong Acid Extractable	mg/kg	2340	1
Iron	Strong Acid Extractable	mg/kg	9900	100
Lead	Strong Acid Extractable	mg/kg	165	0.1
Lithium	Strong Acid Extractable	mg/kg	52	1.0
Magnesium	Strong Acid Extractable	mg/kg	20100	100
Manganese	Strong Acid Extractable	mg/kg	1340	10

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Analytical Report

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	Edmonton, AB, Canada	Project Name:	Maralco	Control Number:	
Attn:	Grant Hainsworth	Project Location:	Kent, WA, USA	Date Received:	Dec 7, 2021
Sampled By:	Rusty Jones	LSD:		Date Reported:	Dec 16, 2021
Company:	CRETE Consulting	P.O.:	1541083	Report Number:	2701322
		Proj. Acct. code:			

Reference Number	1541083-1
Sample Date	December 06, 2021
Sample Time	08:10
Sample Location	
Sample Description	Pile-A / Maralco
Sample Matrix	Solids

Analyte		Units	Result	Nominal Detection Limit
Metals Strong Acid Digestion - Continued				
Mercury	Strong Acid Extractable	mg/kg	<0.5	0.05
Molybdenum	Strong Acid Extractable	mg/kg	<9.9	1
Nickel	Strong Acid Extractable	mg/kg	67	0.5
Phosphorus	Strong Acid Extractable	mg/kg	290	30
Selenium	Strong Acid Extractable	mg/kg	<3	0.3
Silicon	Strong Acid Extractable	mg/kg	550	50
Silver	Strong Acid Extractable	mg/kg	1	0.1
Strontium	Strong Acid Extractable	mg/kg	355	1
Sulfur	Strong Acid Extractable	mg/kg	400	300
Thallium	Strong Acid Extractable	mg/kg	<0.5	0.05
Tin	Strong Acid Extractable	mg/kg	43.8	1
Titanium	Strong Acid Extractable	mg/kg	2590	0.5
Tungsten	Strong Acid Extractable	mg/kg	<5	0.5
Uranium	Strong Acid Extractable	mg/kg	<5	0.5
Vanadium	Strong Acid Extractable	mg/kg	199	0.1
Zinc	Strong Acid Extractable	mg/kg	1950	1
Metals Total (Fusion)				
Aluminum Al_2O_3	Whole Rock Analysis	%	41.4	0.0038
Barium BaO	Whole Rock Analysis	%	0.0233	0.00008
Calcium CaO	Whole Rock Analysis	%	2.26	0.0042
Chromium Cr_2O_3	Whole Rock Analysis	%	0.0453	0.0001
Iron Fe_2O_3	Whole Rock Analysis	%	1.91	0.0028
Copper CuO	Whole Rock Analysis	%	0.306	0.0001
Magnesium MgO	Whole Rock Analysis	%	6.09	0.0033
Manganese MnO	Whole Rock Analysis	%	0.172	0.0006
Phosphorus P_2O_5	Whole Rock Analysis	%	<0.10	0.0023
Potassium K_2O	Whole Rock Analysis	%	1.89	0.012
Silicon as SiO_2	Whole Rock Analysis	%	19.8	0.0107
Sodium Na_2O	Whole Rock Analysis	%	2.45	0.0027
Strontium SrO	Whole Rock Analysis	%	0.0487	0.00005
Titanium TiO_2	Whole Rock Analysis	%	0.674	0.0002
Zinc ZnO	Whole Rock Analysis	%	0.210	0.0002
Zirconium ZrO_2	Whole Rock Analysis	%	0.0384	0.0001
Loss on Ignition @ 900C	Whole Rock Analysis	%	14.2	
Total Oxides	Whole Rock Analysis	%	91.5	
Beryllium	Total	µg/g	5.7	0.3
Cobalt	Total	µg/g	11	1
Molybdenum	Total	µg/g	9.5	1
Nickel	Total	µg/g	124	5
Vanadium	Total	µg/g	382	3

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Analytical Report

Bill To:	CRETE Consulting	Project ID:	Maralco	Lot ID:	**1541083**
	Edmonton, AB, Canada	Project Name:	Maralco	Control Number:	
Attn:	Grant Hainsworth	Project Location:	Kent, WA, USA	Date Received:	Dec 7, 2021
Sampled By:	Rusty Jones	LSD:		Date Reported:	Dec 16, 2021
Company:	CRETE Consulting	P.O.:	1541083	Report Number:	2701322
		Proj. Acct. code:			

Reference Number	1541083-1
Sample Date	December 06, 2021
Sample Time	08:10
Sample Location	
Sample Description	Pile-A / Maralco
Sample Matrix	Solids

Analyte		Units	Result	Nominal Detection Limit
Physical and Aggregate Properties				
Moisture	Wet Weight @ 105°C	%	22.4	0.1
Particle Size Analysis - Dry Sieve				
1.18 mm sieve	% Retained	% by weight	18.80	0.01
150 micron sieve	% Retained	% by weight	38.30	0.01
75 micron sieve	% Retained	% by weight	41.90	0.01
Metals				
Tellurium		µg/g	7.55	
Acid Soluble				
Chloride	Acid Soluble	%	0.795	0.002

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Analytical Report

Bill To:	CRETE Consulting	Project ID:	Maralco	Lot ID:	**1541083**
	Edmonton, AB, Canada	Project Name:	Maralco	Control Number:	
Attn:	Grant Hainsworth	Project Location:	Kent, WA, USA	Date Received:	Dec 7, 2021
Sampled By:	Rusty Jones	LSD:		Date Reported:	Dec 16, 2021
Company:	CRETE Consulting	P.O.:	1541083	Report Number:	2701322
		Proj. Acct. code:			

Reference Number	1541083-2
Sample Date	December 06, 2021
Sample Time	08:20
Sample Location	
Sample Description	Pile-E / Maralco
Sample Matrix	Solids

Analyte		Units	Result	Nominal Detection Limit
Classification				
Carbon	Total Organic	%	1.05	0.04
Leachate Inorganic - TCLP				
Antimony	TCLP Leachate	mg/L	<0.005	0.005
Arsenic	TCLP Leachate	mg/L	<0.002	0.002
Barium	TCLP Leachate	mg/L	0.09	0.05
Beryllium	TCLP Leachate	mg/L	0.003	0.001
Boron	TCLP Leachate	mg/L	4.3	0.2
Cadmium	TCLP Leachate	mg/L	0.012	0.001
Chromium	TCLP Leachate	mg/L	0.012	0.005
Cobalt	TCLP Leachate	mg/L	0.010	0.001
Copper	TCLP Leachate	mg/L	5.0	0.1
Iron	TCLP Leachate	mg/L	<0.1	0.1
Lead	TCLP Leachate	mg/L	<0.05	0.05
Mercury	TCLP Leachate	mg/L	<0.001	0.001
Nickel	TCLP Leachate	mg/L	0.24	0.050
Selenium	TCLP Leachate	mg/L	<0.002	0.002
Silver	TCLP Leachate	mg/L	<0.005	0.05
Thallium	TCLP Leachate	mg/L	<0.0005	0.0005
Uranium	TCLP Leachate	mg/L	<0.005	0.005
Vanadium	TCLP Leachate	mg/L	0.02	0.01
Zinc	TCLP Leachate	mg/L	7.4	0.1
Zirconium	TCLP Leachate	mg/L	<0.01	0.01
pH	Initial		8.7	
pH	Final		6.0	
Metals Strong Acid Digestion				
Aluminum	Strong Acid Extractable	mg/kg	144000	20
Antimony	Strong Acid Extractable	mg/kg	18	0.2
Arsenic	Strong Acid Extractable	mg/kg	7	0.2
Barium	Strong Acid Extractable	mg/kg	112	1
Beryllium	Strong Acid Extractable	mg/kg	3	0.1
Bismuth	Strong Acid Extractable	mg/kg	11	0.5
Cadmium	Strong Acid Extractable	mg/kg	4.3	0.01
Chromium	Strong Acid Extractable	mg/kg	214	0.5
Calcium	Strong Acid Extractable	mg/kg	11100	200
Cobalt	Strong Acid Extractable	mg/kg	4	0.1
Copper	Strong Acid Extractable	mg/kg	2340	1
Iron	Strong Acid Extractable	mg/kg	10200	100
Lead	Strong Acid Extractable	mg/kg	163	0.1
Lithium	Strong Acid Extractable	mg/kg	47	1.0
Magnesium	Strong Acid Extractable	mg/kg	19200	100
Manganese	Strong Acid Extractable	mg/kg	1280	10

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Analytical Report

Bill To:	CRETE Consulting	Project ID:	Maralco	Lot ID:	**1541083**
	Edmonton, AB, Canada	Project Name:	Maralco	Control Number:	
Attn:	Grant Hainsworth	Project Location:	Kent, WA, USA	Date Received:	Dec 7, 2021
Sampled By:	Rusty Jones	LSD:		Date Reported:	Dec 16, 2021
Company:	CRETE Consulting	P.O.:	1541083	Report Number:	2701322
		Proj. Acct. code:			

Reference Number	1541083-2
Sample Date	December 06, 2021
Sample Time	08:20
Sample Location	
Sample Description	Pile-E / Maralco
Sample Matrix	Solids

Analyte		Units	Result	Nominal Detection Limit
Metals Strong Acid Digestion - Continued				
Mercury	Strong Acid Extractable	mg/kg	<0.5	0.05
Molybdenum	Strong Acid Extractable	mg/kg	<9.6	1
Nickel	Strong Acid Extractable	mg/kg	69	0.5
Phosphorus	Strong Acid Extractable	mg/kg	240	30
Selenium	Strong Acid Extractable	mg/kg	<3	0.3
Silicon	Strong Acid Extractable	mg/kg	690	50
Silver	Strong Acid Extractable	mg/kg	1	0.1
Strontium	Strong Acid Extractable	mg/kg	300	1
Sulfur	Strong Acid Extractable	mg/kg	400	300
Thallium	Strong Acid Extractable	mg/kg	<0.5	0.05
Tin	Strong Acid Extractable	mg/kg	44.2	1
Titanium	Strong Acid Extractable	mg/kg	2560	0.5
Tungsten	Strong Acid Extractable	mg/kg	<5	0.5
Uranium	Strong Acid Extractable	mg/kg	<5	0.5
Vanadium	Strong Acid Extractable	mg/kg	197	0.1
Zinc	Strong Acid Extractable	mg/kg	1860	1
Metals Total (Fusion)				
Aluminum Al2O3	Whole Rock Analysis	%	39.6	0.0038
Barium BaO	Whole Rock Analysis	%	0.0229	0.00008
Calcium CaO	Whole Rock Analysis	%	2.35	0.0042
Chromium Cr2O3	Whole Rock Analysis	%	0.0533	0.0001
Iron Fe2O3	Whole Rock Analysis	%	1.94	0.0028
Copper CuO	Whole Rock Analysis	%	0.320	0.0001
Magnesium MgO	Whole Rock Analysis	%	5.60	0.0033
Manganese MnO	Whole Rock Analysis	%	0.166	0.0006
Phosphorus P2O5	Whole Rock Analysis	%	<0.10	0.0023
Potassium K2O	Whole Rock Analysis	%	1.80	0.012
Silicon as SiO2	Whole Rock Analysis	%	19.6	0.0107
Sodium Na2O	Whole Rock Analysis	%	2.43	0.0027
Strontium SrO	Whole Rock Analysis	%	0.0518	0.00005
Titanium TiO2	Whole Rock Analysis	%	0.738	0.0002
Zinc ZnO	Whole Rock Analysis	%	0.229	0.0002
Zirconium ZrO2	Whole Rock Analysis	%	0.100	0.0001
Loss on Ignition @ 900C	Whole Rock Analysis	%	13.7	
Total Oxides	Whole Rock Analysis	%	88.6	
Beryllium	Total	µg/g	5.6	0.3
Cobalt	Total	µg/g	13	1
Molybdenum	Total	µg/g	6	1
Nickel	Total	µg/g	158	5
Vanadium	Total	µg/g	363	3

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Analytical Report

Bill To:	CRETE Consulting	Project ID:	Maralco	Lot ID:	**1541083**
	Edmonton, AB, Canada	Project Name:	Maralco	Control Number:	
Attn:	Grant Hainsworth	Project Location:	Kent, WA, USA	Date Received:	Dec 7, 2021
Sampled By:	Rusty Jones	LSD:		Date Reported:	Dec 16, 2021
Company:	CRETE Consulting	P.O.:	1541083	Report Number:	2701322
		Proj. Acct. code:			

Reference Number	1541083-2
Sample Date	December 06, 2021
Sample Time	08:20
Sample Location	
Sample Description	Pile-E / Maralco
Sample Matrix	Solids

Analyte		Units	Result	Nominal Detection Limit
Physical and Aggregate Properties				
Moisture	Wet Weight @ 105°C	%	8.7	0.1
Particle Size Analysis - Dry Sieve				
1.18 mm sieve	% Retained	% by weight	10.5	0.01
150 micron sieve	% Retained	% by weight	33.40	0.01
75 micron sieve	% Retained	% by weight	55.70	0.01
Metals				
Tellurium		µg/g	6.14	
Acid Soluble				
Chloride	Acid Soluble	%	0.750	0.002

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Analytical Report

Bill To:	CRETE Consulting	Project ID:	Maralco	Lot ID:	**1541083**
	Edmonton, AB, Canada	Project Name:	Maralco	Control Number:	
Attn:	Grant Hainsworth	Project Location:	Kent, WA, USA	Date Received:	Dec 7, 2021
Sampled By:	Rusty Jones	LSD:		Date Reported:	Dec 16, 2021
Company:	CRETE Consulting	P.O.:	1541083	Report Number:	2701322
		Proj. Acct. code:			

Reference Number	1541083-3
Sample Date	December 06, 2021
Sample Time	08:30
Sample Location	
Sample Description	Pile-Outdoor-Washed / Maralco
Sample Matrix	Solids

Analyte		Units	Result	Nominal Detection Limit
Classification				
Carbon	Total Organic	%	0.67	0.04
Leachate Inorganic - TCLP				
Antimony	TCLP Leachate	mg/L	0.030	0.005
Arsenic	TCLP Leachate	mg/L	<0.002	0.002
Barium	TCLP Leachate	mg/L	<0.05	0.05
Beryllium	TCLP Leachate	mg/L	0.022	0.001
Boron	TCLP Leachate	mg/L	0.3	0.2
Cadmium	TCLP Leachate	mg/L	0.014	0.001
Chromium	TCLP Leachate	mg/L	0.058	0.005
Cobalt	TCLP Leachate	mg/L	0.011	0.001
Copper	TCLP Leachate	mg/L	0.5	0.1
Iron	TCLP Leachate	mg/L	1.0	0.1
Lead	TCLP Leachate	mg/L	<0.05	0.05
Mercury	TCLP Leachate	mg/L	<0.001	0.001
Nickel	TCLP Leachate	mg/L	0.12	0.050
Selenium	TCLP Leachate	mg/L	<0.002	0.002
Silver	TCLP Leachate	mg/L	<0.005	0.05
Thallium	TCLP Leachate	mg/L	<0.0005	0.0005
Uranium	TCLP Leachate	mg/L	<0.005	0.005
Vanadium	TCLP Leachate	mg/L	0.03	0.01
Zinc	TCLP Leachate	mg/L	6.1	0.1
Zirconium	TCLP Leachate	mg/L	<0.01	0.01
pH	Initial		8.2	
pH	Final		5.6	
Metals Strong Acid Digestion				
Aluminum	Strong Acid Extractable	mg/kg	110000	20
Antimony	Strong Acid Extractable	mg/kg	47	0.2
Arsenic	Strong Acid Extractable	mg/kg	7	0.2
Barium	Strong Acid Extractable	mg/kg	217	1
Beryllium	Strong Acid Extractable	mg/kg	10	0.1
Bismuth	Strong Acid Extractable	mg/kg	17	0.5
Cadmium	Strong Acid Extractable	mg/kg	5.5	0.01
Chromium	Strong Acid Extractable	mg/kg	296	0.5
Calcium	Strong Acid Extractable	mg/kg	13800	200
Cobalt	Strong Acid Extractable	mg/kg	5	0.1
Copper	Strong Acid Extractable	mg/kg	2030	1
Iron	Strong Acid Extractable	mg/kg	6600	100
Lead	Strong Acid Extractable	mg/kg	169	0.1
Lithium	Strong Acid Extractable	mg/kg	196	1.0
Magnesium	Strong Acid Extractable	mg/kg	31700	100
Manganese	Strong Acid Extractable	mg/kg	840	10

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	Edmonton, AB, Canada	Project Name:	Maralco	Control Number:	
Attn:	Grant Hainsworth	Project Location:	Kent, WA, USA	Date Received:	Dec 7, 2021
Sampled By:	Rusty Jones	LSD:		Date Reported:	Dec 16, 2021
Company:	CRETE Consulting	P.O.:	1541083	Report Number:	2701322
		Proj. Acct. code:			

Reference Number	1541083-3
Sample Date	December 06, 2021
Sample Time	08:30
Sample Location	
Sample Description	Pile-Outdoor-Washed / Maralco
Sample Matrix	Solids

Analyte		Units	Result	Nominal Detection Limit
Metals Strong Acid Digestion - Continued				
Mercury	Strong Acid Extractable	mg/kg	<0.5	0.05
Molybdenum	Strong Acid Extractable	mg/kg	<9.8	1
Nickel	Strong Acid Extractable	mg/kg	85	0.5
Phosphorus	Strong Acid Extractable	mg/kg	250	30
Selenium	Strong Acid Extractable	mg/kg	<3	0.3
Silicon	Strong Acid Extractable	mg/kg	1490	50
Silver	Strong Acid Extractable	mg/kg	2	0.1
Strontium	Strong Acid Extractable	mg/kg	499	1
Sulfur	Strong Acid Extractable	mg/kg	400	300
Thallium	Strong Acid Extractable	mg/kg	<0.5	0.05
Tin	Strong Acid Extractable	mg/kg	47.8	1
Titanium	Strong Acid Extractable	mg/kg	3550	0.5
Tungsten	Strong Acid Extractable	mg/kg	5	0.5
Uranium	Strong Acid Extractable	mg/kg	<5	0.5
Vanadium	Strong Acid Extractable	mg/kg	158	0.1
Zinc	Strong Acid Extractable	mg/kg	1670	1
Metals Total (Fusion)				
Aluminum Al2O3	Whole Rock Analysis	%	44.9	0.0038
Barium BaO	Whole Rock Analysis	%	0.0303	0.00008
Calcium CaO	Whole Rock Analysis	%	2.06	0.0042
Chromium Cr2O3	Whole Rock Analysis	%	0.0699	0.0001
Iron Fe2O3	Whole Rock Analysis	%	1.04	0.0028
Copper CuO	Whole Rock Analysis	%	0.269	0.0001
Magnesium MgO	Whole Rock Analysis	%	9.00	0.0033
Manganese MnO	Whole Rock Analysis	%	0.137	0.0006
Phosphorus P2O5	Whole Rock Analysis	%	<0.10	0.0023
Potassium K2O	Whole Rock Analysis	%	4.81	0.012
Silicon as SiO2	Whole Rock Analysis	%	12.4	0.0107
Sodium Na2O	Whole Rock Analysis	%	4.03	0.0027
Strontium SrO	Whole Rock Analysis	%	0.0736	0.00005
Titanium TiO2	Whole Rock Analysis	%	0.715	0.0002
Zinc ZnO	Whole Rock Analysis	%	0.212	0.0002
Zirconium ZrO2	Whole Rock Analysis	%	0.165	0.0001
Loss on Ignition @ 900C	Whole Rock Analysis	%	8.73	
Total Oxides	Whole Rock Analysis	%	88.6	
Beryllium	Total	µg/g	15.0	0.3
Cobalt	Total	µg/g	13	1
Molybdenum	Total	µg/g	23	1
Nickel	Total	µg/g	171	5
Vanadium	Total	µg/g	398	3

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	Edmonton, AB, Canada	Project Name:	Maralco	Control Number:	
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Sampled By:	Rusty Jones	LSD:		Date Reported:	Dec 16, 2021
Company:	CRETE Consulting	P.O.:	1541083	Report Number:	2701322
		Proj. Acct. code:			

Reference Number	1541083-3
Sample Date	December 06, 2021
Sample Time	08:30
Sample Location	
Sample Description	Pile-Outdoor-Washed / Maralco
Sample Matrix	Solids

Analyte		Units	Result	Nominal Detection Limit
Physical and Aggregate Properties				
Moisture	Wet Weight @ 105°C	%	34.9	0.1
Particle Size Analysis - Dry Sieve				
1.18 mm sieve	% Retained	% by weight	2.73	0.01
150 micron sieve	% Retained	% by weight	48.40	0.01
75 micron sieve	% Retained	% by weight	34.90	0.01
Metals				
Tellurium		µg/g	7.24	
Acid Soluble				
Chloride	Acid Soluble	%	0.080	0.002

Approved by:

Darlene Lintott, MSc
Consulting Scientist

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Methodology and Notes

Bill To:	CRETE Consulting	Project ID:	Maralco	Lot ID:	**1541083**
	Edmonton, AB, Canada	Project Name:	Maralco	Control Number:	
Attn:	Grant Hainsworth	Project Location:	Kent, WA, USA	Date Received:	Dec 7, 2021
Sampled By:	Rusty Jones	LSD:		Date Reported:	Dec 16, 2021
Company:	CRETE Consulting	P.O.:	1541083	Report Number:	2701322
		Proj. Acct. code:			

Method of Analysis

Method Name	Reference		Method	Date Analysis Started	Location
Chloride (Acid Soluble) in cement	Technical Standards Branch		Total Chloride Content in Cement, Mortar and Concrete, TLT-520	Dec 15, 2021	Element Edmonton - Roper Road
Leachate Inorganic (TCLP) ICP-MS	US EPA	*	Toxicity Characteristic Leaching Procedure, SW-846, EPA 1311	Dec 14, 2021	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	EPA	*	Sample Preparation Procedure for Spectrochemical Determination of Total Recoverable Elements, October 1999, 200.2	Dec 14, 2021	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	US EPA	*	Determination of Metals and Trace Elements by Inductively Coupled Plasma-Atomic Emission Spectrometry., 200.7	Dec 14, 2021	Element Edmonton - Roper Road
Metals ICP (Hot Block) in soil	US EPA	*	Determination of Trace Elements in Waters and Wastes by ICP-MS, 200.8	Dec 14, 2021	Element Edmonton - Roper Road
Metals in solids (VAN)	US EPA	*	Metals & Trace Elements by ICP-AES, 6010C	Dec 13, 2021	Element Vancouver
Metals SemiTrace (Oxides) in solids (VAN)	US EPA	*	Metals & Trace Elements by ICP-AES, 6010C	Dec 14, 2021	Element Vancouver
Moisture	Carter	*	Sample Moisture Content, 4.4	Dec 15, 2021	Element Edmonton - Roper Road
Particle Size by Dry Sieve	Carter	*	Sieve Analysis (Mechanical Method), 55.4	Dec 15, 2021	Element Edmonton - Roper Road
Total Carbon, Nitrogen in Soil by Leco Combustion (VAN)	SSSA Book Series 5	*	Total Carbon, Organic Carbon, and Organic Matter, Ch 34	Dec 14, 2021	Element Vancouver

** Reference Method Modified*

References

Carter	Soil Sampling and Methods of Analysis.
EPA	Environmental Protection Agency Test Methods - US
SSSA Book Series 5	Methods of Soil Analysis, Part 3
Technical Standards	Alberta Transportation and Utilities
US EPA	US Environmental Protection Agency Test Methods

Comments:

- Dec 16, 2021 - Reduction of analytical volume was necessary for metals to bring results within the analytical range for sample 1541083. Detection limits are adjusted accordingly.

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Project Information

Project ID: MARALCO
Project Name: MARALCO
Project Location: Kent, WA, USA
Legal Location:
PO/AFE#:
Proj. Acct. Code:
Quote #:

Invoice To

Company: CRETE Consulting
Address: Tukwila, WA
Attention:
Phone:
Cell:
E-mail:
Government Funded Work YES / NO
SRP #
Agreement ID:

Report To

Company: CRETE Consulting
Address: 16300 Christensen Rd, Ste 214 Tukwila WA 98188
Attention: Grant Hainsworth
Phone:
Cell: grant.hainsworth@creteconsulting.com
Fax:
E-mail 1:
E-mail 2:
Copy of Invoice: YES / NO

Additional Reports to

1) Name: Rusty Jones
E-mail: rusty.jones@creteconsulting.com
2) Name:
E-mail:

Sample Custody

Sampled by: Rusty Jones
Company: CRETE Consulting
I authorize Element to proceed with the work indicated on this form:
Signature: R. Jones
Date/Time: 12/6/2021 0900

RUSH Priority

☐ Same Day (200%)
☐ Next Day/Two Day (100%)
☐ Three or Four Days (50%)
☒ 5 to 7 Days (Regular TAT)
Date Required

When "ASAP" is requested, turn around will default to a 100% RUSH priority, with pricing and turn around time to match. Please contact the lab prior to submitting RUSH samples. If not all samples require RUSH, please indicate in the special instructions.

Report Results

☒ Email ☒ QA/QC
☐ Online ☒ PDF
☐ Fax ☒ Excel

Requirements

☐ HCDWQ ☐ SPIGEC
☐ AB Tier 1 ☐ BCCSR
Other (list below)

Special Instructions/Comments (please include contact information including phone number if different from above).

Enter tests above (✓ relevant samples below)

	Site I.D.	Sample Description	Depth start	Depth end (in cm m)	Date/Time sampled	Matrix	Sampling method	Number of Containers #	MeOH Field Preserved? ✓	WRA1	TT9 + Hg	MTTE, MTS	MTLI, MTU	MTW, MMTET	TCLT	CLAS	CL31 (TOC)	PS16, PS18 (#100 #200)	PS36 (1.18mm)	05 (dry, grind, 2mm)
1	MARALCO	PILE-A			12.6.2021 0810	SOLIDS	GRAB	3		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
2		PILE-E			0820			3		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
3		PILE-OUTDOOR-WASHED			0830			2		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				

DEC 7 '21 12:10

Please indicate any potentially hazardous samples

Submission of this form acknowledges acceptance of Element's Standard of terms and conditions (https://www.element.com/terms/terms-and-conditions)

Lot: 1541083 COC

Temp. received: 2.1°C
Date/Time stamp:
Delivery Method:
Waybill:
Received by: [signature]

Page 1 of 1 Control #

ED 120-06

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Cash Account
Cash Account
c/o Exova
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Phone: (604) 514-3322
Fax:
Email:

Agreement ID: 112534
Negotiated Date: April 27, 2017
Expiry Date: December 31, 2021
Representative: Rachel Eden
Surrey, BC

Quote ID: 33648

Washed Aluminum Oxide Testing - Rev.2

Sample Name	Service	Service Requested	QTY	Quoted	Total
Washed Aluminum Oxide Testing					
	DISP	Environmental Disposal Fee Environmental Disposal Fee	3.00	$5.00	$15.00
	WRA1	Whole rock analysis Sample ground to -100 mesh, LOI @ 900 and fused. Al, Ba, Ca, Fe, Mg, Mn, Na, K, P, Si,Sr, Ti, Zr as oxides and trace elements Be, Co, Cr, Mo, V, Zn	3.00	$185.51	$556.53
	TT9	ICP Trace Metals plus Mercury Includes: Al, Sb, As, Ba, Be, Bi, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, P, Se, Si, Ag, Sr, Tl, Sn, Ti, V, Zn plus Hg	3.00	$168.20	$504.60
	MTTE	Tellerium, excluding ICP set-up	3.00	$15.43	$46.29
	MTS	Sulphur, excluding ICP set-up	3.00	$15.43	$46.29
	MTLI	Lithium, excluding ICP set-up	3.00	$15.43	$46.29
	MTU	Uranium, excluding ICP set-up	3.00	$15.43	$46.29
	MTW	Tungsten, excluding ICP set-up	3.00	$77.49	$232.47
	MWET	Moisture (wet weight) Moisture reported on a wet weight basis	3.00	$14.17	$42.51
	TCLT	TCLP leachate (metals) Metals analysis for Landfill requirements: Sb, As, Ba, Be, B, Cd, Cr, Co, Cu, Fe, Pb, Hg, Ni, Se, Ag, Tl, U, V, Zn, Zr.	3.00	$252.28	$756.84
	CLAS	Acid Soluble Chloride	3.00	$53.54	$160.62
	CL31	TOC - soil Total organic carbon (TOC) by combustion	3.00	$44.10	$132.30
	PS16	CSSC dry sieve #100 (150 um)	3.00	$18.59	$55.77
	PS18	CSSC dry sieve #200 (75 um)	3.00	$18.59	$55.77
	PS36	CSSC dry sieve 1.18 mm (0.0469" (#16)	3.00	$37.16	$111.48
	05	Drying,Grinding, 2mm sieve Charged one time per sample where 1 or more analyses are requested requiring this preparation	3.00	$13.85	$41.55
					$2,850.60
				Total	$2,850.60

When analytical method is a modified reference method, modifications to the reference method can be provided to the customer upon request.
Quote name and client name must be indicated on all information sheets submitted with samples.
Payment due within 30 days from the date of original invoice.
Prices quoted in Canadian dollars and do not include GST/HST.
Our liability is limited to the cost of the analyses.

June 28, 2021

Michael Erdahl
Friedman and Bruya
3012 16th Avenue W
Seattle, WA 98059
Tel: (206) 285-8282
E-mail: merdahl@friedmanandbruya.com

Report No.: FAI-2021-0573
Revision No.: 0
Project No.: DST 9292

Dear Michael,

In response to your request, Fauske and Associates, LLC (FAI) performed the following Class 4 test per *UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria – Division 4.3, Test N.5: Test Method for Substances Which in Contact with Water Emit Flammable.* This test was performed on the following material labeled:

1. DC-052421

Sample received on June 1, 2021.

The summary of test results for this sample is summarized in Table 1.

Table 1: Summary of Test Results

Type of test: Division 4.3, Test N.5

Material	Amount of Material Tested (g)	Maximum Rate of Gas Evolved (L/kg*hr)	Elapsed Time of Observation (hour)	Spontaneous Combustion of Gas (yes/no)	Classification	Packing Group
DC-052421	15	0	~7	No	**Not** a Class 4, Division 4.3 material	n/a

The following paragraphs describe the methods, procedures, and detailed results for the tests conducted at Fauske and Associates, LLC.

Material Preparation

The sample was tested in its "as received" form.

UN Class 4, Division 4.3 – Dangerous when Wet Test

The test was performed per UN Manual of Tests and Criteria, Section 33, Classification Procedures, Test Methods and Criteria Relating to Class 4, *Test N.5, "Test Method for Substances Which In Contact With Water Emit Flammable Gases".*

Procedure

The test was performed three times at ambient temperature (~20°C) and at atmospheric pressure in air. A 15-g sample of the test material was placed into an Erlenmeyer flask (volume 250-ml). For the evolved gas measurement, a 500-ml (and/or 1000-ml) graduated cylinder was filled with water, inverted and connected to the flask via a rubber stopper and flexible tubing. Thirty (30) ml of water was added to the Erlenmeyer flask and a stopwatch was started.

The volume of gas evolved was measured by (utilizing a graduated cylinder) using a water displacement method. The rate-of-evolution of gas is calculated over 7 hours at 1-hour (or 30 minutes) intervals. The time taken for all the gas to be evolved was noted and where possible, intermediate readings were taken.

Criteria

If during any stage of the test the gas emitted ignited spontaneously, then no further testing was necessary and the substance should be assigned to Division 4.3. If spontaneous ignition of the emitted gas did not occur, then the final stage of the test should be performed to determine the rate of emission of flammable gas.

Whether a substance is a water-reactive substance of Division 4.3 or whether Packing Group I, II, or III should be assigned is decided on the basis of the gas evolution rate.

Overall criteria for Class 4, Division 4.3

A substance should be classified in Division 4.3 if:

(1) Spontaneous ignition takes place in any step of the test procedure; or

(2) There is an evolution of a flammable gas at a rate greater than 1 liter per kilogram of the substance per hour.

According to Code of Federal Regulations (CFR) 49, Transportation, Parts 100 to 185, §§ 173.125, Class 4 – Assignment of Packing Groups and UN Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria, the packing group assignment are as follows:

(1) Packing Group I, if the material reacts vigorously with water at ambient temperatures and demonstrates a tendency for the gas produced to ignite spontaneously, or which reacts readily with water at ambient temperatures such that the rate-of-evolution of flammable gases is equal or greater than 10 liters per kilogram of material over any one minute;

(2) Packing Group II, if the material reacts readily with water at ambient temperatures such that the maximum rate-of-evolution of flammable gases is equal to or greater than 20 liters per kilogram of material per hour, and which does not meet the criteria for Packing Group I; or

(3) Packing Group III, if the material reacts slowly with water at ambient temperatures such that the maximum rate-of-evolution of flammable gases is greater than 1 L per kilogram of material per hour, and which does not meet the criteria for Packing Group I or II.

Dangerous When Wet Test Results

The detailed test results are summarized in Table 2. This material, when in contact with water, did not emit gas at a rate greater than 1 liter per kilogram per hour. Therefore, the sample is not classified as a Class 4, Division 4.3 material.

Table 2: UN Class 4, Division 4.3 (Dangerous when Wet) Test Results

Amount of test sample: 15 g — Operator: R. Andreasen
Amount of water: 30 ml — Test Temperature: 20°C

Sample	Maximum Rate of Gas Evolved (L/kg*hr)	Elapsed Time of Observation (hour)	Test #1 Volume of Gas Evolved (ml)	Test #2 Volume of Gas Evolved (ml)	Test #3 Volume of Gas Evolved (ml)	Spontaneous Combustion of Gas (yes/no)	Overall Test Result
DC-052421	0	0	2*	4*	2*	No	**Not** Class 4, Division 4.3 material
		1	0	0	0		
		2	0	0	0		
		3	0	0	0		
		4	0	0	0		
		5	0	0	0		
		6	0	0	0		
		7	0	0	0		
		Total	**2**	**4**	**2**		

**air bubbles trapped in transfer line*

<u>CONCLUSION</u>

The results of the Class 4, Division 4.3 (Dangerous when Wet) test indicate that the sample did not produce enough flammable gas to meet the minimum standards to be classified as a Class 4, Division 4.3 sample. Therefore, this material is <u>not</u> classified as a Dangerous When Wet material.

If you have any further questions regarding the content of this report, please feel free to contact us.

Respectfully submitted,
Fauske and Associates, LLC.

Prepared by:
Rachelle Andreasen
Manager, Dust Testing Technician

Reviewed by:
Marie-Christin Holt
Laboratory Testing Technician

Note that the conclusions and recommendations in this report are based on the specific considerations stated and laboratory test methodologies used. These considerations include (but are not limited to) exact sample materials tested [including particle size distribution, particle morphology, moisture content and level of oxidation]; formulae/composition tested, conditions of the test, and assumed plant physical parameters. The conclusions and recommendations may not be applicable for conditions not <u>identical</u> to those considered. Consult local building and fire codes or transportation codes, in addition to NFPA 652, 70, 1, 101 and other relevant NFPA codes, for instructions and guidance.

RECORD OF REVISIONS

Rev.	Date	Revision Description
0	See front cover	Original Issue

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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January 6, 2022

Grant Hainsworth, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Hainsworth:

Included are the results from the testing of material submitted on December 1, 2021 from the Maralco, F&BI 112011 project. There are 22 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Rusty Jones
CTC0106R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on December 1, 2021 by Friedman & Bruya, Inc. from the Crete Consulting Maralco, F&BI 112011 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
112011 -01	Pile-A
112011 -02	Pile-E
112011 -03	Pile-B
112011 -04	Pile-F
112011 -05	Pile-C
112011 -06	Pile-D
112011 -07	Bags
112011 -08	Pile-Outdoor-Washed
112011 -09	Pile-Outdoor-Nonwashed

Samples Pile-B, Pile-F, Pile-C , Pile-D, and Bags were sent to Amtest for fluoride, chloride, potassium, boron, strontium, titanium, and magnesium analyses. In addition, samples Pile-B, Pile-F, Pile-D, and Bags were sent to Amtest for ammonia analysis. Review of the enclosed report indicates that all quality assurance were acceptable. The report generated by Amtest will be forwarded to your office upon receipt.

All quality control requirements were acceptable.

Date of Report: 01/06/22
Date Received: 12/01/21
Project: Maralco, F&BI 112011
Date Extracted: 12/01/21
Date Analyzed: 12/01/21

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR pH USING EPA METHOD 9045D

Sample ID Laboratory ID	pH
Pile-B 112011-03	8.2
Pile-F 112011-04	8.4
Pile-C 112011-05	8.0
Pile-D 112011-06	8.0
Bags 112011-07	4.5

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-B	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-03
Date Analyzed:	12/03/21	Data File:	112011-03.276
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	18.4
Arsenic	3.93
Cadmium	4.35
Chromium	201
Cobalt	2.59
Manganese	1,160
Nickel	111

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-B	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-03 x10
Date Analyzed:	12/06/21	Data File:	112011-03 x10.034
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	5,010
Lead	235
Zinc	2,950

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-F	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-04
Date Analyzed:	12/03/21	Data File:	112011-04.277
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	3.65
Cadmium	4.55
Lead	94.3

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-F	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-04 x2
Date Analyzed:	12/06/21	Data File:	112011-04 x2.051
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	7.90
Chromium	171
Cobalt	2.58
Manganese	1,640
Nickel	66.0
Zinc	1,480

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-F	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-04 x10
Date Analyzed:	12/06/21	Data File:	112011-04 x10.035
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	4,460

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-C	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-05
Date Analyzed:	12/03/21	Data File:	112011-05.278
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	17.8
Arsenic	<1
Cadmium	1.93
Chromium	86.1
Cobalt	1.29
Manganese	403
Nickel	59.2

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-C	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-05 x10
Date Analyzed:	12/06/21	Data File:	112011-05 x10.047
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	4,810
Lead	192
Zinc	3,270

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-D	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-06
Date Analyzed:	12/03/21	Data File:	112011-06.279
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	5.49
Arsenic	1.15
Cadmium	9.23
Cobalt	3.65
Lead	106
Nickel	61.2

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-D	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-06 x2
Date Analyzed:	12/06/21	Data File:	112011-06 x2.053
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	2,350
Zinc	1,030

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-D	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-06 x10
Date Analyzed:	12/06/21	Data File:	112011-06 x10.048
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	5,430
Manganese	3,240

Analysis For Total Metals By EPA Method 6020B

Client ID:	Bags	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-07
Date Analyzed:	12/03/21	Data File:	112011-07.280
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	23.9
Arsenic	3.23
Cadmium	5.46

Analysis For Total Metals By EPA Method 6020B

Client ID:	Bags	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-07 x10
Date Analyzed:	12/06/21	Data File:	112011-07 x10.038
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Lead	345

Analysis For Total Metals By EPA Method 6020B

Client ID:	Bags	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-07 x20
Date Analyzed:	12/06/21	Data File:	112011-07 x20.134
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	583
Cobalt	<20
Copper	8,350
Manganese	1,340
Nickel	318
Zinc	5,070

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	I1-791 mb2
Date Analyzed:	12/02/21	Data File:	I1-791 mb2.059
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Manganese	<1
Nickel	<1
Zinc	<5

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Pile-Outdoor-Nonwashed	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	112011-09
Date Analyzed:	12/03/21	Data File:	112011-09.142
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1	0.2
Selenium	<1	1.0
Silver	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 112011
Date Extracted:	12/02/21	Lab ID:	I1-802 mb
Date Analyzed:	12/03/21	Data File:	I1-802 mb.131
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1	0.2
Selenium	<1	1.0
Silver	<1	5.0

Date of Report: 01/06/22
Date Received: 12/01/21
Project: Maralco, F&BI 112011

**QUALITY ASSURANCE RESULTS
FROM THE ANALYSIS OF SOIL
SAMPLES FOR pH BY METHOD 9045D**

Laboratory Code: 112011-03 (Duplicate)

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	8.2	8.2	0	0-20

Date of Report: 01/06/22
Date Received: 12/01/21
Project: Maralco, F&BI 112011

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

Laboratory Code: 111537-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Antimony	mg/kg (ppm)	20	<1	90	93	75-125	3
Arsenic	mg/kg (ppm)	10	4.12	77	85	75-125	10
Cadmium	mg/kg (ppm)	10	<1	100	118	75-125	17
Chromium	mg/kg (ppm)	50	16.1	106	111	75-125	5
Cobalt	mg/kg (ppm)	20	3.86	84	86	75-125	2
Copper	mg/kg (ppm)	50	18.6	77	84	75-125	9
Lead	mg/kg (ppm)	50	25.4	92	93	75-125	1
Manganese	mg/kg (ppm	20	255	0 b	128 b	75-125	200 b
Nickel	mg/kg (ppm)	25	14.5	89	99	75-125	11
Zinc	mg/kg (ppm)	50	50.0	74 b	93 b	75-125	23 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Antimony	mg/kg (ppm)	20	100	80-120
Arsenic	mg/kg (ppm)	10	84	80-120
Cadmium	mg/kg (ppm)	10	101	80-120
Chromium	mg/kg (ppm)	50	112	80-120
Cobalt	mg/kg (ppm)	20	98	80-120
Copper	mg/kg (ppm)	50	102	80-120
Lead	mg/kg (ppm)	50	101	80-120
Manganese	mg/kg (ppm)	20	99	80-120
Nickel	mg/kg (ppm)	25	104	80-120
Zinc	mg/kg (ppm)	50	100	80-120

Date of Report: 01/06/22
Date Received: 12/01/21
Project: Maralco, F&BI 112011

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL/SOLID SAMPLES
FOR TCLP METALS USING
EPA METHODS 6020B AND 1311**

Laboratory Code: 110571-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/L (ppm)	1.0	<1	89	94	75-125	5
Barium	mg/L (ppm)	5.0	<1	96	102	75-125	6
Cadmium	mg/L (ppm)	0.5	<1	96	101	75-125	5
Chromium	mg/L (ppm)	2.0	<1	96	99	75-125	3
Lead	mg/L (ppm)	1.0	<1	92	97	75-125	5
Mercury	mg/L (ppm)	1.0	<0.1	108	109	75-125	1
Selenium	mg/L (ppm)	0.5	<1	97	101	75-125	4
Silver	mg/L (ppm)	0.5	<1	92	103	75-125	11

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/L (ppm)	1.0	86	80-120
Barium	mg/L (ppm)	5.0	92	80-120
Cadmium	mg/L (ppm)	0.5	92	80-120
Chromium	mg/L (ppm)	2.0	93	80-120
Lead	mg/L (ppm)	1.0	88	80-120
Mercury	mg/L (ppm)	1.0	110	80-120
Selenium	mg/L (ppm)	0.5	92	80-120
Silver	mg/L (ppm)	0.5	92	80-120

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.

112011

[redacted]

SAMPLE CHAIN OF CUSTODY

12-01-21 BIU/VS1

[redacted]

Page # 1 of 1

Report To R. Jones / G. Hainsworth

Company CRETE Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME MARALCO

PO #

REMARKS Email for Metals List

Project specific RLs? - Yes / No

INVOICE TO CRETE

TURNAROUND TIME
X Standard turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
X 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~~ TCLP-RCRA Metals	RCRA Metals List	Flouride, Chloride	Potassium, Na	Ammonia	Notes
PILE-A	01 A-F	11.30.2021	0845	SOLIDS	6 ~~2~~												HOLD
PILE-E	02		0915		6 ~~2~~												HOLD
PILE-B	03 A-C		0945		3								X	X	X	X	
PILE-F	04		1015		3								X	X	X	X	
PILE-C	05 A-D		1030		4								X	X	X		Incl. Strontium, Titanium, Boron
PILE-D	06		1045		4								X	X	X	X	Incl. pH + magnesium
BAGS	07 A-C		0930		3								X	X	X	X	Incl. pH + magnesium
PILE-OUTDOOR-WASHED	08 A-F		1100		6 ~~2~~												HOLD
PILE-OUTDOOR-NONWASHED	09 A-B		1115		2							X					TCLP-RCRA Metals

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	CRETE Consulting	12/1/2021	1147
Received by:	[signature]	James Bruya	F&B	12/1	1147
Relinquished by:					
Received by:			Samples received at ___ °C		

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Jan 5 2022
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL

Dear MICHAEL ERDAHL:

Enclosed please find the analytical data for your project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
PILE-B	Soil	21-A018148	MIN, NUT, MET
PILE-F	Soil	21-A018149	MIN, NUT, MET
PILE-C	Soil	21-A018150	MIN, MET
PILE-D	Soil	21-A018151	MIN, NUT, MET
BAGS	Soil	21-A018152	MIN, NUT, MET

Your samples were received on Thursday, December 2, 2021. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Aaron W Young

Aaron W. Young
Vice President

Project #: 112011
PO Number: B-512

BACT = Bacteriological
CONV = Conventionals
MET = Metals
ORG = Organics
NUT=Nutrients
DEM=Demand
MIN=Minerals

Am Test Inc.
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Professional Analytical Services

ANALYSIS REPORT

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project #: 112011
PO Number: B-512
All results reported on an as received basis.

Date Received: 12/02/21
Date Reported: 1/ 5/22

AMTEST Identification Number **21-A018148**
Client Identification **PILE-B**
Sampling Date **11/30/21, 09:45**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fluoride	1400	ug/g		1900	EPA 300.0	KS	12/10/21
Magnesium	11000	ug/g		19.	EPA 6010D	JDR	12/17/21
Sodium	49100	ug/g		76.	EPA 6010D	JDR	12/08/21
Chloride	85000	ug/g		10.	EPA 300.0	KS	12/10/21

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	180.	ug/g		5	SM 4500NH3-E	KS	01/04/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	JDR	12/07/21
Aluminum	134000	ug/g		190	EPA 6010D	JDR	12/17/21
Boron	151.	ug/g		11.	EPA 6010D	JDR	12/08/21
Iron	3350	ug/g		38.	EPA 6010D	JDR	12/08/21
Strontium	156.	ug/g		1.9	EPA 6010D	JDR	12/08/21
Titanium	543.	ug/g		3.8	EPA 6010D	JDR	12/08/21

AMTEST Identification Number **21-A018149**
Client Identification **PILE-F**
Sampling Date **11/30/21, 10:15**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fluoride	460	ug/g		1400	EPA 300.0	KS	12/09/21
Magnesium	7300	ug/g		14.	EPA 6010D	JDR	12/17/21
Sodium	9020.	ug/g		57.	EPA 6010D	JDR	12/08/21
Chloride	6700	ug/g		10.	EPA 300.0	KS	12/10/21

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	33.2	ug/g		5	SM 4500NH3-E	KS	01/04/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	JDR	12/07/21
Aluminum	210000	ug/g		140	EPA 6010D	JDR	12/17/21
Boron	241.	ug/g		8.5	EPA 6010D	JDR	12/08/21
Iron	6290	ug/g		28.	EPA 6010D	JDR	12/17/21
Strontium	167.	ug/g		1.4	EPA 6010D	JDR	12/08/21
Titanium	377.	ug/g		2.8	EPA 6010D	JDR	12/08/21

AMTEST Identification Number **21-A018150**
Client Identification **PILE-C**
Sampling Date **11/30/21, 10:50**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fluoride	2200	ug/g		1900	EPA 300.0	KS	12/10/21
Magnesium	2800	ug/g		19.	EPA 6010D	JDR	12/08/21
Sodium	58800	ug/g		77.	EPA 6010D	JDR	12/08/21
Chloride	20000	ug/g		10.	EPA 300.0	KS	12/10/21

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	JDR	12/07/21
Aluminum	178000	ug/g		190	EPA 6010D	JDR	12/17/21
Boron	17.2	ug/g		12.	EPA 6010D	JDR	12/08/21
Iron	4020	ug/g		39.	EPA 6010D	JDR	12/08/21
Strontium	35.3	ug/g		1.9	EPA 6010D	JDR	12/08/21
Titanium	245.	ug/g		3.9	EPA 6010D	JDR	12/08/21

AMTEST Identification Number **21-A018151**
Client Identification **PILE-D**
Sampling Date **11/30/21, 10:45**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fluoride	340	ug/g		1700	EPA 300.0	KS	12/09/21
Magnesium	4800	ug/g		17.	EPA 6010D	JDR	12/17/21
Sodium	25100	ug/g		66.	EPA 6010D	JDR	12/17/21
Chloride	59000	ug/g		10.	EPA 300.0	KS	12/10/21

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	958.	ug/g		5	SM 4500NH3-E	KS	01/04/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	JDR	12/07/21
Aluminum	194000	ug/g		170	EPA 6010D	JDR	12/17/21
Boron	651.	ug/g		9.9	EPA 6010D	JDR	12/08/21
Iron	3500	ug/g		33.	EPA 6010D	JDR	12/08/21
Strontium	258.	ug/g		1.7	EPA 6010D	JDR	12/08/21
Titanium	181.	ug/g		3.3	EPA 6010D	JDR	12/08/21

Friedman & Bruya, Inc.
Project Name:
AmTest ID: 21-A018152

AMTEST Identification Number **21-A018152**
Client Identification **BAGS**
Sampling Date **11/30/21, 09:30**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fluoride	150	ug/g		26000	EPA 300.0	KS	12/14/21
Magnesium	< 2.6	ug/g		260	EPA 6010D	JDR	12/08/21
Sodium	1320.	ug/g		1100	EPA 6010D	JDR	12/08/21
Chloride	14000	ug/g		10.	EPA 300.0	KS	12/10/21

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	2010	ug/g		5	SM 4500NH3-E	KS	01/04/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	JDR	12/07/21
Aluminum	169000	ug/g		2600	EPA 6010D	JDR	12/17/21
Boron	19.5	ug/g		160	EPA 6010D	JDR	12/08/21
Iron	122000	ug/g		530	EPA 6010D	JDR	12/17/21
Strontium	1.64	ug/g		26.	EPA 6010D	JDR	12/08/21
Titanium	89.2	ug/g		53.	EPA 6010D	JDR	12/08/21

Aaron W. Young
Aaron W. Young
Vice President

Am Test Inc.
13600 NE 126th PL
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Professional Analytical Services

QC Summary for sample numbers: 21-A018148 to 21-A018152

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
21-A018152	Chloride	ug/g	14000	13000	7.4
21-A018152	Fluoride	ug/g	89.	50.	56.
21-A019128	Ammonia	ug/g	898.	847.	5.8
21-A018151	Aluminum	ug/g	194000	204000	5.0
21-A018151	Boron	ug/g	651.	776.	18.
21-A018151	Iron	ug/g	3500	3870	10.
21-A018151	Magnesium	ug/g	4800	4700	2.1
21-A018151	Sodium	ug/g	25100	27400	8.8
21-A018151	Strontium	ug/g	258.	256.	0.78
21-A018151	Titanium	ug/g	181.	1190	150

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
21-A018152	Chloride	ug/g	14000	18000	4000	100.00 %
21-A018152	Fluoride	ug/g	89.	170	100	81.00 %
Duplicate	Aluminum	ug/g	204000	205000	270.	370.37 %
Duplicate	Iron	ug/g	3870	5800	270.	714.82 %
Duplicate	Magnesium	ug/g	4700	5400	600	116.67 %
Duplicate	Sodium	ug/g	27400	27900	600.0	83.33 %
Duplicate	Strontium	ug/g	256.	259.	45.0	6.67 %

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Chloride	ug/g	2.0	1.9	95.0 %
Fluoride	ug/g	2.0	2.0	100. %
Fluoride	ug/g	2.0	2.0	100. %
Ammonia	ug/g	20.0	19.0	95.0 %
Ammonia	ug/g	20.0	18.0	90.0 %
Aluminum	ug/g	2.00	1.93	96.5 %
Boron	ug/g	0.800	0.772	96.5 %
Boron	ug/g	0.800	0.804	100. %
Iron	ug/g	2.00	2.01	100. %
Iron	ug/g	2.00	1.97	98.5 %
Iron	ug/g	2.00	1.81	90.5 %
Magnesium	ug/g	4.0	4.0	100. %
Magnesium	ug/g	4.0	4.0	100. %
Magnesium	ug/g	4.0	3.7	92.5 %
Sodium	ug/g	20.00	20.20	101. %

QC Summary for sample numbers: 21-A018148 to 21-A018152...

STANDARD REFERENCE MATERIALS continued....

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Sodium	ug/g	20.00	20.70	104. %
Sodium	ug/g	20.00	19.90	99.5 %
Strontium	ug/g	0.800	0.793	99.1 %
Strontium	ug/g	0.800	0.796	99.5 %
Titanium	ug/g	2.00	1.94	97.0 %
Titanium	ug/g	2.00	1.96	98.0 %

BLANKS

ANALYTE	UNITS	RESULT
Chloride	ug/g	< 10
Fluoride	ug/g	< 5
Fluoride	ug/g	< 5
Ammonia	ug/g	< 5
Ammonia	ug/g	< 5
Aluminum	ug/g	< 0.5
Boron	ug/g	< 0.03
Boron	ug/g	0.036
Iron	ug/g	< 0.1
Iron	ug/g	< 0.1
Iron	ug/g	< 0.1
Magnesium	ug/g	< 0.05
Magnesium	ug/g	< 0.05
Magnesium	ug/g	< 0.05
Sodium	ug/g	< 0.2
Sodium	ug/g	< 0.2
Sodium	ug/g	< 0.2
Strontium	ug/g	< 0.005
Strontium	ug/g	< 0.005
Titanium	ug/g	< 0.01
Titanium	ug/g	< 0.01

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER ~~Fremont~~ Amtest

PROJECT NAME/NO.	PO #
112011	B512

REMARKS

Page # 1 of 1

TURNAROUND TIME
☒ Standard TAT
☐ RUSH
Rush charges authorized by:

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Fluoride, Chloride	Ammonia	Al, Na, Boron, Ti, Fe, Sr, Mg				Notes
PILE-B	18148	11/30/21	0945	solid	1				x	x	x				
PILE-F	49		1015		1				x	x	x				
PILE-C	50		1030		1				x	~~x~~	x				Do not analyze for ammonia
PILE-D	51		1045		1				x	x	x				
BAGS	52		0930		1				x	x	x				

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	12/1/21	1243
Received by:	Kyle Wataya	Amtest	12/2/21	1455
Relinquished by:				
Received by:				

Fedex T9.2

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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

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

January 28, 2021

Grant Hainsworth, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Hainsworth:

Included are the additional results from the testing of material submitted on December 1, 2021 from the Maralco, F&BI 112011 project. There are 9 pages included in this report.

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

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Rusty Jones
CTC0128R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on December 1, 2022 by Friedman & Bruya, Inc. from the Crete Consulting Maralco, F&BI 112011 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
112011 -01	Pile-A
112011 -02	Pile-E
112011 -03	Pile-B
112011 -04	Pile-F
112011 -05	Pile-C
112011 -06	Pile-D
112011 -07	Bags
112011 -08	Pile-Outdoor-Washed
112011 -09	Pile-Outdoor-Nonwashed

The TCLP mercury analysis was requested outside of the holding time. The data were flagged accordingly.

All other quality control requirements were acceptable.

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Pile-B	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	01/26/22	Lab ID:	112011-03
Date Analyzed:	01/27/22	Data File:	112011-03.046
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1 ht	0.2
Selenium	<1	1.0
Silver	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Pile-F	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	01/26/22	Lab ID:	112011-04
Date Analyzed:	01/27/22	Data File:	112011-04.049
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1 ht	0.2
Selenium	<1	1.0
Silver	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Pile-C	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	01/26/22	Lab ID:	112011-05
Date Analyzed:	01/27/22	Data File:	112011-05.050
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1 ht	0.2
Selenium	<1	1.0
Silver	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Pile-D	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	01/26/22	Lab ID:	112011-06
Date Analyzed:	01/27/22	Data File:	112011-06.051
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1 ht	0.2
Selenium	<1	1.0
Silver	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Bags	Client:	Crete Consulting
Date Received:	12/01/21	Project:	Maralco, F&BI 112011
Date Extracted:	01/26/22	Lab ID:	112011-07
Date Analyzed:	01/27/22	Data File:	112011-07.052
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	2.10	5.0
Mercury	<0.1 ht	0.2
Selenium	<1	1.0
Silver	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 112011
Date Extracted:	01/26/22	Lab ID:	I2-66 mb
Date Analyzed:	01/27/22	Data File:	I2-66 mb.038
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Arsenic	<1	5.0
Barium	<1	100
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1	0.2
Selenium	<1	1.0
Silver	<1	5.0

Date of Report: 01/28/22
Date Received: 12/01/21
Project: Maralco, F&BI 112011

QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL/SOLID SAMPLES
FOR TCLP METALS USING
EPA METHODS 6020B AND 1311

Laboratory Code: 112011-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/L (ppm)	1.0	<1	101	101	75-125	0
Barium	mg/L (ppm)	5.0	<1	103	103	75-125	0
Cadmium	mg/L (ppm)	0.5	<1	101	102	75-125	1
Chromium	mg/L (ppm)	2.0	<1	101	103	75-125	2
Lead	mg/L (ppm)	1.0	<1	92	93	75-125	1
Mercury	mg/L (ppm)	1.0	<0.1	98	96	75-125	2
Selenium	mg/L (ppm)	0.5	<1	103	102	75-125	1
Silver	mg/L (ppm)	0.5	<1	91	97	75-125	6

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/L (ppm)	1.0	96	80-120
Barium	mg/L (ppm)	5.0	98	80-120
Cadmium	mg/L (ppm)	0.5	95	80-120
Chromium	mg/L (ppm)	2.0	96	80-120
Lead	mg/L (ppm)	1.0	96	80-120
Mercury	mg/L (ppm)	1.0	98	80-120
Selenium	mg/L (ppm)	0.5	98	80-120
Silver	mg/L (ppm)	0.5	100	80-120

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.

112011 [redacted]

SAMPLE CHAIN OF CUSTODY

12-01-21 [redacted] BI4/V31

Page # 1 of 1

Report To R. Jones/G. Hainsworth

Company CRETE Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME	PO #
MARALCO	

REMARKS	INVOICE TO
Email for Metals List	CRETE
Project specific RLs? - Yes / No	

TURNAROUND TIME
X Standard turnaround
☐ RUSH
Rush charges authorized by:

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

ANALYSES REQUESTED

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	TCLP RCRA Metals ~~PCBs EPA 8082~~	~~RCRA Metals List~~	Flouride, Chloride	Potassium, Na	Ammonia	● per RJ 1/20/22 ME Notes
PILE-A	01 A-F	11.30.2021	0845	SOLIDS	~~2~~ 6												HOLD
PILE-E	02		0915		~~2~~ 6												HOLD
PILE-B	03 A-C		0945		3							●	X	X	X	X	
PILE-F	04		1015		3							●	X	X	X	X	
PILE-C	05 A-D		1030		4							●	X	X	X		Incl. Strontium, Titanium, Boron
PILE-D	06		1045		4							●	X	X	X	X	Incl. pH + magnesium
BAGS	07 A-C		0930		3							●	X	X	X	X	Incl. pH + magnesium
PILE-OUTDOOR-WASHED	08 A-F		1100		~~2~~ 6												HOLD
PILE-OUTDOOR-NONWASHED	09 A-B		1115		2							X					TCLP-RCRA Metals

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE Consulting	12/1/2021	1147
Received by: [signature]	James Bruya	F&B	12/1	1147
Relinquished by:				
Received by:		Samples received at ___ °C		

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Jan 12 2022
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL

Dear MICHAEL ERDAHL:

Enclosed please find the analytical data for your project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
PILE-B	Soil	21-A018148	MIN, NUT, MET
PILE-F	Soil	21-A018149	MIN, NUT, MET
PILE-C	Soil	21-A018150	MIN, MET
PILE-D	Soil	21-A018151	MIN, NUT, MET
BAGS	Soil	21-A018152	MIN, NUT, MET

Your samples were received on Thursday, December 2, 2021. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Aaron W Young

Aaron W. Young
Vice President

Project #: 112011
PO Number: B-512

BACT = Bacteriological
CONV = Conventionals
MET = Metals
ORG = Organics
NUT=Nutrients
DEM=Demand
MIN=Minerals

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project #: 112011
PO Number: B-512
All results reported on an as received basis.

Date Received: 12/02/21
Date Reported: 1/12/22

AMTEST Identification Number **21-A018148**
Client Identification **PILE-B**
Sampling Date **11/30/21, 09:45**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fluoride	1400	ug/g		1900	EPA 300.0	KS	12/10/21
Potassium	47100	ug/g		380	EPA 6010D	JDR	12/17/21
Magnesium	11000	ug/g		19.	EPA 6010D	JDR	12/17/21
Sodium	49100	ug/g		76.	EPA 6010D	JDR	12/08/21
Chloride	85000	ug/g		10.	EPA 300.0	KS	12/10/21

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	180.	ug/g		5	SM 4500NH3-E	KS	01/04/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	JDR	12/07/21
Aluminum	134000	ug/g		190	EPA 6010D	JDR	12/17/21
Boron	151.	ug/g		11.	EPA 6010D	JDR	12/08/21
Iron	3350	ug/g		38.	EPA 6010D	JDR	12/08/21
Strontium	156.	ug/g		1.9	EPA 6010D	JDR	12/08/21
Titanium	543.	ug/g		3.8	EPA 6010D	JDR	12/08/21

AMTEST Identification Number **21-A018149**
Client Identification **PILE-F**
Sampling Date **11/30/21, 10:15**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fluoride	460	ug/g		1400	EPA 300.0	KS	12/09/21
Potassium	8640	ug/g		280	EPA 6010D	JDR	12/17/21
Magnesium	7300	ug/g		14.	EPA 6010D	JDR	12/17/21
Sodium	9020.	ug/g		57.	EPA 6010D	JDR	12/08/21
Chloride	6700	ug/g		10.	EPA 300.0	KS	12/10/21

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	33.2	ug/g		5	SM 4500NH3-E	KS	01/04/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	JDR	12/07/21
Aluminum	210000	ug/g		140	EPA 6010D	JDR	12/17/21
Boron	241.	ug/g		8.5	EPA 6010D	JDR	12/08/21
Iron	6290	ug/g		28.	EPA 6010D	JDR	12/17/21
Strontium	167.	ug/g		1.4	EPA 6010D	JDR	12/08/21
Titanium	377.	ug/g		2.8	EPA 6010D	JDR	12/08/21

AMTEST Identification Number **21-A018150**
Client Identification **PILE-C**
Sampling Date **11/30/21, 10:50**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fluoride	2200	ug/g		1900	EPA 300.0	KS	12/10/21
Potassium	8330	ug/g		390	EPA 6010D	JDR	12/17/21
Magnesium	2800	ug/g		19.	EPA 6010D	JDR	12/08/21
Sodium	58800	ug/g		77.	EPA 6010D	JDR	12/08/21
Chloride	20000	ug/g		10.	EPA 300.0	KS	12/10/21

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	JDR	12/07/21
Aluminum	178000	ug/g		190	EPA 6010D	JDR	12/17/21
Boron	17.2	ug/g		12.	EPA 6010D	JDR	12/08/21
Iron	4020	ug/g		39.	EPA 6010D	JDR	12/08/21
Strontium	35.3	ug/g		1.9	EPA 6010D	JDR	12/08/21
Titanium	245.	ug/g		3.9	EPA 6010D	JDR	12/08/21

AMTEST Identification Number **21-A018151**
Client Identification **PILE-D**
Sampling Date **11/30/21, 10:45**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fluoride	340	ug/g		1700	EPA 300.0	KS	12/09/21
Potassium	29200	ug/g		330	EPA 6010D	JDR	12/17/21
Magnesium	4800	ug/g		17.	EPA 6010D	JDR	12/17/21
Sodium	25100	ug/g		66.	EPA 6010D	JDR	12/17/21
Chloride	59000	ug/g		10.	EPA 300.0	KS	12/10/21

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	958.	ug/g		5	SM 4500NH3-E	KS	01/04/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	JDR	12/07/21
Aluminum	194000	ug/g		170	EPA 6010D	JDR	12/17/21
Boron	651.	ug/g		9.9	EPA 6010D	JDR	12/08/21
Iron	3500	ug/g		33.	EPA 6010D	JDR	12/08/21
Strontium	258.	ug/g		1.7	EPA 6010D	JDR	12/08/21
Titanium	181.	ug/g		3.3	EPA 6010D	JDR	12/08/21

Friedman & Bruya, Inc.
Project Name:
AmTest ID: 21-A018152

AMTEST Identification Number **21-A018152**
Client Identification **BAGS**
Sampling Date **11/30/21, 09:30**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fluoride	150	ug/g		26000	EPA 300.0	KS	12/14/21
Potassium	1240	ug/g		5300	EPA 6010D	JDR	12/17/21
Magnesium	< 2.6	ug/g		260	EPA 6010D	JDR	12/08/21
Sodium	1320.	ug/g		1100	EPA 6010D	JDR	12/08/21
Chloride	14000	ug/g		10.	EPA 300.0	KS	12/10/21

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	2010	ug/g		5	SM 4500NH3-E	KS	01/04/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	JDR	12/07/21
Aluminum	169000	ug/g		2600	EPA 6010D	JDR	12/17/21
Boron	19.5	ug/g		160	EPA 6010D	JDR	12/08/21
Iron	122000	ug/g		530	EPA 6010D	JDR	12/17/21
Strontium	1.64	ug/g		26.	EPA 6010D	JDR	12/08/21
Titanium	89.2	ug/g		53.	EPA 6010D	JDR	12/08/21

Aaron W Young

Aaron W. Young
Vice President

Am Test Inc.
13600 NE 126th PL
Suite C
Kirkland, WA, 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

QC Summary for sample numbers: 21-A018148 to 21-A018152

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
21-A018152	Chloride	ug/g	14000	13000	7.4
21-A018152	Fluoride	ug/g	89.	50.	56.
21-A019128	Ammonia	ug/g	898.	847.	5.8
21-A018151	Aluminum	ug/g	194000	204000	5.0
21-A018151	Boron	ug/g	651.	776.	18.
21-A018151	Iron	ug/g	3500	3870	10.
21-A018151	Potassium	ug/g	29200	29400	0.68
21-A018151	Magnesium	ug/g	4800	4700	2.1
21-A018151	Sodium	ug/g	25100	27400	8.8
21-A018151	Strontium	ug/g	258.	256.	0.78
21-A018151	Titanium	ug/g	181.	1190	150

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
21-A018152	Chloride	ug/g	14000	18000	4000	100.00 %
21-A018152	Fluoride	ug/g	89.	170	100	81.00 %
Duplicate	Aluminum	ug/g	204000	205000	270.	370.37 %
Duplicate	Iron	ug/g	3870	5800	270.	714.82 %
Duplicate	Magnesium	ug/g	4700	5400	600	116.67 %
Duplicate	Sodium	ug/g	27400	27900	600.0	83.33 %
Duplicate	Strontium	ug/g	256.	259.	45.0	6.67 %

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Chloride	ug/g	2.0	1.9	95.0 %
Fluoride	ug/g	2.0	2.0	100. %
Fluoride	ug/g	2.0	2.0	100. %
Ammonia	ug/g	20.0	19.0	95.0 %
Ammonia	ug/g	20.0	18.0	90.0 %
Aluminum	ug/g	2.00	1.93	96.5 %
Boron	ug/g	0.800	0.772	96.5 %
Boron	ug/g	0.800	0.804	100. %
Iron	ug/g	2.00	2.01	100. %
Iron	ug/g	2.00	1.97	98.5 %
Iron	ug/g	2.00	1.81	90.5 %
Potassium	ug/g	4.00	3.75	93.8 %
Magnesium	ug/g	4.0	4.0	100. %
Magnesium	ug/g	4.0	4.0	100. %

QC Summary for sample numbers: 21-A018148 to 21-A018152...

STANDARD REFERENCE MATERIALS continued....

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Magnesium	ug/g	4.0	3.7	92.5 %
Sodium	ug/g	20.00	20.20	101. %
Sodium	ug/g	20.00	20.70	104. %
Sodium	ug/g	20.00	19.90	99.5 %
Strontium	ug/g	0.800	0.793	99.1 %
Strontium	ug/g	0.800	0.796	99.5 %
Titanium	ug/g	2.00	1.94	97.0 %
Titanium	ug/g	2.00	1.96	98.0 %

BLANKS

ANALYTE	UNITS	RESULT
Chloride	ug/g	< 10
Fluoride	ug/g	< 5
Fluoride	ug/g	< 5
Ammonia	ug/g	< 5
Ammonia	ug/g	< 5
Aluminum	ug/g	< 0.5
Boron	ug/g	< 0.03
Boron	ug/g	0.036
Iron	ug/g	< 0.1
Iron	ug/g	< 0.1
Iron	ug/g	< 0.1
Potassium	ug/g	< 1
Magnesium	ug/g	< 0.05
Magnesium	ug/g	< 0.05
Magnesium	ug/g	< 0.05
Sodium	ug/g	< 0.2
Sodium	ug/g	< 0.2
Sodium	ug/g	< 0.2
Strontium	ug/g	< 0.005
Strontium	ug/g	< 0.005
Titanium	ug/g	< 0.01
Titanium	ug/g	< 0.01

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER ~~Fremont~~ Amtest	
PROJECT NAME/NO. 112011	PO # B512
REMARKS	

Page # 1 of 1

TURNAROUND TIME
- ☒ Standard TAT
- ☐ RUSH
- Rush charges authorized by:

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

P.9

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	Fluoride, Chloride	Ammonia	Al, Na, Boron, Ti, Fe, Sr, Mg					Notes
PILE-B	18148	11/30/21	0945	solid	1				x	x	x					
PILE-F	49		1015		1				x	x	x					
PILE-C	50		1030		1				x	~~x~~	x					Do not analyze for ammonia
PILE-D	51		1045		1				x	x	x					
BAGS	52		0930		1				x	x	x					

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: [signature]	Michael Erdahl	Friedman & Bruya	12/1/21	1243
Received by: [signature]	Kyle Wataya	Amtest	12/2/21	1455
Relinquished by:				
Received by:				

Fedex T9.2

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

October 10, 2022

Rusty Jones, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Jones:

Included are the results from the testing of material submitted on August 31, 2022 from the Maralco R.I., F&BI 208488 project. There are 31 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Grant Hainsworth
CTC1010R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on August 31, 2022 by Friedman & Bruya, Inc. from the Crete Consulting Maralco R.I., F&BI 208488 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
208488 -01	DPT-16 6.5-8'
208488 -02	DPT-16 10-11.5'
208488 -03	DPT-16 13.5-15'
208488 -04	DPT-16
208488 -05	MW-7 5-7'
208488 -06	MW-7 7-10'
208488 -07	MW-7 13.5-15'
208488 -08	MW-7 19-20'
208488 -09	MW-5R 5.5-7'
208488 -10	MW-5R 11-12'
208488 -11	MW-5R 15-16'
208488 -12	MW-8 4-5'
208488 -13	MW-8 5-7'
208488 -14	MW-8 12-13'
208488 -15	MW-8 18-19'
208488 -16	DPT-17 5.5-8'
208488 -17	DPT-17 9-10'
208488 -18	DPT-17 19-20'
208488 -19	DPT-17

The soil samples marked for analysis were sent to Amtest for fluoride, chloride, ammonia, aluminum and iron analyses. The water samples marked for analysis were sent to Amtest for fluoride, chloride, ammonia, and aluminum analyses.

Zinc in the 6020B matrix spike and matrix spike duplicate failed the acceptance criteria. The laboratory control sample passed the acceptance criteria, therefore the results were due to matrix effect.

Pyrene in the 8270E soil laboratory control sample exceeded the acceptance criteria. The compound was not detected, therefore the data were acceptable.

All other quality control requirements were acceptable.

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208488
Date Extracted: 09/06/22
Date Analyzed: 09/07/22

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 56-165)
MW-7 5-7' 208488-05	<50	<250	105
MW-7 13.5-15' 208488-07	<50	<250	105
MW-5R 5.5-7' 208488-09	<50	<250	105
MW-5R 11-12' 208488-10	<50	<250	105
MW-8 4-5' 208488-12	<50	<250	104
MW-8 12-13' 208488-14	<50	<250	104
Method Blank 02-2119 MB	<50	<250	104

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208488
Date Extracted: 09/06/22
Date Analyzed: 09/06/22

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx
Sample Extracts Passed Through a Silica Gel Column Prior to Analysis
Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 48-168)
MW-7 5-7' 208488-05	<50	<250	133
MW-7 13.5-15' 208488-07	<50	<250	117
MW-5R 5.5-7' 208488-09	<50	<250	122
MW-5R 11-12' 208488-10	<50	<250	137
MW-8 4-5' 208488-12	<50	<250	135
MW-8 12-13' 208488-14	<50	<250	137
Method Blank 02-2119 MB	<50	<250	132

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-16	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/26/22	Lab ID:	208488-04
Date Analyzed:	09/26/22	Data File:	208488-04.120
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.55
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Nickel	1.67
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-16	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/26/22	Lab ID:	208488-04 x100
Date Analyzed:	09/27/22	Data File:	208488-04 x100.091
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	27,400

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	NA	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/26/22	Lab ID:	I2-683 mb
Date Analyzed:	09/26/22	Data File:	I2-683 mb.070
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Iron	<50
Lead	<1
Nickel	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-16	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/06/22	Lab ID:	208488-04
Date Analyzed:	09/06/22	Data File:	208488-04.137
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	3.23
Cadmium	<1
Chromium	1.65
Cobalt	1.67
Copper	6.20
Lead	<1
Nickel	2.34
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-16	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/06/22	Lab ID:	208488-04 x100
Date Analyzed:	09/08/22	Data File:	208488-04 x100.043
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	33,800

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	NA	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/06/22	Lab ID:	I2-613 mb
Date Analyzed:	09/07/22	Data File:	I2-613 mb.043
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Iron	<50
Lead	<1
Nickel	<1
Zinc	<5

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ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-16 6.5-8'	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/02/22	Lab ID:	208488-01
Date Analyzed:	09/02/22	Data File:	208488-01.135
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.17
Cadmium	<1
Chromium	8.37
Cobalt	2.69
Copper	7.00
Lead	1.10
Nickel	4.91
Silver	<1
Zinc	15.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-16 10-11.5'	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/02/22	Lab ID:	208488-02
Date Analyzed:	09/02/22	Data File:	208488-02.138
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.51
Cadmium	<1
Chromium	5.49
Cobalt	2.95
Copper	7.92
Lead	1.37
Nickel	5.12
Silver	<1
Zinc	14.2

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-7 5-7’	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/02/22	Lab ID:	208488-05
Date Analyzed:	09/02/22	Data File:	208488-05.139
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	12.2
Cadmium	<1
Chromium	9.13
Cobalt	3.93
Copper	15.9
Lead	14.7
Nickel	8.80
Silver	<1
Zinc	34.5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-7 13.5-15'	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/02/22	Lab ID:	208488-07
Date Analyzed:	09/02/22	Data File:	208488-07.140
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	5.27
Cadmium	<1
Chromium	8.01
Cobalt	7.01
Copper	23.2
Lead	2.62
Nickel	9.61
Silver	<1
Zinc	31.6

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-5R 5.5-7'	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/02/22	Lab ID:	208488-09
Date Analyzed:	09/02/22	Data File:	208488-09.141
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.52
Cadmium	<1
Chromium	6.98
Cobalt	2.15
Copper	7.60
Lead	1.09
Nickel	4.49
Silver	<1
Zinc	14.2

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-5R 11-12’	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/02/22	Lab ID:	208488-10
Date Analyzed:	09/02/22	Data File:	208488-10.142
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.93
Cadmium	<1
Chromium	8.50
Cobalt	3.18
Copper	14.1
Lead	1.96
Nickel	6.41
Silver	<1
Zinc	20.4

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-8 4-5'	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/02/22	Lab ID:	208488-12
Date Analyzed:	09/02/22	Data File:	208488-12.143
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	10.7
Cadmium	<1
Chromium	6.95
Cobalt	3.09
Copper	19.0
Lead	21.5
Nickel	5.77
Silver	<1
Zinc	45.2

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-8 12-13'	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/02/22	Lab ID:	208488-14
Date Analyzed:	09/02/22	Data File:	208488-14.144
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	2.99
Cadmium	<1
Chromium	8.61
Cobalt	4.33
Copper	16.5
Lead	2.07
Nickel	8.46
Silver	<1
Zinc	22.8

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	NA	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/02/22	Lab ID:	I2-609 mb
Date Analyzed:	09/02/22	Data File:	I2-609 mb.081
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Nickel	<1
Silver	<1
Zinc	<5

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	DPT-17 5.5-8'	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/02/22	Lab ID:	208488-16 1/5
Date Analyzed:	09/02/22	Data File:	090209.D
Matrix:	Soil	Instrument:	GCMS12
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Nitrobenzene-d5	68	16	137
2-Fluorobiphenyl	77	46	122
2,4,6-Tribromophenol	79	17	154
Terphenyl-d14	85	31	167

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
2-Methylnaphthalene	<0.01
1-Methylnaphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/02/22	Lab ID:	02-2107 mb2 1/5
Date Analyzed:	09/02/22	Data File:	090206.D
Matrix:	Soil	Instrument:	GCMS12
Units:	mg/kg (ppm) Dry Weight	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Nitrobenzene-d5	89	16	137
2-Fluorobiphenyl	96	46	122
2,4,6-Tribromophenol	84	17	154
Terphenyl-d14	98	31	167

Compounds:	Concentration mg/kg (ppm)
Naphthalene	<0.01
2-Methylnaphthalene	<0.01
1-Methylnaphthalene	<0.01
Acenaphthylene	<0.01
Acenaphthene	<0.01
Fluorene	<0.01
Phenanthrene	<0.01
Anthracene	<0.01
Fluoranthene	<0.01
Pyrene	<0.01
Benz(a)anthracene	<0.01
Chrysene	<0.01
Benzo(a)pyrene	<0.01
Benzo(b)fluoranthene	<0.01
Benzo(k)fluoranthene	<0.01
Indeno(1,2,3-cd)pyrene	<0.01
Dibenz(a,h)anthracene	<0.01
Benzo(g,h,i)perylene	<0.01

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	DPT-17	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/01/22	Lab ID:	208488-19
Date Analyzed:	09/01/22	Data File:	090120.D
Matrix:	Water	Instrument:	GCMS12
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Nitrobenzene-d5	69	11	173
2-Fluorobiphenyl	73	44	108
2,4,6-Tribromophenol	85	10	140
Terphenyl-d14	87	50	150

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.2
2-Methylnaphthalene	<0.2
1-Methylnaphthalene	<0.2
Acenaphthylene	<0.02
Acenaphthene	0.056
Fluorene	0.034
Phenanthrene	<0.02
Anthracene	<0.02
Fluoranthene	<0.02
Pyrene	<0.02
Benz(a)anthracene	<0.02
Chrysene	<0.02
Benzo(a)pyrene	<0.02
Benzo(b)fluoranthene	<0.02
Benzo(k)fluoranthene	<0.02
Indeno(1,2,3-cd)pyrene	<0.02
Dibenz(a,h)anthracene	<0.02
Benzo(g,h,i)perylene	<0.04

Analysis For Semivolatile Compounds By EPA Method 8270E

Client Sample ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco R.I., F&BI 208488
Date Extracted:	09/01/22	Lab ID:	02-2061 mb3
Date Analyzed:	09/01/22	Data File:	090115.D
Matrix:	Water	Instrument:	GCMS12
Units:	ug/L (ppb)	Operator:	VM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
Nitrobenzene-d5	80	11	173
2-Fluorobiphenyl	78	44	108
2,4,6-Tribromophenol	72	10	140
Terphenyl-d14	99	50	150

Compounds:	Concentration ug/L (ppb)
Naphthalene	<0.2
2-Methylnaphthalene	<0.2
1-Methylnaphthalene	<0.2
Acenaphthylene	<0.02
Acenaphthene	<0.02
Fluorene	<0.02
Phenanthrene	<0.02
Anthracene	<0.02
Fluoranthene	<0.02
Pyrene	<0.02
Benz(a)anthracene	<0.02
Chrysene	<0.02
Benzo(a)pyrene	<0.02
Benzo(b)fluoranthene	<0.02
Benzo(k)fluoranthene	<0.02
Indeno(1,2,3-cd)pyrene	<0.02
Dibenz(a,h)anthracene	<0.02
Benzo(g,h,i)perylene	<0.04

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208488

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: 208488-05 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	82	80	63-146	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	80	79-144

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208488

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: 208488-05 (Matrix Spike) Silica Gel

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	112	106	73-135	6

Laboratory Code: Laboratory Control Sample Silica Gel

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	130	74-139

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208488

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

Laboratory Code: 209383-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	2.73	85	84	75-125	1
Cadmium	ug/L (ppb)	5	<1	99	97	75-125	2
Chromium	ug/L (ppb)	20	<1	78	78	75-125	0
Cobalt	ug/L (ppb)	20	<1	78	77	75-125	1
Copper	ug/L (ppb)	20	<5	76	75	75-125	1
Iron	ug/L (ppb)	100	14,100	387 b	0 b	75-125	200 b
Lead	ug/L (ppb)	10	<1	79	78	75-125	1
Nickel	ug/L (ppb)	20	2.94	78	77	75-125	1
Zinc	ug/L (ppb)	50	<5	74 vo	74 vo	75-125	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	99	80-120
Cadmium	ug/L (ppb)	5	95	80-120
Chromium	ug/L (ppb)	20	96	80-120
Cobalt	ug/L (ppb)	20	97	80-120
Copper	ug/L (ppb)	20	99	80-120
Iron	ug/L (ppb)	100	97	80-120
Lead	ug/L (ppb)	10	93	80-120
Nickel	ug/L (ppb)	20	97	80-120
Zinc	ug/L (ppb)	50	98	80-120

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208488

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

Laboratory Code: 208508-05 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	2.45	84	87	75-125	4
Cadmium	ug/L (ppb)	5	<1	100	103	75-125	3
Chromium	ug/L (ppb)	20	<1	97	97	75-125	0
Cobalt	ug/L (ppb)	20	<1	95	96	75-125	1
Copper	ug/L (ppb)	20	<5	94	94	75-125	0
Iron	ug/L (ppb)	100	486	102	132 b	75-125	26 b
Lead	ug/L (ppb)	10	<1	91	93	75-125	2
Nickel	ug/L (ppb)	20	<1	95	97	75-125	2
Zinc	ug/L (ppb)	50	<5	94	96	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	88	80-120
Cadmium	ug/L (ppb)	5	90	80-120
Chromium	ug/L (ppb)	20	91	80-120
Cobalt	ug/L (ppb)	20	91	80-120
Copper	ug/L (ppb)	20	94	80-120
Iron	ug/L (ppb)	100	97	80-120
Lead	ug/L (ppb)	10	95	80-120
Nickel	ug/L (ppb)	20	94	80-120
Zinc	ug/L (ppb)	50	93	80-120

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208488

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

Laboratory Code: 208488-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Antimony	mg/kg (ppm)	20	<1	95	94	75-125	1
Arsenic	mg/kg (ppm)	10	1.10	92	91	75-125	1
Cadmium	mg/kg (ppm)	10	<1	95	93	75-125	2
Chromium	mg/kg (ppm)	50	7.87	81	81	75-125	0
Cobalt	mg/kg (ppm)	20	2.53	85	83	75-125	2
Copper	mg/kg (ppm)	50	6.58	84	83	75-125	1
Lead	mg/kg (ppm)	50	1.04	94	91	75-125	3
Nickel	mg/kg (ppm)	25	4.62	83	82	75-125	1
Silver	mg/kg (ppm)	10	<1	100	99	75-125	1
Zinc	mg/kg (ppm)	50	14.2	87	85	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Antimony	mg/kg (ppm)	20	95	80-120
Arsenic	mg/kg (ppm)	10	87	80-120
Cadmium	mg/kg (ppm)	10	92	80-120
Chromium	mg/kg (ppm)	50	89	80-120
Cobalt	mg/kg (ppm)	20	89	80-120
Copper	mg/kg (ppm)	50	92	80-120
Lead	mg/kg (ppm)	50	91	80-120
Nickel	mg/kg (ppm)	25	91	80-120
Silver	mg/kg (ppm)	10	97	80-120
Zinc	mg/kg (ppm)	50	93	80-120

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR SEMIVOLATILES BY EPA METHOD 8270E

Laboratory Code: 208466-01 1/5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	mg/kg (ppm)	0.83	<0.01	88	86	50-150	2
2-Methylnaphthalene	mg/kg (ppm)	0.83	<0.01	88	88	50-150	0
1-Methylnaphthalene	mg/kg (ppm)	0.83	<0.01	87	89	50-150	2
Acenaphthylene	mg/kg (ppm)	0.83	<0.01	94	93	50-150	1
Acenaphthene	mg/kg (ppm)	0.83	<0.01	88	87	50-150	1
Fluorene	mg/kg (ppm)	0.83	<0.01	92	92	50-150	0
Phenanthrene	mg/kg (ppm)	0.83	<0.01	96	97	10-170	1
Anthracene	mg/kg (ppm)	0.83	<0.01	96	99	50-150	3
Fluoranthene	mg/kg (ppm)	0.83	<0.01	103	101	10-203	2
Pyrene	mg/kg (ppm)	0.83	0.012	104	115	10-208	10
Benz(a)anthracene	mg/kg (ppm)	0.83	<0.01	100	104	37-146	4
Chrysene	mg/kg (ppm)	0.83	0.011	97	102	36-144	5
Benzo(a)pyrene	mg/kg (ppm)	0.83	<0.01	99	101	40-150	2
Benzo(b)fluoranthene	mg/kg (ppm)	0.83	0.011	99	103	45-157	4
Benzo(k)fluoranthene	mg/kg (ppm)	0.83	<0.01	97	94	50-150	3
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.83	<0.01	108	106	24-145	2
Dibenz(a,h)anthracene	mg/kg (ppm)	0.83	<0.01	108	106	31-137	2
Benzo(g,h,i)perylene	mg/kg (ppm)	0.83	<0.01	106	102	14-141	4

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR SEMIVOLATILES BY EPA METHOD 8270E

Laboratory Code: Laboratory Control Sample 1/5

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Naphthalene	mg/kg (ppm)	0.83	95	61-102
2-Methylnaphthalene	mg/kg (ppm)	0.83	98	62-108
1-Methylnaphthalene	mg/kg (ppm)	0.83	98	62-108
Acenaphthylene	mg/kg (ppm)	0.83	101	61-111
Acenaphthene	mg/kg (ppm)	0.83	95	61-110
Fluorene	mg/kg (ppm)	0.83	100	62-114
Phenanthrene	mg/kg (ppm)	0.83	104	64-112
Anthracene	mg/kg (ppm)	0.83	102	63-111
Fluoranthene	mg/kg (ppm)	0.83	108	66-115
Pyrene	mg/kg (ppm)	0.83	117 vo	65-112
Benz(a)anthracene	mg/kg (ppm)	0.83	106	64-116
Chrysene	mg/kg (ppm)	0.83	104	66-119
Benzo(a)pyrene	mg/kg (ppm)	0.83	104	62-116
Benzo(b)fluoranthene	mg/kg (ppm)	0.83	104	61-118
Benzo(k)fluoranthene	mg/kg (ppm)	0.83	99	65-119
Indeno(1,2,3-cd)pyrene	mg/kg (ppm)	0.83	119	64-130
Dibenz(a,h)anthracene	mg/kg (ppm)	0.83	116	67-131
Benzo(g,h,i)perylene	mg/kg (ppm)	0.83	112	67-126

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208488

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR SEMIVOLATILES BY EPA METHOD 8270E

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Naphthalene	ug/L (ppb)	5	75	80	62-97	6
2-Methylnaphthalene	ug/L (ppb)	5	77	80	64-101	4
1-Methylnaphthalene	ug/L (ppb)	5	78	80	64-93	3
Acenaphthylene	ug/L (ppb)	5	84	92	70-130	9
Acenaphthene	ug/L (ppb)	5	79	86	70-130	8
Fluorene	ug/L (ppb)	5	86	91	70-130	6
Phenanthrene	ug/L (ppb)	5	93	97	70-130	4
Anthracene	ug/L (ppb)	5	94	98	70-130	4
Fluoranthene	ug/L (ppb)	5	100	105	70-130	5
Pyrene	ug/L (ppb)	5	106	109	70-130	3
Benz(a)anthracene	ug/L (ppb)	5	98	103	70-130	5
Chrysene	ug/L (ppb)	5	97	102	70-130	5
Benzo(a)pyrene	ug/L (ppb)	5	97	102	70-130	5
Benzo(b)fluoranthene	ug/L (ppb)	5	96	103	70-130	7
Benzo(k)fluoranthene	ug/L (ppb)	5	96	103	70-130	7
Indeno(1,2,3-cd)pyrene	ug/L (ppb)	5	116	117	70-130	1
Dibenz(a,h)anthracene	ug/L (ppb)	5	117	117	70-130	0
Benzo(g,h,i)perylene	ug/L (ppb)	5	118	118	70-130	0

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.

208488   BI4/AI3/E03

SAMPLE CHAIN OF COUSTODY

8/31/22

~~Report To~~ R. Jones / G. Hainsworth

Company CRETE CONSULTING

Address

City, State, ZIP

Phone ______ Email ______

SAMPLERS (signature) Rusty Jones R. Jones	
PROJECT NAME Maralco R.I.	PO #
REMARKS All diesel w/ & w/out SGC	INVOICE TO
Project specific RLs? - Yes / No	

Page # 1 of 2

TURNAROUND TIME
X 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	Fluoride/Chloride	Ammonia	Metals		Notes
DPT-16 6.5-8'	01A-B	8/30/22	0845	SOIL	2	X							X	X	X		* hold per GH
DPT-16 10-11.5'	02		0850		2	X							X	X	X		8/31/22 ME
DPT-16 13.5-15'	03		0855		2												METALS - (Soil)
DPT-16	04A-E		0905	WATER	5	X							X	X	X		Al, Sb, As, Cd
MW-7 5-7'	05A-B		1050	SOIL	2	X							X	X	X		Cr, Co, Cu, Fe
MW-7 7-10'	06		1055		2												Ni, Pb, Ag, Zn
MW-7 13.5-15'	07		1100		2	X							X	X	X		
MW-7 19-20'	08		1105		2												@ 9/1
MW-5R 5.5-7'	09		1205	SOIL	2	X							X	X	X		H2O — Al, As, Cd, Cr, Co
MW-5R 11-12'	10		1210		2	X							X	X	X		Cu, Fe, Ni, Pb, Zn

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	8/31/22	0715
Received by: W. Madden	W. Madden	F+BI	8/31/22	1200
Relinquished by:		Samples received at 6 °C		
Received by:				

SAMPLE CHAIN OF CUSTODY 8/31/22

BI4/AI3/E03

208488

~~Report~~ To R. Jones / G. Hainsworth

Company CRETE Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (*signature*) Rusty Jones R. Jones

PROJECT NAME Mavaleo R.I.

PO #

REMARKS All diesel w/ & w/out SGC

Project specific RLs? - Yes / No

INVOICE TO

Page # 2 of 2

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	Fluoride/Chloride	Ammonia	Metals		Notes
MW-5R 15-16'	11 AB	8/30/22	1215	SOIL	2												
MW-8 4-5'	12		1335		2	X							X	X	X		
MW-8 5-7'	13		1340		2												
MW-8 12-13'	14		1345		2	X							X	X	X		
MW-8 18-19	15		1350		2												
DPT-17 5.5-8'	16		1455	SOIL	2	~~X~~					X		~~X~~	~~X~~	~~X~~		PAHs only
DPT-17 9-10'	17		1500		2												
DPT-17 19-20'	18		1505		2												
DPT-17	19		1545	WATER	~~5~~ 2	~~X~~					X		~~X~~	~~X~~	~~X~~		PAHs only

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	8/31/22	0715
Received by: W. Madden	W. Madden	F+BI	8/31/22	1200
Relinquished by:		Samples received at 0 °C		
Received by:				

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Sep 23 2022
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL

Dear MICHAEL ERDAHL:

Enclosed please find the analytical data for your 208488 project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
DPT-16	Water	22-A014715	MIN, NUT, MET
MW-7 5-7'	Soil	22-A014716	MIN, NUT, MET
MW-7 13.5-15'	Soil	22-A014717	MIN, NUT, MET
MW-5R 5.5-7'	Soil	22-A014718	MIN, NUT, MET
MW-5R 11-12'	Soil	22-A014719	MIN, NUT, MET
MW-8 4-5'	Soil	22-A014720	MIN, NUT, MET
MW-8 12-13	Soil	22-A014721	MIN, NUT, MET

Your samples were received on Thursday, September 1, 2022. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Aaron W Young

Aaron W. Young
Vice President

Project #: 208488

BACT = Bacteriological
CONV = Conventionals
MET = Metals
ORG = Organics
NUT=Nutrients
DEM=Demand
MIN=Minerals

Am Test Inc.
13600 NE 126TH PL
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www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: 208488
Project #: 208488
All results reported on an as received basis.

Date Received: 09/01/22
Date Reported: 9/23/22

AMTEST Identification Number **22-A014715**
Client Identification **DPT-16**
Sampling Date **08/30/22, 09:05**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	139.	mg/l		0.05	EPA 300.0	AY	09/07/22
Fluoride	0.17	mg/l		0.05	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	2120	mg/l		0.02	EPA 350.1		

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	348.	ug/L		5	EPA 200.8	CM	09/20/22

AMTEST Identification Number **22-A014716**
Client Identification **MW-7 5-7'**
Sampling Date **08/30/22, 10:50**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 10	ug/g		10	EPA 300.0	AY	09/06/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	103.	ug/g		5	SM 4500NH3-E	MD	09/02/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	6920	ug/g		0.5	EPA 6010D	CM	09/15/22
Iron	22200	ug/g		0.15	EPA 6010D	CM	09/15/22

AMTEST Identification Number **22-A014717**
Client Identification **MW-7 13.5-15'**
Sampling Date **08/30/22, 11:00**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	950	ug/g		10	EPA 300.0	AY	09/07/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	99.0	ug/g		5	SM 4500NH3-E	MD	09/02/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	8820	ug/g		0.5	EPA 6010D	CM	09/15/22
Iron	27400	ug/g		0.15	EPA 6010D	CM	09/15/22

AMTEST Identification Number **22-A014718**
Client Identification **MW-5R 5.5-7'**
Sampling Date **08/30/22, 12:05**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 10	ug/g		10	EPA 300.0	AY	09/06/22
Fluoride	41.	ug/g		5	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	286.	ug/g		5	SM 4500NH3-E	MD	09/02/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	5000	ug/g		0.5	EPA 6010D	CM	09/15/22
Iron	13700	ug/g		0.15	EPA 6010D	CM	09/15/22

AMTEST Identification Number 22-A014719
Client Identification MW-5R 11-12'
Sampling Date 08/30/22, 12:10

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	22.	ug/g		10	EPA 300.0	AY	09/06/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	285.	ug/g		5	SM 4500NH3-E	MD	09/02/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	7760	ug/g		0.5	EPA 6010D	CM	09/13/22
Iron	7260	ug/g		0.15	EPA 6010D	CM	09/13/22

AMTEST Identification Number **22-A014720**
Client Identification **MW-8 4-5'**
Sampling Date **08/30/22, 13:35**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	80.	ug/g		10	EPA 300.0	AY	09/06/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	189.	ug/g		5	SM 4500NH3-E	MD	09/02/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	5340	ug/g		0.5	EPA 6010D	CM	09/13/22
Iron	7000	ug/g		0.15	EPA 6010D	CM	09/13/22

Friedman & Bruya, Inc.
Project Name: 208488
AmTest ID: 22-A014721

AMTEST Identification Number **22-A014721**
Client Identification **MW-8 12-13**
Sampling Date **08/30/22, 13:45**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	1600	ug/g		10	EPA 300.0	AY	09/07/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	197.	ug/g		5	SM 4500NH3-E	MD	09/02/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	8160	ug/g		0.5	EPA 6010D	CM	09/15/22
Iron	9090	ug/g		0.15	EPA 6010D	CM	09/15/22

Aaron W. Young
Vice President

Am Test Inc.
13600 NE 126th PL
Suite C
Kirkland, WA, 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

QC Summary for sample numbers: 22-A014715 to 22-A014721

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
22-A014722	Chloride	ug/g	150	150	0.00
22-A014902	Chloride	ug/g	< 10	< 10	
22-A014921	Fluoride	mg/l	< 0.05	< 0.05	
22-A014915	Fluoride	mg/l	0.05	0.05	0.00
22-A014722	Fluoride	ug/g	23.	23.	0.00
22-A014749	Ammonia	ug/g	159.	164.	3.1

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
22-A014722	Chloride	ug/g	150	230	80.	100.63 %
22-A014902	Chloride	ug/g	< 10	70.	64.	109.38 %
22-A014921	Fluoride	mg/l	< 0.05	2.04	2.00	102.00 %
22-A014915	Fluoride	mg/l	0.05	2.09	2.00	102.00 %
22-A014722	Fluoride	ug/g	23.	100	80.	96.86 %

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Chloride	mg/l	2.00	2.14	107. %
Chloride	mg/l	2.00	2.00	100. %
Chloride	ug/g	2.0	2.1	105. %
Chloride	ug/g	2.0	1.9	95.0 %
Chloride	ug/g	2.0	2.2	110. %
Fluoride	mg/l	2.00	2.04	102. %
Fluoride	mg/l	2.00	2.10	105. %
Fluoride	ug/g	2.0	2.0	100. %
Ammonia	ug/g	20.0	20.9	104. %
Ammonia	ug/g	20.0	21.3	106. %
Aluminum	ug/g	2.00	2.13	106. %
Aluminum	ug/g	20.0	20.2	101. %
Iron	ug/g	2.00	2.18	109. %
Iron	ug/g	20.0	21.5	108. %
Aluminum	ug/L	25.0	25.3	101. %

BLANKS

ANALYTE	UNITS	RESULT
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Chloride	ug/g	< 10

QC Summary for sample numbers: 22-A014715 to 22-A014721...

BLANKS continued....

ANALYTE	UNITS	RESULT
Chloride	ug/g	< 10
Chloride	ug/g	< 10
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	ug/g	< 5
Ammonia	ug/g	< 5
Ammonia	ug/g	< 5
Aluminum	ug/g	< 0.5
Aluminum	ug/g	< 0.5
Iron	ug/g	< 0.15
Iron	ug/g	< 0.15
Aluminum	ug/L	< 5

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To: Michael Erdahl
Company: Friedman and Bruya, Inc.
Address: 3012 16th Ave W
City, State, ZIP: Seattle, WA 98119
Phone #: (206) 285-8282 Fax #: (206) 283-5044

SUBCONTRACTOR: Amtest
PROJECT NAME/NO.: 208488
PO #: C-343
REMARKS

Page # 1 of 1

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

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Containers	Metals: Al	Fluoride/Chloride	Ammonia							
①~~DPT-16 6.5-8'~~		8/30/22	0845	Soil	1	X	X	X							
~~DPT-16 10-11.5'~~			0850	Soil		X	X	X							
DPT-16 14715			0905	W	AWB 9/1 2	X	X	X							
MW-7 5-7' 14716			1050	Soil		X	X	X							
MW-7 13.5-15' 14717			1100	Soil		X	X	X							
MW-5R 5.5-7' 14718			1205	Soil		X	X	X							
MW-5R 11-12' 14719			1210	Soil		X	X	X							
MW-8 4-5' 14720			1335	Soil		X	X	X							
MW-8 12-13' 14721			1345	Soil		X	X	X							

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: [signature]	Ann Webber-Bruya	Friedman & Bruya	9/1/22	1000
Received by: [signature]	SF	AmTest	9/1/22	1425
Relinquished by:				
Received by:				

FORMS\COC\Subcontract.DOC

① contacted client, did not receive samples in this set.
KD 9/1/22

5.3°C Fedex

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Oct 27 2022
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL

Dear MICHAEL ERDAHL:

Enclosed please find the analytical data for your 208488 project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
DPT-16	Water	22-A014715	MIN, NUT, MET, Dissolved MET

Your sample was received on Thursday, September 1, 2022. At the time of receipt, the sample was logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Aaron W Young

Aaron W. Young
Vice President

Project #: 208488

BACT = Bacteriological	MET = Metals	NUT=Nutrients	MIN=Minerals
CONV = Conventionals	ORG = Organics	DEM=Demand	

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

AMTEST LABORATORIES

Professional Analytical Services

ANALYSIS REPORT

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: 208488
Project #: 208488
All results reported on an as received basis.

Date Received: 09/01/22
Date Reported: 10/27/22

AMTEST Identification Number **22-A014715**
Client Identification **DPT-16**
Sampling Date **08/30/22, 09:05**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	139.	mg/l		0.05	EPA 300.0	AY	09/07/22
Fluoride	0.17	mg/l		0.05	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	2120	mg/l		0.02	EPA 350.1		

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	348.	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	2.37	ug/L		1	EPA 200.8	AY	10/07/22

Aaron W. Young
Aaron W. Young
Vice President

Am Test Inc.
13600 NE 126th PL
Suite C
Kirkland, WA, 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

QC Summary for sample number: 22-A014715

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
22-A014921	Fluoride	mg/l	< 0.05	< 0.05	
22-A014915	Fluoride	mg/l	0.05	0.05	0.00

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
22-A014921	Fluoride	mg/l	< 0.05	2.04	2.00	102.00 %
22-A014915	Fluoride	mg/l	0.05	2.09	2.00	102.00 %
22-A014909	Dissolved Aluminum	ug/L	1.67	103.	100.	101.33 %
22-A014909	Dissolved Aluminum	ug/L	1.67	107.	100.	105.33 %
22-A014915	Dissolved Aluminum	ug/L	< 1	102.	100.	102.00 %
22-A014915	Dissolved Aluminum	ug/L	< 1	99.8	100.	99.80 %

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Dissolved Aluminum	ug/L	103.	107.	3.8
Spike	Dissolved Aluminum	ug/L	102.	99.8	2.2

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Chloride	mg/l	2.00	2.14	107. %
Chloride	mg/l	2.00	2.00	100. %
Fluoride	mg/l	2.00	2.04	102. %
Fluoride	mg/l	2.00	2.10	105. %
Aluminum	ug/L	25.0	25.3	101. %
Dissolved Aluminum	ug/L	25.0	25.9	104. %
Dissolved Aluminum	ug/L	25.0	23.7	94.8 %

BLANKS

ANALYTE	UNITS	RESULT
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Aluminum	ug/L	< 5
Dissolved Aluminum	ug/L	< 1
Dissolved Aluminum	ug/L	< 1

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

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

SUBCONTRACTOR Amtest	
PROJECT NAME/NO. 208488	PO # C-343
REMARKS	

Page # 1 of 1

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

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

P.4

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Containers	Metals: Al	Fluoride/Chloride	Ammonia							
1 ~~DPT-16 6.5-8'~~		8/30/22	0845	Soil	1	X	X	X							
~~DPT-16 10-11.5'~~			0850	Soil		X	X	X							
DPT-16 14715			0905	W	AWB 9/1 2	X	X	X							
MW-7 5-7' 14716			1050	Soil		X	X	X							
MW-7 13.5-15' 14717			1100	Soil		X	X	X							
MW-5R 5.5-7' 14718			1205	Soil		X	X	X							
MW-5R 11-12' 14719			1210	Soil		X	X	X							
MW-8 4-5' 14720			1335	Soil		X	X	X							
MW-8 12-13' 14721			1345	Soil		X	X	X							

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:	Ann Webber-Bruya	Friedman & Bruya	9/1/22	1000
Received by:	SF	AmTest	9/1/22	1425
Relinquished by:				
Received by:				

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1 contacted client, did not receive samples in this set.
KD 9/1/22

5.3°C Fedex

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Oct 13 2022
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL

Dear MICHAEL ERDAHL:

Enclosed please find the analytical data for your 208488 project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
DPT-16 6.5-8'	Soil	22-A014916	MIN, NUT, MET
DPT-16 10-11.5	Soil	22-A014917	MIN, NUT, MET

Your samples were received on Friday, September 2, 2022. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Aaron W Young

Aaron W. Young
Vice President

Project #: 208488
PO Number: C-343

BACT = Bacteriological	MET = Metals	NUT=Nutrients	MIN=Minerals
CONV = Conventionals	ORG = Organics	DEM=Demand	

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: 208488
Project #: 208488
PO Number: C-343
All results reported on an as received basis.

Date Received: 09/02/22
Date Reported: 10/13/22

AMTEST Identification Number **22-A014916**
Client Identification **DPT-16 6.5-8'**
Sampling Date **08/30/22, 08:45**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	12.	ug/g		10	EPA 300.0	AY	09/12/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/12/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	156.	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	3380	ug/g		0.5	EPA 6010D	CM	09/28/22
Iron	841.	ug/g		0.15	EPA 6010D	CM	09/28/22

Friedman & Bruya, Inc.
Project Name: 208488
AmTest ID: 22-A014917

AMTEST Identification Number **22-A014917**
Client Identification **DPT-16 10-11.5**
Sampling Date **08/30/22, 08:50**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 10	ug/g		10	EPA 300.0	AY	09/12/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/12/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	74.6	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	5260	ug/g		0.5	EPA 6010D	CM	09/28/22
Iron	9480	ug/g		0.15	EPA 6010D	CM	09/28/22

Aaron W. Young
Aaron W. Young
Vice President

Am Test Inc.
13600 NE 126th PL
Suite C
Kirkland, WA, 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

QC Summary for sample numbers: 22-A014916 to 22-A014917

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
22-A014917	Chloride	ug/g	< 10	10.	
22-A014919	Chloride	ug/g	< 10	< 10	
22-A014917	Fluoride	ug/g	< 5	< 5	
22-A014919	Fluoride	ug/g	< 5	< 5	
22-A014910	Ammonia	ug/g	129.	131.	1.5
22-A014957	Ammonia	ug/g	242.	261.	7.6

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
22-A014917	Chloride	ug/g	< 10	69.	63.	109.52 %
22-A014919	Chloride	ug/g	< 10	61.	60.	101.67 %
22-A014917	Fluoride	ug/g	< 5	67.	63.	106.35 %
22-A014919	Fluoride	ug/g	< 5	62.	60.	103.33 %

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Chloride	ug/g	2.0	1.9	95.0 %
Fluoride	ug/g	2.0	2.1	105. %
Ammonia	ug/g	20.0	20.2	101. %
Aluminum	ug/g	2.00	2.00	100. %
Aluminum	ug/g	2.00	2.13	106. %
Iron	ug/g	2.00	1.96	98.0 %
Iron	ug/g	2.00	2.20	110. %

BLANKS

ANALYTE	UNITS	RESULT
Chloride	ug/g	< 10
Fluoride	ug/g	< 5
Ammonia	ug/g	< 5
Aluminum	ug/g	< 0.5
Aluminum	ug/g	< 0.5
Iron	ug/g	< 0.15
Iron	ug/g	< 0.15

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

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

SUBCONTRACTOR AmTest	
PROJECT NAME/NO. 208488	PO # ~~C3-43~~ C-343
REMARKS	

Page # 1 of 1

TURNAROUND TIME
- ☑ Standard (1 Week)
- ☐ RUSH
- Rush charges authorized by:

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Containers	Fluoride/Chloride	Ammonia	Metals: Al							
DPT-16 6-6.8'	14916	8/30/22	0845	S	1	X	X	X							
DPT-16 10-11.5'	14917	↓	0850	S	1	X	X	X							

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: [signature]	Ann Webber-Bruya	Friedman & Bruya	9/1/22	1400
Received by:				
Relinquished by:				
Received by:				

FORMS\COC\Subcontract.DOC

FedEx KH 9/2/22 1511 0.1°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.

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

October 10, 2022

Rusty Jones, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Jones:

Included are the results from the testing of material submitted on August 31, 2022 from the Maralco R.I., F&BI 208489 project. There are 51 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Grant Hainsworth
CTC1010R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on August 31, 2022 by Friedman & Bruya, Inc. from the Crete Consulting Maralco R.I., F&BI 208489 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
208489 -01	SB-UST-01 5-6'
208489 -02	SB-UST-01 7-8'
208489 -03	SB-UST-01 13-14'
208489 -04	SB-UST-01 19-20'
208489 -05	SB-UST-01
208489 -06	SB-UST-02 5-6'
208489 -07	SB-UST-02 15-16'
208489 -08	SB-UST-02 19-20'
208489 -09	SB-UST-02
208489 -10	SB-UST-03 1-2'
208489 -11	SB-UST-03 7-8'
208489 -12	SB-UST-03 11-12'
208489 -13	SB-UST-03
208489 -14	DPT-14 5-7.5'
208489 -15	DPT-14 10-11.5'
208489 -16	DPT-14
208489 -17	DPT-15 5-6.5'
208489 -18	DPT-15 8.5-10'
208489 -19	DPT-15

The soil samples marked for analysis were sent to Amtest for fluoride, chloride, ammonia, aluminum and iron analyses. The water samples marked for analysis were sent to Amtest for fluoride, chloride, ammonia, and aluminum analyses. The report will be forwarded upon receipt.

Zinc in the 6020B matrix spike and matrix spike duplicate failed the acceptance criteria. The laboratory control sample passed the acceptance criteria, therefore the results were due to matrix effect.

All other quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208489
Date Extracted: 09/06/22
Date Analyzed: 09/07/22

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 56-165)
SB-UST-01 5-6’ 208489-01	<50	<250	105
SB-UST-02 5-6’ 208489-06	<50	<250	107
SB-UST-02 15-16’ 208489-07	<50	<250	110
SB-UST-03 1-2’ 208489-10	<50	<250	106
Method Blank 02-2119 MB	<50	<250	104

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208489
Date Extracted: 09/06/22
Date Analyzed: 09/06/22

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx
Sample Extracts Passed Through a Silica Gel Column Prior to Analysis
Results Reported on a Dry Weight Basis
Results Reported as mg/kg (ppm)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 48-168)
SB-UST-01 5-6' 208489-01	<50	<250	125
SB-UST-02 5-6' 208489-06	<50	<250	137
SB-UST-02 15-16' 208489-07	<50	<250	121
SB-UST-03 1-2' 208489-10	<50	<250	117
Method Blank 02-2119 MB	<50	<250	132

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208489
Date Extracted: 09/02/22
Date Analyzed: 09/02/22

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
SB-UST-01 208489-05	91 x	<250	106
SB-UST-02 208489-09	880 x	<250	135
SB-UST-03 208489-13	290 x	<250	110
Method Blank 02-2111 MB	<50	<250	141

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208489
Date Extracted: 09/02/22
Date Analyzed: 09/06/22

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx
Sample Extracts Passed Through a Silica Gel Column Prior to Analysis
Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
SB-UST-01 208489-05	<50	<250	98
SB-UST-02 208489-09	<50	<250	117
SB-UST-03 208489-13	<50	<250	100
Method Blank 02-2111 MB	<50	<250	128

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	SB-UST-01	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/26/22	Lab ID:	208489-05
Date Analyzed:	09/26/22	Data File:	208489-05.192
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Chromium	4.72
Cobalt	<1
Copper	<5
Lead	<1
Nickel	1.62
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	SB-UST-01	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/26/22	Lab ID:	208489-05 x5
Date Analyzed:	09/27/22	Data File:	208489-05 x5.183
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	SB-UST-01	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/26/22	Lab ID:	208489-05 x50
Date Analyzed:	10/04/22	Data File:	208489-05 x50.065
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	8,760

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	SB-UST-02	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/26/22	Lab ID:	208489-09
Date Analyzed:	09/26/22	Data File:	208489-09.193
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Chromium	1.32
Cobalt	<1
Copper	<5
Lead	<1
Nickel	<1
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	SB-UST-02	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/26/22	Lab ID:	208489-09 x5
Date Analyzed:	09/27/22	Data File:	208489-09 x5.184
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	32.2

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	SB-UST-02	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/26/22	Lab ID:	208489-09 x100
Date Analyzed:	10/04/22	Data File:	208489-09 x100.066
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	30,000

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	SB-UST-03	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/26/22	Lab ID:	208489-13
Date Analyzed:	09/26/22	Data File:	208489-13.194
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Chromium	1.51
Cobalt	<1
Copper	<5
Lead	<1
Nickel	1.20
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	SB-UST-03	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/26/22	Lab ID:	208489-13 x5
Date Analyzed:	09/27/22	Data File:	208489-13 x5.185
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	19.7

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	SB-UST-03	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/27/22	Lab ID:	208489-13 x100
Date Analyzed:	09/27/22	Data File:	208489-13 x100.172
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	57,900

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-14	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/26/22	Lab ID:	208489-16
Date Analyzed:	09/26/22	Data File:	208489-16.195
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Nickel	1.30
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-14	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/26/22	Lab ID:	208489-16 x5
Date Analyzed:	09/27/22	Data File:	208489-16 x5.186
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	7.90

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-14	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/27/22	Lab ID:	208489-16 x100
Date Analyzed:	09/27/22	Data File:	208489-16 x100.173
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	32,500

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-15	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/26/22	Lab ID:	208489-19
Date Analyzed:	09/26/22	Data File:	208489-19.196
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Nickel	<1
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-15	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/26/22	Lab ID:	208489-19 x5
Date Analyzed:	09/27/22	Data File:	208489-19 x5.187
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	18.0

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-15	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/27/22	Lab ID:	208489-19 x100
Date Analyzed:	09/27/22	Data File:	208489-19 x100.174
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	50,400

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	NA	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/26/22	Lab ID:	I2-683 mb
Date Analyzed:	09/26/22	Data File:	I2-683 mb.070
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Iron	<50
Lead	<1
Nickel	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	SB-UST-01	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/06/22	Lab ID:	208489-05
Date Analyzed:	09/06/22	Data File:	208489-05.138
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	3.12
Cadmium	<1
Chromium	6.73
Cobalt	1.51
Copper	13.0
Lead	1.94
Nickel	3.59
Zinc	6.65

Analysis For Total Metals By EPA Method 6020B

Client ID:	SB-UST-01	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/06/22	Lab ID:	208489-05 x100
Date Analyzed:	09/08/22	Data File:	208489-05 x100.267
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	13,500

Analysis For Total Metals By EPA Method 6020B

Client ID:	SB-UST-02	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/06/22	Lab ID:	208489-09
Date Analyzed:	09/06/22	Data File:	208489-09.139
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	35.3
Cadmium	<1
Chromium	7.97
Cobalt	4.38
Copper	21.1
Lead	3.09
Nickel	7.26
Zinc	18.3

Analysis For Total Metals By EPA Method 6020B

Client ID:	SB-UST-02	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/06/22	Lab ID:	208489-09 x100
Date Analyzed:	09/08/22	Data File:	208489-09 x100.268
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	45,500

Analysis For Total Metals By EPA Method 6020B

Client ID:	SB-UST-03	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/06/22	Lab ID:	208489-13
Date Analyzed:	09/06/22	Data File:	208489-13.140
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	3.53
Cobalt	1.71
Copper	11.2
Lead	1.62
Nickel	2.79
Zinc	6.30

Analysis For Total Metals By EPA Method 6020B

Client ID:	SB-UST-03	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/06/22	Lab ID:	208489-13 x10
Date Analyzed:	09/08/22	Data File:	208489-13 x10.272
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	20.3
Cadmium	<10

Analysis For Total Metals By EPA Method 6020B

Client ID:	SB-UST-03	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/06/22	Lab ID:	208489-13 x200
Date Analyzed:	09/08/22	Data File:	208489-13 x200.052
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	64,900

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-14	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/06/22	Lab ID:	208489-16
Date Analyzed:	09/06/22	Data File:	208489-16.141
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	8.31
Cadmium	<1
Chromium	1.19
Cobalt	<1
Copper	<5
Lead	<1
Nickel	1.52
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-14	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/06/22	Lab ID:	208489-16 x100
Date Analyzed:	09/08/22	Data File:	208489-16 x100.270
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	33,900

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-15	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/06/22	Lab ID:	208489-19
Date Analyzed:	09/06/22	Data File:	208489-19.142
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	7.44
Cobalt	5.78
Copper	22.4
Lead	3.47
Nickel	7.10
Zinc	20.4

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-15	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/06/22	Lab ID:	208489-19 x10
Date Analyzed:	09/08/22	Data File:	208489-19 x10.273
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	22.1
Cadmium	<10

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-15	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/06/22	Lab ID:	208489-19 x200
Date Analyzed:	09/08/22	Data File:	208489-19 x200.053
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	84,700

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	NA	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/06/22	Lab ID:	I2-613 mb
Date Analyzed:	09/07/22	Data File:	I2-613 mb.043
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Iron	<50
Lead	<1
Nickel	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	SB-UST-01 5-6’	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/02/22	Lab ID:	208489-01
Date Analyzed:	09/02/22	Data File:	208489-01.148
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	2.05
Cadmium	<1
Chromium	9.82
Cobalt	2.99
Copper	12.0
Lead	1.80
Nickel	6.18
Silver	<1
Zinc	17.2

Analysis For Total Metals By EPA Method 6020B

Client ID:	SB-UST-02 5-6’	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/02/22	Lab ID:	208489-06
Date Analyzed:	09/02/22	Data File:	208489-06.149
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	2.18
Cadmium	<1
Chromium	10.7
Cobalt	4.29
Copper	13.6
Lead	2.16
Nickel	7.98
Silver	<1
Zinc	20.8

Analysis For Total Metals By EPA Method 6020B

Client ID:	SB-UST-02 15-16’	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/02/22	Lab ID:	208489-07
Date Analyzed:	09/02/22	Data File:	208489-07.150
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	2.83
Cadmium	<1
Chromium	9.27
Cobalt	4.51
Copper	19.7
Lead	2.66
Nickel	8.48
Silver	<1
Zinc	25.7

Analysis For Total Metals By EPA Method 6020B

Client ID:	SB-UST-03 1-2'	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/02/22	Lab ID:	208489-10
Date Analyzed:	09/02/22	Data File:	208489-10.151
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	7.81
Cadmium	<1
Chromium	8.57
Cobalt	4.35
Copper	16.7
Lead	13.5
Nickel	10.1
Silver	<1
Zinc	28.2

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-14 5-7.5’	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/02/22	Lab ID:	208489-14
Date Analyzed:	09/02/22	Data File:	208489-14.152
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	2.63
Cadmium	<1
Chromium	6.57
Cobalt	2.25
Copper	7.43
Lead	1.99
Nickel	5.05
Silver	<1
Zinc	16.9

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-14 10-11.5'	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/02/22	Lab ID:	208489-15
Date Analyzed:	09/02/22	Data File:	208489-15.153
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	<1
Cadmium	<1
Chromium	5.99
Cobalt	2.18
Copper	7.27
Lead	1.10
Nickel	4.36
Silver	<1
Zinc	15.6

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-15 5-6.5'	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/02/22	Lab ID:	208489-17
Date Analyzed:	09/02/22	Data File:	208489-17.154
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	2.05
Cadmium	<1
Chromium	9.15
Cobalt	2.63
Copper	10.1
Lead	1.17
Nickel	5.25
Silver	<1
Zinc	16.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-15 8.5-10’	Client:	Crete Consulting
Date Received:	08/31/22	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/02/22	Lab ID:	208489-18
Date Analyzed:	09/02/22	Data File:	208489-18.155
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	5.09
Cadmium	<1
Chromium	6.52
Cobalt	7.14
Copper	15.2
Lead	2.14
Nickel	8.96
Silver	<1
Zinc	22.6

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	NA	Project:	Maralco R.I., F&BI 208489
Date Extracted:	09/02/22	Lab ID:	I2-609 mb
Date Analyzed:	09/02/22	Data File:	I2-609 mb.081
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Nickel	<1
Silver	<1
Zinc	<5

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208489

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: 208488-05 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	82	80	63-146	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	80	79-144

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208489

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: 208488-05 (Matrix Spike) Silica Gel

Analyte	Reporting Units	Spike Level	Sample Result (Wet Wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	mg/kg (ppm)	5,000	<50	112	106	73-135	6

Laboratory Code: Laboratory Control Sample Silica Gel

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Diesel Extended	mg/kg (ppm)	5,000	130	74-139

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208489

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	83	84	63-142	1

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208489

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	74	84	63-142	13

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208489

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

Laboratory Code: 209383-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	2.73	85	84	75-125	1
Cadmium	ug/L (ppb)	5	<1	99	97	75-125	2
Chromium	ug/L (ppb)	20	<1	78	78	75-125	0
Cobalt	ug/L (ppb)	20	<1	78	77	75-125	1
Copper	ug/L (ppb)	20	<5	76	75	75-125	1
Lead	ug/L (ppb)	10	<1	79	78	75-125	1
Nickel	ug/L (ppb)	20	2.94	78	77	75-125	1
Zinc	ug/L (ppb)	50	<5	74 vo	74 vo	75-125	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	99	80-120
Cadmium	ug/L (ppb)	5	95	80-120
Chromium	ug/L (ppb)	20	96	80-120
Cobalt	ug/L (ppb)	20	97	80-120
Copper	ug/L (ppb)	20	99	80-120
Lead	ug/L (ppb)	10	93	80-120
Nickel	ug/L (ppb)	20	97	80-120
Zinc	ug/L (ppb)	50	98	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208489

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

Laboratory Code: 208508-05 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	2.45	84	87	75-125	4
Cadmium	ug/L (ppb)	5	<1	100	103	75-125	3
Chromium	ug/L (ppb)	20	<1	97	97	75-125	0
Cobalt	ug/L (ppb)	20	<1	95	96	75-125	1
Copper	ug/L (ppb)	20	<5	93	94	75-125	1
Iron	ug/L (ppb)	100	486	102	132 b	75-125	26 b
Lead	ug/L (ppb)	10	<1	91	93	75-125	2
Nickel	ug/L (ppb)	20	<1	95	97	75-125	2
Zinc	ug/L (ppb)	50	<5	94	96	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	88	80-120
Cadmium	ug/L (ppb)	5	90	80-120
Chromium	ug/L (ppb)	20	91	80-120
Cobalt	ug/L (ppb)	20	91	80-120
Copper	ug/L (ppb)	20	92	80-120
Iron	ug/L (ppb)	100	97	80-120
Lead	ug/L (ppb)	10	95	80-120
Nickel	ug/L (ppb)	20	94	80-120
Zinc	ug/L (ppb)	50	93	80-120

Date of Report: 10/10/22
Date Received: 08/31/22
Project: Maralco R.I., F&BI 208489

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

Laboratory Code: 208488-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Antimony	mg/kg (ppm)	20	<1	95	94	75-125	1
Arsenic	mg/kg (ppm)	10	1.10	92	91	75-125	1
Cadmium	mg/kg (ppm)	10	<1	95	93	75-125	2
Chromium	mg/kg (ppm)	50	7.87	81	81	75-125	0
Cobalt	mg/kg (ppm)	20	2.53	85	83	75-125	2
Copper	mg/kg (ppm)	50	6.58	84	83	75-125	1
Lead	mg/kg (ppm)	50	1.04	94	91	75-125	3
Nickel	mg/kg (ppm)	25	4.62	83	82	75-125	1
Silver	mg/kg (ppm)	10	<1	100	99	75-125	1
Zinc	mg/kg (ppm)	50	14.2	87	85	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Antimony	mg/kg (ppm)	20	95	80-120
Arsenic	mg/kg (ppm)	10	87	80-120
Cadmium	mg/kg (ppm)	10	92	80-120
Chromium	mg/kg (ppm)	50	89	80-120
Cobalt	mg/kg (ppm)	20	89	80-120
Copper	mg/kg (ppm)	50	92	80-120
Lead	mg/kg (ppm)	50	91	80-120
Nickel	mg/kg (ppm)	25	91	80-120
Silver	mg/kg (ppm)	10	97	80-120
Zinc	mg/kg (ppm)	50	93	80-120

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.

SAMPLE CHAIN OF CUSTODY

208489 ~~Report~~ To R. Jones / G. Hainsworth

Company CRETE CONSULTING

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R Jones

8/31/22

AI4/BI41, E03

Page # 1 of 2

PROJECT NAME: Maralco R.I.

PO #

REMARKS: All diesel w/ & w/out SGC

INVOICE TO

Project specific RLs? - Yes / No

TURNAROUND TIME
- X 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	Fluoride/Chloride	Ammonia	Metals		Notes
SB-UST-01 5-6'	01 A-B	8/29/22	0910	SOIL	2	X									X		METALS - (Soil)
SB-UST-01 7-8'	02		0915		2												Al, Sb, As, Cd
SB-UST-01 13-14'	03		0920		2												Cr, Co, Cu, Fe
SB-UST-01 19-20'	04		0925	↓	2												Ni, Pb, Ag, Zn
SB-UST-01	05 A-E		0935	WATER	5	X							X	X	X		of 89/01
SB-UST-02 5-6'	06 A-B		1035	SOIL	2	X									X		
SB-UST-02 15-16'	07		1040		2	X									X		H2O -
SB-UST-02 19-20'	08		1045	↓	2												Al, As, Cd, Cr, Co
SB-UST-02	09 A-E		1055	WATER	5	X							X	X	X		Cu, Fe, Ni, Pb, Zn
SB-UST-03 1-2'	10	↓	1200	SOIL	2	X									X		

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

SIGNATURE		PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	CRETE Consult.	8/31/22	0715
Received by:	W. Madden	W. Madden	F+BI	8/31/22	1200
Relinquished by:					
Received by:			Samples received at 0 °C		

SAMPLE CHAIN OF CUSTODY

8/31/22 AI4/BI4/E03

208489

~~Report To~~ R. Jones / G. Hainsworth

Company CRETE CONSULTING

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME Maralco R.I.

PO #

REMARKS All diesel w/ & w/out SGC

Project specific RLs? - Yes / No

INVOICE TO

Page # 2 of 2

TURNAROUND TIME

X 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	Fluoride/Chloride	Ammonia	Metals		Notes
SB-UST-03 7-8'	11 A-B	8/29/22	1205	SOIL	2												
SB-UST-03 11-12'	12		1210	↓	2												
SB-UST-03	13 A-E		1232	WATER	5	X							X	X	X		
DPT-14 5-7.5'	14 A-B		1400	SOIL	2	~~X~~							X	X	X		* hold per GH
DPT-14 10-11.5'	15		1405	↓	2	~~X~~							X	X	X		8/31/22 ME
DPT-14	16 A-E		1425	WATER	5	~~X~~							X	X	X		
DPT-15 5-6.5'	17 A-B		1515	SOIL	2	~~X~~							X	X	X		
DPT-15 8.5-10'	18		1520	SOIL	2	~~X~~							X	X	X		
DPT-15	19 A-E	↓	1538	WATER	5	~~X~~							X	X	X		

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	8/31/22	0715
Received by: W. Madden	W. Madden	F+BI	8/31/22	1200
Relinquished by:				
Received by:		Samples received at 0 °C		

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Oct 13 2022
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL

Dear MICHAEL ERDAHL:

Enclosed please find the analytical data for your 208489 project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
SB-UST-01 5-6'	Soil	22-A014722	MET
SB-UST-01	Water	22-A014723	MIN, NUT, MET, Dissolved MET
SB-UST-02 5-6'	Soil	22-A014724	MET
SB-UST-02 15-16'	Soil	22-A014725	MET
SB-UST-02	Water	22-A014726	MIN, NUT, MET, Dissolved MET
SB-UST-03 1-2'	Soil	22-A014727	MET
SB-UST-03	Water	22-A014728	MIN, NUT, MET, Dissolved MET
DPT-14	Water	22-A014729	MIN, NUT, MET, Dissolved MET
DPT-16 6.5-8'	Soil	22-A014730	MIN, NUT, MET
DPT-16 10-11.5'	Soil	22-A014731	MIN, NUT, MET
DPT-15	Water	22-A014732	MIN, NUT, MET, Dissolved MET

Your samples were received on Thursday, September 1, 2022. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Aaron W. Young
Vice President

PO Number: C-343

BACT = Bacteriological
CONV = Conventionals
MET = Metals
ORG = Organics
NUT=Nutrients
DEM=Demand
MIN=Minerals

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: 208489
PO Number: C-343
All results reported on an as received basis.

Date Received: 09/01/22
Date Reported: 10/13/22

AMTEST Identification Number **22-A014722**
Client Identification **SB-UST-01 5-6'**
Sampling Date **08/29/22, 09:10**

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	6720	ug/g		0.5	EPA 6010D	CM	09/15/22
Iron	8660	ug/g		0.15	EPA 6010D	CM	09/15/22

AMTEST Identification Number **22-A014723**
Client Identification **SB-UST-01**
Sampling Date **08/29/22, 09:35**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	265.	mg/l		0.05	EPA 300.0	AY	09/08/22
Fluoride	16.3	mg/l		0.05	EPA 300.0	AY	09/08/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.304	mg/l		0.02	EPA 350.1	MD	09/09/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	9350	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	606.	ug/L		1	EPA 200.8	AY	10/07/22

AMTEST Identification Number **22-A014724**
Client Identification **SB-UST-02 5-6'**
Sampling Date **08/29/22, 10:35**

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	7250	ug/g		0.5	EPA 6010D	CM	09/15/22
Iron	9870	ug/g		0.15	EPA 6010D	CM	09/15/22

AMTEST Identification Number **22-A014725**
Client Identification **SB-UST-02 15-16'**
Sampling Date **08/29/22, 10:40**

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	6690	ug/g		0.5	EPA 6010D	CM	09/15/22
Iron	8940	ug/g		0.15	EPA 6010D	CM	09/15/22

AMTEST Identification Number **22-A014726**
Client Identification **SB-UST-02**
Sampling Date **08/29/22, 10:55**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	271.	mg/l		0.05	EPA 300.0	AY	09/08/22
Fluoride	0.78	mg/l		0.05	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	5.21	mg/l		0.02	EPA 350.1	MD	09/09/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	3120	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	15.5	ug/L		1	EPA 200.8	AY	10/07/22

AMTEST Identification Number 22-A014727
Client Identification SB-UST-03 1-2'
Sampling Date 08/29/22, 12:00

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	5370	ug/g		0.5	EPA 6010D	CM	09/15/22
Iron	7800	ug/g		0.15	EPA 6010D	CM	09/15/22

AMTEST Identification Number 22-A014728
Client Identification SB-UST-03
Sampling Date 08/29/22, 12:32

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	693.	mg/l		0.05	EPA 300.0	AY	09/08/22
Fluoride	0.27	mg/l		0.05	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	5.40	mg/l		0.02	EPA 350.1	MD	09/09/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	1100	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	7.64	ug/L		1	EPA 200.8	AY	10/07/22

AMTEST Identification Number 22-A014729
Client Identification DPT-14
Sampling Date 08/29/22, 14:25

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	20.1	mg/l		0.05	EPA 300.0	AY	09/08/22
Fluoride	1.36	mg/l		0.05	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	2.72	mg/l		0.02	EPA 350.1	MD	09/09/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	< 1	ug/L		1	EPA 200.8	AY	10/07/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	< 0.3	mg/l		0.3	EPA 200.7	CM	09/23/22

AMTEST Identification Number **22-A014730**
Client Identification **DPT-16 6.5-8'**
Sampling Date **08/30/22, 08:45**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	92.	ug/g		10	EPA 300.0	AY	09/07/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	244.	ug/g		5	SM 4500NH3-E	MD	09/02/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	2540	ug/g		0.5	EPA 6010D	CM	09/13/22
Iron	9220	ug/g		0.15	EPA 6010D	CM	09/15/22

AMTEST Identification Number **22-A014731**
Client Identification **DPT-16 10-11.5'**
Sampling Date **08/30/22, 08:50**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	48.	ug/g		10	EPA 300.0	AY	09/07/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	748.	ug/g		5	SM 4500NH3-E	MD	09/02/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	2730	ug/g		0.5	EPA 6010D	CM	09/13/22
Iron	6120	ug/g		0.15	EPA 6010D	CM	09/15/22

Friedman & Bruya, Inc.
Project Name: 208489
AmTest ID: 22-A014732

AMTEST Identification Number **22-A014732**
Client Identification **DPT-15**
Sampling Date **08/29/22, 15:38**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	183.	mg/l		0.05	EPA 300.0	AY	09/08/22
Fluoride	0.14	mg/l		0.05	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	3.31	mg/l		0.02	EPA 350.1	MD	09/09/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	1660	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	1.10	ug/L		1	EPA 200.8	AY	10/07/22

Aaron W. Young

Aaron W. Young
Vice President

Am Test Inc.
13600 NE 126th PL
Suite C
Kirkland, WA, 98034
(425) 885-1664
www.amtestlab.com

AMTEST LABORATORIES

Professional Analytical Services

QC Summary for sample numbers: 22-A014722 to 22-A014732

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
22-A015091	Chloride	mg/l	6.70	6.77	1.0
22-A014902	Chloride	ug/g	< 10	< 10	
22-A014732	Fluoride	mg/l	0.14	0.15	6.9
22-A015091	Fluoride	mg/l	< 0.05	< 0.05	
22-A014902	Fluoride	ug/g	< 5	< 5	
22-A014543	Ammonia Nitrogen	mg/l	0.022	0.023	4.4
22-A014553	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
22-A014663	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
22-A014681	Ammonia Nitrogen	mg/l	19.9	20.8	4.4
22-A014867	Ammonia Nitrogen	mg/l	0.025	0.026	3.9
22-A014749	Ammonia	ug/g	159.	164.	3.1

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
22-A015091	Chloride	mg/l	6.70	8.47	2.00	88.50 %
22-A014902	Chloride	ug/g	< 10	70.	64.	109.38 %
22-A014732	Fluoride	mg/l	0.14	2.22	2.00	104.00 %
22-A015091	Fluoride	mg/l	< 0.05	1.98	2.00	99.00 %
22-A014902	Fluoride	ug/g	< 5	65.	64.	101.56 %
22-A014543	Ammonia Nitrogen	mg/l	0.022	1.01	1.00	98.80 %
22-A014553	Ammonia Nitrogen	mg/l	< 0.02	1.06	1.00	106.00 %
22-A014663	Ammonia Nitrogen	mg/l	< 0.02	1.05	1.00	105.00 %
22-A014681	Ammonia Nitrogen	mg/l	19.9	40.1	20.0	101.00 %
22-A014867	Ammonia Nitrogen	mg/l	0.025	1.06	1.00	103.50 %
22-A014909	Dissolved Aluminum	ug/L	1.67	103.	100.	101.33 %
22-A014909	Dissolved Aluminum	ug/L	1.67	107.	100.	105.33 %
22-A014915	Dissolved Aluminum	ug/L	< 1	102.	100.	102.00 %
22-A014915	Dissolved Aluminum	ug/L	< 1	99.8	100.	99.80 %

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Dissolved Aluminum	ug/L	103.	107.	3.8
Spike	Dissolved Aluminum	ug/L	102.	99.8	2.2

QC Summary for sample numbers: 22-A014722 to 22-A014732...

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Chloride	mg/l	2.00	2.17	108. %
Chloride	mg/l	2.00	2.13	106. %
Chloride	mg/l	2.00	2.02	101. %
Chloride	ug/g	2.0	1.9	95.0 %
Chloride	ug/g	2.0	2.2	110. %
Fluoride	mg/l	2.00	2.03	102. %
Fluoride	mg/l	2.00	2.06	103. %
Fluoride	mg/l	2.00	2.00	100. %
Fluoride	mg/l	2.00	1.98	99.0 %
Fluoride	mg/l	2.00	2.02	101. %
Fluoride	ug/g	2.0	2.0	100. %
Fluoride	ug/g	2.0	2.2	110. %
Ammonia Nitrogen	mg/l	1.00	0.980	98.0 %
Ammonia Nitrogen	mg/l	1.00	0.910	91.0 %
Ammonia Nitrogen	mg/l	1.00	1.04	104. %
Ammonia Nitrogen	mg/l	1.00	0.977	97.7 %
Ammonia	ug/g	20.0	20.9	104. %
Ammonia	ug/g	20.0	21.3	106. %
Aluminum	ug/g	2.00	2.13	106. %
Aluminum	ug/g	20.0	20.2	101. %
Iron	ug/g	20.0	21.5	108. %
Aluminum	ug/L	25.0	25.3	101. %
Dissolved Aluminum	ug/L	25.0	25.9	104. %
Dissolved Aluminum	ug/L	25.0	23.7	94.8 %

BLANKS

ANALYTE	UNITS	RESULT
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Chloride	ug/g	< 10
Chloride	ug/g	< 10
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	ug/g	< 5
Fluoride	ug/g	< 5
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia	ug/g	< 5

QC Summary for sample numbers: 22-A014722 to 22-A014732...

BLANKS continued....

ANALYTE	UNITS	RESULT
Ammonia	ug/g	< 5
Aluminum	mg/l	< 0.3
Aluminum	ug/g	< 0.5
Aluminum	ug/g	< 0.5
Iron	ug/g	< 0.15
Aluminum	ug/L	< 5
Dissolved Aluminum	ug/L	< 1
Dissolved Aluminum	ug/L	< 1

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

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

SUBCONTRACTOR Amtest

PROJECT NAME/NO. 208489

PO # C-343

REMARKS

Page # 1 of 2

TURNAROUND TIME
- [x] Standard (1 Week)
- [ ] RUSH

Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Dispose after 30 days
- [ ] Return samples
- [ ] Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Containers	ANALYSES REQUESTED: Metals: Al	Fluoride/Chloride	Ammonia
SB-UST-01 5-6' 14722		8/29/22	0910	Soil	1	X		
SB-UST-01 14723			0935	W	AMB 1L 2	X	X	X
SB-UST-02 5-6' 14724			1035	Soil		X		
SB-UST-02 15-16' 14725			1040	Soil		X		
SB-UST-02 14726			1055	W	2	X	X	X
SB-UST-03 1-2' 14727			1200	Soil		X		
SB-UST-03 14728			1232	W	2	X	X	X
① ~~DPT-14 5-7.5'~~			~~1400~~	~~Soil~~		~~X~~	~~X~~	~~X~~
~~DPT-14 10-11.5'~~			~~1405~~	~~Soil~~		~~X~~	~~X~~	~~X~~
DPT-14 14729			1425	W	2	X	X	X

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:	[signature]	Ann Webber-Bruya	Friedman & Bruya	9/1/22	1000
Received by:	[signature]	SE	AmTest	9/1/22	1425
Relinquished by:					
Received by:					

FORMS\COC\Subcontract.DOC

① Contacted client. did not receive samples in this set. KO 9/1/22

5.3°C Fedex

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

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

SUBCONTRACTOR Amtest

PROJECT NAME/NO.	PO #
208489	C-343

REMARKS

Page # 2 of 2

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

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Containers	Metals: Al	Fluoride/Chloride	Ammonia							
DPT-15 5-6.5' 14730		8/29/22	1515	Soil	1	X	X	X							
DPT-15 8.5-10' 14731		↓	1520	Soil	↓	X	X	X							
DPT-15 14732		↓	~~1~~1538	W	2	X	X	X							

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:	[signature]	Ann Webber-Bruya	Friedman & Bruya	9/1/22	1000
Received by:	[signature]	SF	AmTest	9/1/22	1425
Relinquished by:					
Received by:					

FORMS\COC\Subcontract.DOC

5.3°C Fedex

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Oct 17 2022
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL

Dear MICHAEL ERDAHL:

Enclosed please find the analytical data for your project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
DPT-15 5-6.5	Soil	22-A015351	MIN, NUT, MET
DPT-15 8.5-10	Soil	22-A015352	MIN, NUT, MET

Your samples were received on Friday, September 9, 2022. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Aaron W. Young

Aaron W. Young
Vice President

Project #: 208489
PO Number: C-343

BACT = Bacteriological	MET = Metals	NUT=Nutrients	MIN=Minerals
CONV = Conventionals	ORG = Organics	DEM=Demand	

Am Test Inc.
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Professional Analytical Services

ANALYSIS REPORT

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project #: 208489
PO Number: C-343
All results reported on an as received basis.

Date Received: 09/09/22
Date Reported: 10/17/22

AMTEST Identification Number **22-A015351**
Client Identification **DPT-15 5-6.5**
Sampling Date **08/29/22, 15:15**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fluoride	< 5	ug/g		150	EPA 300.0	AY	09/29/22
Chloride	< 10	ug/g		10.	EPA 300.0	AY	09/29/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	135.	ug/g		5	SM 4500NH3-E	MD	09/15/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	10/17/22
Aluminum	4720	ug/g		15.	EPA 6010D	CM	10/17/22
Iron	8700	ug/g		4.4	EPA 6010D	CM	10/17/22

Friedman & Bruya, Inc.
Project Name:
AmTest ID: 22-A015352

AMTEST Identification Number **22-A015352**
Client Identification **DPT-15 8.5-10**
Sampling Date **08/29/22, 15:20**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Fluoride	< 5	ug/g		140	EPA 300.0	AY	09/29/22
Chloride	19.	ug/g		10.	EPA 300.0	AY	09/29/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	123.	ug/g		5	SM 4500NH3-E	MD	09/15/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	10/17/22
Aluminum	2640	ug/g		14.	EPA 6010D	CM	10/17/22
Iron	2960	ug/g		4.1	EPA 6010D	CM	10/17/22

Aaron W Young

Aaron W. Young
Vice President

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Professional Analytical Services

QC Summary for sample numbers: 22-A015351 to 22-A015352

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
22-A015351	Chloride	ug/g	< 10	< 10	
22-A015351	Fluoride	ug/g	< 5	< 5	
22-A015352	Ammonia	ug/g	123.	122.	0.82

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
22-A015351	Chloride	ug/g	< 10	59.	57.	103.51 %
22-A015351	Fluoride	ug/g	< 5	59.	57.	103.51 %

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Chloride	ug/g	2.0	2.1	105. %
Fluoride	ug/g	2.0	2.2	110. %
Ammonia	ug/g	20.0	20.2	101. %
Aluminum	ug/g	2.00	2.00	100. %
Aluminum	ug/g	2.00	2.00	100. %
Iron	ug/g	2.00	1.92	96.0 %
Iron	ug/g	2.00	1.92	96.0 %

BLANKS

ANALYTE	UNITS	RESULT
Chloride	ug/g	< 10
Fluoride	ug/g	< 5
Ammonia	ug/g	< 5
Aluminum	ug/g	< 0.5
Aluminum	ug/g	< 0.5
Iron	ug/g	< 0.15
Iron	ug/g	< 0.15

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

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

SUBCONTRACTOR Amtest

PROJECT NAME/NO.	PO #
208489	C-343

REMARKS

Page # 1 of 1

TURNAROUND TIME
- ☐ Standard (1 Week)
- ☒ RUSH results w/ other initial 208489 samples

Rush charges authorized by: AWB

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Containers	Fluoride/Chloride	Ammonia	Metals: Al								
DPT-15 5-6.5'	15351	8/29/22	1515	S	1	X	X	X								
DPT-15 8.5-10'	55352	↓	1520	S	1	↓	↓	↓								

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: [signature]	Ann Webber-Bruya	Friedman & Bruya	9/8/22	1430
Received by: KH	Kayleigh Hunter	~~KH~~ Amtest KH 9/9/22	9/9/22	1602
Relinquished by:				
Received by:				

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Temp: 3.2°C

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Oct 17 2022
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL

Dear MICHAEL ERDAHL:

Enclosed please find the analytical data for your 208485 project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
DPT-14 5-7.5'	Soil	22-A014918	MIN, NUT, MET
DPT-14 10-11.5'	Soil	22-A014919	MIN, NUT, MET

Your samples were received on Friday, September 2, 2022. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Aaron W Young

Aaron W. Young
Vice President

Project #: 208485
PO Number: C-343

BACT = Bacteriological
CONV = Conventionals
MET = Metals
ORG = Organics
NUT=Nutrients
DEM=Demand
MIN=Minerals

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www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: 208485
Project #: 208485
PO Number: C-343
All results reported on an as received basis.

Date Received: 09/02/22
Date Reported: 10/17/22

AMTEST Identification Number	**22-A014918**
Client Identification	**DPT-14 5-7.5'**
Sampling Date	**08/29/22, 14:00**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 10	ug/g		10	EPA 300.0	AY	09/12/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/12/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	162.	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	4340	ug/g		0.5	EPA 6010D	CM	09/28/22
Iron	7910	ug/g		0.15	EPA 6010D	CM	09/28/22

AMTEST Identification Number **22-A014919**
Client Identification **DPT-14 10-11.5'**
Sampling Date **08/29/22, 14:05**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 10	ug/g		10	EPA 300.0	AY	09/12/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/12/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	82.0	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	6980	ug/g		0.5	EPA 6010D	CM	10/17/22
Iron	11500	ug/g		0.15	EPA 6010D	CM	10/17/22

Aaron W. Young
Aaron W. Young
Vice President

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Professional Analytical Services

QC Summary for sample numbers: 22-A014918 to 22-A014919

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
22-A014917	Chloride	ug/g	< 10	10.	
22-A014919	Chloride	ug/g	< 10	< 10	
22-A014917	Fluoride	ug/g	< 5	< 5	
22-A014919	Fluoride	ug/g	< 5	< 5	
22-A014910	Ammonia	ug/g	129.	131.	1.5
22-A014957	Ammonia	ug/g	242.	261.	7.6

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
22-A014917	Chloride	ug/g	< 10	69.	63.	109.52 %
22-A014919	Chloride	ug/g	< 10	61.	60.	101.67 %
22-A014917	Fluoride	ug/g	< 5	67.	63.	106.35 %
22-A014919	Fluoride	ug/g	< 5	62.	60.	103.33 %

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Chloride	ug/g	2.0	1.9	95.0 %
Fluoride	ug/g	2.0	2.1	105. %
Ammonia	ug/g	20.0	20.2	101. %
Aluminum	ug/g	2.00	2.00	100. %
Aluminum	ug/g	2.00	2.13	106. %
Aluminum	ug/g	2.00	2.00	100. %
Iron	ug/g	2.00	1.96	98.0 %
Iron	ug/g	2.00	2.20	110. %
Iron	ug/g	2.00	1.92	96.0 %

BLANKS

ANALYTE	UNITS	RESULT
Chloride	ug/g	< 10
Fluoride	ug/g	< 5
Ammonia	ug/g	< 5
Aluminum	ug/g	< 0.5
Aluminum	ug/g	< 0.5
Aluminum	ug/g	< 0.5
Iron	ug/g	< 0.15
Iron	ug/g	< 0.15
Iron	ug/g	< 0.15

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

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

SUBCONTRACTOR Amtest

PROJECT NAME/NO.	PO #
208489	C-343

REMARKS

Page # 1 of 1

TURNAROUND TIME
- ☑ Standard (1 Week)
- ☐ RUSH
- Rush charges authorized by:

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Containers	Fluoride/chloride	Ammonia	Metals: Al							
DPT-14 5-7.5'	14918	8/29/22	1400	S	1	x	x	x							
DPT-14 10-11.5'	14919	↓	1405	S	1	x	x	x							

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: [signature]	Ann Webber-Bruya	Friedman & Bruya	9/1/22	1400
Received by:				
Relinquished by:				
Received by:				

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KH 9/2/22 0.1°C
1511

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Oct 13 2022
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL

Dear MICHAEL ERDAHL:

Enclosed please find the analytical data for your 208489 project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
SB-UST-01 5-6'	Soil	22-A014722	MET
SB-UST-01	Water	22-A014723	MIN, NUT, MET, Dissolved MET
SB-UST-02 5-6'	Soil	22-A014724	MET
SB-UST-02 15-16'	Soil	22-A014725	MET
SB-UST-02	Water	22-A014726	MIN, NUT, MET, Dissolved MET
SB-UST-03 1-2'	Soil	22-A014727	MET
SB-UST-03	Water	22-A014728	MIN, NUT, MET, Dissolved MET
DPT-14	Water	22-A014729	MIN, NUT, MET, Dissolved MET
DPT-16 6.5-8'	Soil	22-A014730	MIN, NUT, MET
DPT-16 10-11.5'	Soil	22-A014731	MIN, NUT, MET
DPT-15	Water	22-A014732	MIN, NUT, MET, Dissolved MET

Your samples were received on Thursday, September 1, 2022. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

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Sincerely,

Aaron W Young

Aaron W. Young
Vice President

PO Number: C-343

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CONV = Conventionals
MET = Metals
ORG = Organics
NUT=Nutrients
DEM=Demand
MIN=Minerals

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Professional Analytical Services

ANALYSIS REPORT

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: 208489
PO Number: C-343
All results reported on an as received basis.

Date Received: 09/01/22
Date Reported: 10/13/22

AMTEST Identification Number **22-A014722**
Client Identification **SB-UST-01 5-6'**
Sampling Date **08/29/22, 09:10**

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	6720	ug/g		0.5	EPA 6010D	CM	09/15/22
Iron	8660	ug/g		0.15	EPA 6010D	CM	09/15/22

AMTEST Identification Number **22-A014723**
Client Identification **SB-UST-01**
Sampling Date **08/29/22, 09:35**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	265.	mg/l		0.05	EPA 300.0	AY	09/08/22
Fluoride	16.3	mg/l		0.05	EPA 300.0	AY	09/08/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.304	mg/l		0.02	EPA 350.1	MD	09/09/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	9350	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	606.	ug/L		1	EPA 200.8	AY	10/07/22

AMTEST Identification Number **22-A014724**
Client Identification **SB-UST-02 5-6'**
Sampling Date **08/29/22, 10:35**

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	7250	ug/g		0.5	EPA 6010D	CM	09/15/22
Iron	9870	ug/g		0.15	EPA 6010D	CM	09/15/22

AMTEST Identification Number **22-A014725**
Client Identification **SB-UST-02 15-16'**
Sampling Date **08/29/22, 10:40**

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	6690	ug/g		0.5	EPA 6010D	CM	09/15/22
Iron	8940	ug/g		0.15	EPA 6010D	CM	09/15/22

AMTEST Identification Number 22-A014726
Client Identification SB-UST-02
Sampling Date 08/29/22, 10:55

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	271.	mg/l		0.05	EPA 300.0	AY	09/08/22
Fluoride	0.78	mg/l		0.05	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	5.21	mg/l		0.02	EPA 350.1	MD	09/09/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	3120	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	15.5	ug/L		1	EPA 200.8	AY	10/07/22

AMTEST Identification Number **22-A014727**
Client Identification **SB-UST-03 1-2'**
Sampling Date **08/29/22, 12:00**

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	5370	ug/g		0.5	EPA 6010D	CM	09/15/22
Iron	7800	ug/g		0.15	EPA 6010D	CM	09/15/22

AMTEST Identification Number **22-A014728**
Client Identification **SB-UST-03**
Sampling Date **08/29/22, 12:32**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	693.	mg/l		0.05	EPA 300.0	AY	09/08/22
Fluoride	0.27	mg/l		0.05	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	5.40	mg/l		0.02	EPA 350.1	MD	09/09/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	1100	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	7.64	ug/L		1	EPA 200.8	AY	10/07/22

AMTEST Identification Number **22-A014729**
Client Identification **DPT-14**
Sampling Date **08/29/22, 14:25**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	20.1	mg/l		0.05	EPA 300.0	AY	09/08/22
Fluoride	1.36	mg/l		0.05	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	2.72	mg/l		0.02	EPA 350.1	MD	09/09/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	< 1	ug/L		1	EPA 200.8	AY	10/07/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	< 0.3	mg/l		0.3	EPA 200.7	CM	09/23/22

AMTEST Identification Number 22-A014730
Client Identification DPT-16 6.5-8'
Sampling Date 08/30/22, 08:45

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	92.	ug/g		10	EPA 300.0	AY	09/07/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	244.	ug/g		5	SM 4500NH3-E	MD	09/02/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	2540	ug/g		0.5	EPA 6010D	CM	09/13/22
Iron	9220	ug/g		0.15	EPA 6010D	CM	09/15/22

AMTEST Identification Number **22-A014731**
Client Identification **DPT-16 10-11.5'**
Sampling Date **08/30/22, 08:50**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	48.	ug/g		10	EPA 300.0	AY	09/07/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	748.	ug/g		5	SM 4500NH3-E	MD	09/02/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/13/22
Aluminum	2730	ug/g		0.5	EPA 6010D	CM	09/13/22
Iron	6120	ug/g		0.15	EPA 6010D	CM	09/15/22

Friedman & Bruya, Inc.
Project Name: 208489
AmTest ID: 22-A014732

AMTEST Identification Number **22-A014732**
Client Identification **DPT-15**
Sampling Date **08/29/22, 15:38**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	183.	mg/l		0.05	EPA 300.0	AY	09/08/22
Fluoride	0.14	mg/l		0.05	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	3.31	mg/l		0.02	EPA 350.1	MD	09/09/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	1660	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	1.10	ug/L		1	EPA 200.8	AY	10/07/22

Aaron W Young

Aaron W. Young
Vice President

Am Test Inc.
13600 NE 126th PL
Suite C
Kirkland, WA, 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

QC Summary for sample numbers: 22-A014722 to 22-A014732

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
22-A015091	Chloride	mg/l	6.70	6.77	1.0
22-A014902	Chloride	ug/g	< 10	< 10	
22-A014732	Fluoride	mg/l	0.14	0.15	6.9
22-A015091	Fluoride	mg/l	< 0.05	< 0.05	
22-A014902	Fluoride	ug/g	< 5	< 5	
22-A014543	Ammonia Nitrogen	mg/l	0.022	0.023	4.4
22-A014553	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
22-A014663	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
22-A014681	Ammonia Nitrogen	mg/l	19.9	20.8	4.4
22-A014867	Ammonia Nitrogen	mg/l	0.025	0.026	3.9
22-A014749	Ammonia	ug/g	159.	164.	3.1

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
22-A015091	Chloride	mg/l	6.70	8.47	2.00	88.50 %
22-A014902	Chloride	ug/g	< 10	70.	64.	109.38 %
22-A014732	Fluoride	mg/l	0.14	2.22	2.00	104.00 %
22-A015091	Fluoride	mg/l	< 0.05	1.98	2.00	99.00 %
22-A014902	Fluoride	ug/g	< 5	65.	64.	101.56 %
22-A014543	Ammonia Nitrogen	mg/l	0.022	1.01	1.00	98.80 %
22-A014553	Ammonia Nitrogen	mg/l	< 0.02	1.06	1.00	106.00 %
22-A014663	Ammonia Nitrogen	mg/l	< 0.02	1.05	1.00	105.00 %
22-A014681	Ammonia Nitrogen	mg/l	19.9	40.1	20.0	101.00 %
22-A014867	Ammonia Nitrogen	mg/l	0.025	1.06	1.00	103.50 %
22-A014909	Dissolved Aluminum	ug/L	1.67	103.	100.	101.33 %
22-A014909	Dissolved Aluminum	ug/L	1.67	107.	100.	105.33 %
22-A014915	Dissolved Aluminum	ug/L	< 1	102.	100.	102.00 %
22-A014915	Dissolved Aluminum	ug/L	< 1	99.8	100.	99.80 %

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Dissolved Aluminum	ug/L	103.	107.	3.8
Spike	Dissolved Aluminum	ug/L	102.	99.8	2.2

QC Summary for sample numbers: 22-A014722 to 22-A014732...

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Chloride	mg/l	2.00	2.17	108. %
Chloride	mg/l	2.00	2.13	106. %
Chloride	mg/l	2.00	2.02	101. %
Chloride	ug/g	2.0	1.9	95.0 %
Chloride	ug/g	2.0	2.2	110. %
Fluoride	mg/l	2.00	2.03	102. %
Fluoride	mg/l	2.00	2.06	103. %
Fluoride	mg/l	2.00	2.00	100. %
Fluoride	mg/l	2.00	1.98	99.0 %
Fluoride	mg/l	2.00	2.02	101. %
Fluoride	ug/g	2.0	2.0	100. %
Fluoride	ug/g	2.0	2.2	110. %
Ammonia Nitrogen	mg/l	1.00	0.980	98.0 %
Ammonia Nitrogen	mg/l	1.00	0.910	91.0 %
Ammonia Nitrogen	mg/l	1.00	1.04	104. %
Ammonia Nitrogen	mg/l	1.00	0.977	97.7 %
Ammonia	ug/g	20.0	20.9	104. %
Ammonia	ug/g	20.0	21.3	106. %
Aluminum	ug/g	2.00	2.13	106. %
Aluminum	ug/g	20.0	20.2	101. %
Iron	ug/g	20.0	21.5	108. %
Aluminum	ug/L	25.0	25.3	101. %
Dissolved Aluminum	ug/L	25.0	25.9	104. %
Dissolved Aluminum	ug/L	25.0	23.7	94.8 %

BLANKS

ANALYTE	UNITS	RESULT
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Chloride	ug/g	< 10
Chloride	ug/g	< 10
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	ug/g	< 5
Fluoride	ug/g	< 5
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia	ug/g	< 5

QC Summary for sample numbers: 22-A014722 to 22-A014732...

BLANKS continued....

ANALYTE	UNITS	RESULT
Ammonia	ug/g	< 5
Aluminum	mg/l	< 0.3
Aluminum	ug/g	< 0.5
Aluminum	ug/g	< 0.5
Iron	ug/g	< 0.15
Aluminum	ug/L	< 5
Dissolved Aluminum	ug/L	< 1
Dissolved Aluminum	ug/L	< 1

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

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

SUBCONTRACTOR Amtest

PROJECT NAME/NO.	PO #
208489	C-343

REMARKS

Page # 1 of 2

TURNAROUND TIME
- [x] Standard (1 Week)
- [ ] RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
- [x] Dispose after 30 days
- [ ] Return samples
- [ ] Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Containers	Metals: Al	Fluoride/Chloride	Ammonia							
SB-UST-01 5-6' 14722		8/29/22	0910	Soil	1	X									
SB-UST-01 14723		↓	0935	W AWB 9/1	~~1~~ 2	X	X	X							
SB-UST-02 5-6' 14724			1035	Soil		X									
SB-UST-02 15-16' 14725			1040	Soil		X									
SB-UST-02 14726			1055	W	~~1~~ 2	X	X	X							
SB-UST-03 1-2' 14727			1200	Soil		X									
SB-UST-03 14728			1232	W	~~1~~ 2	X	X	X							
~~DPT-14 5-7.5'~~			~~1400~~	~~Soil~~		~~X~~	~~X~~	~~X~~							
~~DPT-14 10-11.5'~~			~~1405~~	~~Soil~~		~~X~~	~~X~~	~~X~~							
DPT-14 14729		↓	1425	W	~~1~~ 2	X	X	X							

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: [signature]	Ann Webber-Bruya	Friedman & Bruya	9/1/22	1000
Received by: [signature]	SE	AmTest	9/1/22	1425
Relinquished by:				
Received by:				

FORMS\COC\Subcontract.DOC

(1) Contacted client. did not receive samples in this set. KO 9/1/22

5.3°C Fedex

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

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

SUBCONTRACTOR Amtest

PROJECT NAME/NO. 208489

PO # C-343

REMARKS

Page # 2 of 2

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

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Containers	Metals: Al	Fluoride/Chloride	Ammonia								
DPT-15 5-6.5' 14730		8/29/22	1515	Soil	1	X	X	X								
DPT-15 8.5-10' 14731			1520	Soil		X	X	X								
DPT-15 14732			~~1~~1538	W	2	X	X	X								

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:	[signature]	Ann Webber-Bruya	Friedman & Bruya	9/1/22	1000
Received by:	[signature]	SF	AmTest	9/1/22	1425
Relinquished by:					
Received by:					

FORMS\COC\Subcontract.DOC

5.3°C Fedex

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
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fbi@isomedia.com
www.friedmanandbruya.com

October 10, 2022

Rusty Jones, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Jones:

Included are the results from the testing of material submitted on September 1, 2022 from the Maralco R.I., F&BI 209011 project. There are 48 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Grant Hainsworth
CTC1010R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on September 1, 2022 by Friedman & Bruya, Inc. from the Crete Consulting Maralco R.I., F&BI 209011 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
209011 -01	DPT-18 5-7.2'
209011 -02	DPT-18 14-15'
209011 -03	DPT-18
209011 -04	DPT-19 6-8'
209011 -05	DPT-19 12.5-15'
209011 -06	DPT-20 6.5-7.5'
209011 -07	DPT-20 13.5-15'
209011 -08	DPT-20
209011 -09	DPT-19
209011 -10	DPT-21 6-10'
209011 -11	DPT-21 11.5-14'
209011 -12	DPT-21
209011 -13	DPT-22 3.5-5'
209011 -14	DPT-22 5-7'
209011 -15	DPT-22 11-13.2'
209011 -16	DPT-22
209011 -17	DUP01-220831
209011 -18	DUP02-220831

The soil samples marked for analysis were sent to Amtest for fluoride, chloride, ammonia, aluminum and iron analyses. The water samples marked for analysis were sent to Amtest for fluoride, chloride, ammonia, and aluminum analyses. The report is enclosed.

Zinc in the 6020B dissolved matrix spike and matrix spike duplicate failed the acceptance criteria. The laboratory control sample passed the acceptance criteria, therefore the results were due to matrix effect.

All other quality control requirements were acceptable.

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-18	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-03
Date Analyzed:	09/26/22	Data File:	209011-03.121
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	3.82
Cadmium	<1
Lead	<1

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-18	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-03 x2
Date Analyzed:	09/27/22	Data File:	209011-03 x2.182
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	<2
Cobalt	<2
Copper	<10
Lead	<2
Nickel	<2
Zinc	<10

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-18	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-03 x100
Date Analyzed:	10/05/22	Data File:	209011-03 x100.070
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	24,000

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-20	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-08
Date Analyzed:	09/26/22	Data File:	209011-08.181
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	6.64
Cadmium	<1
Lead	<1

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-20	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-08 x2
Date Analyzed:	10/06/22	Data File:	209011-08 x2.072
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	<2
Cobalt	<2
Copper	<10
Nickel	<2
Zinc	<10

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-20	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-08 x100
Date Analyzed:	10/05/22	Data File:	209011-08 x100.073
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	32,700

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-19	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-09
Date Analyzed:	09/26/22	Data File:	209011-09.182
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	8.93
Cadmium	<1
Lead	<1

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-19	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-09 x2
Date Analyzed:	10/06/22	Data File:	209011-09 x2.073
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	<2
Cobalt	<2
Copper	<10
Nickel	<2
Zinc	<10

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-19	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-09 x100
Date Analyzed:	10/05/22	Data File:	209011-09 x100.074
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	29,800

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-21	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-12
Date Analyzed:	09/26/22	Data File:	209011-12.183
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	2.83
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Nickel	1.09
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-21	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-12 x100
Date Analyzed:	10/05/22	Data File:	209011-12 x100.075
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	27,900

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-22	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-16
Date Analyzed:	09/26/22	Data File:	209011-16.184
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Nickel	1.60
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DPT-22	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-16 x100
Date Analyzed:	10/05/22	Data File:	209011-16 x100.076
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	17,600

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DUP02-220831	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-18
Date Analyzed:	09/26/22	Data File:	209011-18.185
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	2.95
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Nickel	1.17
Zinc	<5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	DUP02-220831	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	209011-18 x100
Date Analyzed:	10/04/22	Data File:	209011-18 x100.064
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	29,400

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/26/22	Lab ID:	I2-683 mb
Date Analyzed:	09/26/22	Data File:	I2-683 mb.070
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Iron	<50
Lead	<1
Nickel	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-18	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-03
Date Analyzed:	09/06/22	Data File:	209011-03.155
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	5.12
Cadmium	<1
Chromium	2.68
Cobalt	1.60
Copper	9.32
Lead	1.66
Nickel	3.10
Zinc	7.15

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-18	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-03 x100
Date Analyzed:	09/07/22	Data File:	209011-03 x100.082
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	29,800

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-20	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-08
Date Analyzed:	09/06/22	Data File:	209011-08.156
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	6.97
Cadmium	<1
Chromium	1.11
Cobalt	1.18
Copper	<5
Lead	<1
Nickel	1.63
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-20	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-08 x100
Date Analyzed:	09/07/22	Data File:	209011-08 x100.083
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	34,100

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-19	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-09
Date Analyzed:	09/06/22	Data File:	209011-09.159
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Lead	7.51

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-19	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-09 x5
Date Analyzed:	09/07/22	Data File:	209011-09 x5.087
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	17.4
Cadmium	<5
Chromium	26.7
Cobalt	21.7
Copper	57.3
Nickel	26.6
Zinc	91.3

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ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-19	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-09 x100
Date Analyzed:	09/07/22	Data File:	209011-09 x100.084
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	91,000

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-21	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-12
Date Analyzed:	09/07/22	Data File:	209011-12.154
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	3.46
Cadmium	<1
Chromium	2.19
Cobalt	1.51
Copper	<5
Lead	<1
Nickel	3.10
Zinc	6.14

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-21	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-12 x100
Date Analyzed:	09/07/22	Data File:	209011-12 x100.088
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	33,200

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-22	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-16
Date Analyzed:	09/07/22	Data File:	209011-16.155
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.16
Cadmium	<1
Chromium	1.66
Cobalt	1.17
Copper	<5
Lead	<1
Nickel	2.46
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-22	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-16 x100
Date Analyzed:	09/07/22	Data File:	209011-16 x100.090
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	20,000

Analysis For Total Metals By EPA Method 6020B

Client ID:	DUP02-220831	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-18
Date Analyzed:	09/07/22	Data File:	209011-18.156
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	3.45
Cadmium	<1
Chromium	2.00
Cobalt	1.46
Copper	<5
Lead	<1
Nickel	2.93
Zinc	5.83

Analysis For Total Metals By EPA Method 6020B

Client ID:	DUP02-220831	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-18 x100
Date Analyzed:	09/07/22	Data File:	209011-18 x100.091
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	35,300

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	I2-613 mb
Date Analyzed:	09/07/22	Data File:	I2-613 mb.043
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Iron	<50
Lead	<1
Nickel	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-18 5-7.2'	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-01
Date Analyzed:	09/06/22	Data File:	209011-01.117
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	2.48
Cadmium	<1
Chromium	10.0
Cobalt	3.64
Copper	13.0
Lead	4.04
Nickel	9.26
Silver	<1
Zinc	23.7

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-18 14-15'	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-02
Date Analyzed:	09/06/22	Data File:	209011-02.118
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.26
Cadmium	<1
Chromium	7.89
Cobalt	3.52
Copper	10.8
Lead	1.63
Nickel	5.85
Silver	<1
Zinc	18.5

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-19 6-8’	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-04
Date Analyzed:	09/06/22	Data File:	209011-04.119
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	3.32
Cadmium	<1
Chromium	11.8
Cobalt	6.42
Copper	24.2
Lead	3.73
Nickel	11.1
Silver	<1
Zinc	38.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-19 12.5-15’	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-05
Date Analyzed:	09/06/22	Data File:	209011-05.120
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	2.09
Cadmium	<1
Chromium	10.0
Cobalt	4.34
Copper	16.6
Lead	2.84
Nickel	8.24
Silver	<1
Zinc	23.3

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-20 6.5-7.5’	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-06
Date Analyzed:	09/06/22	Data File:	209011-06.111
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	4.13
Cadmium	<1
Chromium	12.3
Cobalt	5.73
Copper	23.5
Lead	4.22
Nickel	11.2
Silver	<1
Zinc	33.8

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-20 13.5-15'	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-07
Date Analyzed:	09/06/22	Data File:	209011-07.123
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	2.33
Cadmium	<1
Chromium	11.8
Cobalt	4.54
Copper	19.5
Lead	2.55
Nickel	12.8
Silver	<1
Zinc	24.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-21 6-10’	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-10
Date Analyzed:	09/06/22	Data File:	209011-10.124
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.84
Cadmium	<1
Chromium	10.2
Cobalt	3.19
Copper	11.0
Lead	2.79
Nickel	6.01
Silver	<1
Zinc	54.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-21 11.5-14'	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-11
Date Analyzed:	09/06/22	Data File:	209011-11.125
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	<1
Cadmium	<1
Chromium	8.02
Cobalt	3.21
Copper	10.1
Lead	1.46
Nickel	6.25
Silver	<1
Zinc	18.7

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-22 3.5-5’	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-13
Date Analyzed:	09/06/22	Data File:	209011-13.126
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	6.91
Cadmium	<1
Chromium	12.9
Cobalt	4.94
Copper	22.3
Lead	21.7
Nickel	12.3
Silver	<1
Zinc	37.0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-22 5-7’	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-14
Date Analyzed:	09/06/22	Data File:	209011-14.127
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.64
Cadmium	<1
Chromium	10.3
Cobalt	3.66
Copper	20.0
Lead	2.54
Nickel	7.87
Silver	<1
Zinc	23.6

Analysis For Total Metals By EPA Method 6020B

Client ID:	DPT-22 11-13.2'	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-15
Date Analyzed:	09/06/22	Data File:	209011-15.128
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	3.23
Cadmium	<1
Chromium	8.39
Cobalt	3.70
Copper	8.74
Lead	1.19
Nickel	7.24
Silver	<1
Zinc	17.3

Analysis For Total Metals By EPA Method 6020B

Client ID:	DUP01-220831	Client:	Crete Consulting
Date Received:	09/01/22	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	209011-17
Date Analyzed:	09/06/22	Data File:	209011-17.129
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	1.14
Cadmium	<1
Chromium	8.51
Cobalt	3.37
Copper	11.7
Lead	1.56
Nickel	6.63
Silver	<1
Zinc	20.0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco R.I., F&BI 209011
Date Extracted:	09/06/22	Lab ID:	I2-612 mb
Date Analyzed:	09/07/22	Data File:	I2-612 mb.044
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Antimony	<1
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Lead	<1
Nickel	<1
Silver	<1
Zinc	<5

Date of Report: 10/10/22
Date Received: 09/01/22
Project: Maralco R.I., F&BI 209011

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

Laboratory Code: 209383-03 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	2.73	85	84	75-125	1
Cadmium	ug/L (ppb)	5	<1	99	97	75-125	2
Chromium	ug/L (ppb)	20	<1	78	78	75-125	0
Cobalt	ug/L (ppb)	20	<1	78	77	75-125	1
Copper	ug/L (ppb)	20	<5	76	75	75-125	1
Lead	ug/L (ppb)	10	<1	79	78	75-125	1
Nickel	ug/L (ppb)	20	2.94	78	77	75-125	1
Zinc	ug/L (ppb)	50	<5	74 vo	74 vo	75-125	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	99	80-120
Cadmium	ug/L (ppb)	5	95	80-120
Chromium	ug/L (ppb)	20	96	80-120
Cobalt	ug/L (ppb)	20	97	80-120
Copper	ug/L (ppb)	20	99	80-120
Lead	ug/L (ppb)	10	93	80-120
Nickel	ug/L (ppb)	20	97	80-120
Zinc	ug/L (ppb)	50	98	80-120

Date of Report: 10/10/22
Date Received: 09/01/22
Project: Maralco R.I., F&BI 209011

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

Laboratory Code: 208508-05 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	2.45	84	87	75-125	4
Cadmium	ug/L (ppb)	5	<1	100	103	75-125	3
Chromium	ug/L (ppb)	20	<1	97	97	75-125	0
Cobalt	ug/L (ppb)	20	<1	95	96	75-125	1
Copper	ug/L (ppb)	20	<5	94	94	75-125	0
Iron	ug/L (ppb)	100	486	102	132 b	75-125	26 b
Lead	ug/L (ppb)	10	<1	91	93	75-125	2
Nickel	ug/L (ppb)	20	<1	95	97	75-125	2
Zinc	ug/L (ppb)	50	<5	94	96	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	88	80-120
Cadmium	ug/L (ppb)	5	90	80-120
Chromium	ug/L (ppb)	20	91	80-120
Cobalt	ug/L (ppb)	20	91	80-120
Copper	ug/L (ppb)	20	94	80-120
Iron	ug/L (ppb)	100	97	80-120
Lead	ug/L (ppb)	10	95	80-120
Nickel	ug/L (ppb)	20	94	80-120
Zinc	ug/L (ppb)	50	93	80-120

Date of Report: 10/10/22
Date Received: 09/01/22
Project: Maralco R.I., F&BI 209011

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

Laboratory Code: 208506-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Antimony	mg/kg (ppm)	20	13.1	85	69 b	75-125	21 b
Arsenic	mg/kg (ppm)	10	12.5	67 b	52 b	75-125	25 b
Cadmium	mg/kg (ppm)	10	<5	88	95	75-125	8
Chromium	mg/kg (ppm)	50	17.1	88	94	75-125	7
Cobalt	mg/kg (ppm)	20	8.54	84	87	75-125	4
Copper	mg/kg (ppm)	50	77.8	96	76	75-125	23 b
Lead	mg/kg (ppm)	50	145	60 b	94	75-125	44 b
Nickel	mg/kg (ppm)	25	27.3	115	87	75-125	28 b
Silver	mg/kg (ppm)	10	<5	97	103	75-125	6
Zinc	mg/kg (ppm)	50	213	41 b	52 b	75-125	24 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Antimony	mg/kg (ppm)	20	101	80-120
Arsenic	mg/kg (ppm)	10	93	80-120
Cadmium	mg/kg (ppm)	10	97	80-120
Chromium	mg/kg (ppm)	50	103	80-120
Cobalt	mg/kg (ppm)	20	101	80-120
Copper	mg/kg (ppm)	50	100	80-120
Lead	mg/kg (ppm)	50	104	80-120
Nickel	mg/kg (ppm)	25	100	80-120
Silver	mg/kg (ppm)	10	103	80-120
Zinc	mg/kg (ppm)	50	102	80-120

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.

SAMPLE CHAIN OF CUSTODY

9/1/22 E04/ ~~AI5~~/ ~~AI~~2

Page # 1 of 2

~~Report To~~ 209011 R. Jones / G. Hainsworth

Company CRETE Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME Maralco R.I.

PO#

REMARKS See email for metals list.

Project specific RLs? - Yes / No

INVOICE TO CRETE

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	Fluoride/Chloride	Ammonia	Metals		Notes
DPT-18 5-7.2'	01 A-B	8/31/2022	0915	SOIL	2								X	X	X		Metals (Soil) - Al, Sb, As, Cd, Cr, Co, Cu, Fe, Ni, Pb, Ag, Zn
DPT-18 14-15'	02 ↓	↓	0920	↓	2								X	X	X		Metals (H2O) - Al, As, Cd, Cr, Co, Cu, Fe, Ni, Pb, Zn
DPT-18	03 A-E		0934	WATER	5								X	X	X		
DPT-19 6-8'	04 A-B		1020	SOIL	2								X	X	X		AWS 9/1
DPT-19 12.5-15'	05 ↓		1025	↓	2								X	X	X		
DPT-20 6.5-7.5'	06		1135		2								X	X	X		
DPT-20 13.5-15'	07		1140	↓	2								X	X	X		
DPT-20	08 A-E		1155	WATER	5								X	X	X		
DPT-19	09 ↓		1235	↓	5								X	X	X		
DPT-21 6-10'	10 A-B	↓	1330	SOIL	2								X	X	X		

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	~~8/31/22~~	~~15~~ 0710
Received by: W. Madden	W. Madden	F+BI	9/1/22	1155
Relinquished by:		Samples received at 0 °C		
Received by:				

SAMPLE CHAIN OF CUSTODY

9/1/22 E04 / AI5 / BT2

209011 ~~Report To~~ R. Jones | G. Hainsworth

Company CRETE Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (*signature*) Rusty Jones R. Jones	
PROJECT NAME Maralco R.I	PO #
REMARKS See email for metals list. Project specific RLs? - Yes / No	INVOICE TO CRETE

Page # 2 of 2

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	Fluoride/Chloride	Ammonia	Metals		Notes
DPT-21 11.5-14'	11 A-B	8/31/2022	1335	SOIL	2								X	X	X		
DPT-21	12 A-E		1350	WATER	5								X	X	X		
DPT-22 3.5-5'	13 A-B		1450	SOIL	2								X	X	X		
DPT-22 5-7'	14		1455		2												HOLD
DPT-22 11-13.2'	15		1500		2								X	X	X		
DPT-22	16 A-E		1515	WATER	5								X	X	X		
DUP01-220831	17 A-B		0800	SOIL	2								X	X	X		
DUP02-220831	18 A-E		0815	WATER	5								X	X	X		

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	CRETE	~~8/31/22~~	0710
Received by:	W. Madden	W. Madden	F+BI	9/1/22	1155
Relinquished by:					
Received by:			~~Samples received at~~	0 °C	

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Oct 17 2022
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL

Dear MICHAEL ERDAHL:

Enclosed please find the analytical data for your 209011 project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
DPT-18 5-7.2'	Soil	22-A014898	MIN, NUT, MET
DPT-18 14-15'	Soil	22-A014899	MIN, NUT, MET
DPT-18	Water	22-A014900	MIN, NUT, MET, Dissolved MET
DPT-19 6-8'	Soil	22-A014901	MIN, NUT, MET
DPT-19 12.5-15'	Soil	22-A014902	MIN, NUT, MET
DPT-20 6.5-7.5'	Soil	22-A014903	MIN, NUT, MET
DPT-20 13.5-15'	Soil	22-A014904	MIN, NUT, MET
DPT-20	Water	22-A014905	MIN, NUT, MET, Dissolved MET
DPT-19	Water	22-A014906	MIN, NUT, MET, Dissolved MET
DPT-21 6-10'	Soil	22-A014907	MIN, NUT, MET
DPT-21 11.5-14'	Soil	22-A014908	MIN, NUT, MET
DPT-21	Water	22-A014909	MIN, NUT, MET, Dissolved MET
DPT-22 3.5-5'	Soil	22-A014910	MIN, NUT, MET
DPT-22 5-7'	Soil	22-A014911	MIN, NUT, MET
DPT-22 11-13.2'	Soil	22-A014912	MIN, NUT, MET
DPT-22	Water	22-A014913	MIN, NUT, MET, Dissolved MET
DUP01-220831	Soil	22-A014914	MIN, NUT, MET
DUP02-220831	Water	22-A014915	MIN, NUT, MET, Dissolved MET

Your samples were received on Friday, September 2, 2022. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Oct 17 2022
Friedman & Bruya, Inc.
continued . . .

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Aaron W. Young
Vice President

Project #: 209011
PO Number: C-343

BACT = Bacteriological	MET = Metals	NUT=Nutrients	MIN=Minerals
CONV = Conventionals	ORG = Organics	DEM=Demand	

Am Test Inc.
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Kirkland, WA 98034
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Professional Analytical Services

ANALYSIS REPORT

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: 209011
Project #: 209011
PO Number: C-343
All results reported on an as received basis.

Date Received: 09/02/22
Date Reported: 10/17/22

AMTEST Identification Number **22-A014898**
Client Identification **DPT-18 5-7.2'**
Sampling Date **08/31/22, 09:15**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 10	ug/g		10	EPA 300.0	AY	09/07/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	165.	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	5010	ug/g		0.5	EPA 6010D	CM	09/26/22
Iron	6490	ug/g		0.15	EPA 6010D	CM	09/26/22

AMTEST Identification Number **22-A014899**
Client Identification **DPT-18 14-15'**
Sampling Date **08/31/22, 09:20**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 10	ug/g		10	EPA 300.0	AY	09/07/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	94.5	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	5130	ug/g		0.5	EPA 6010D	CM	09/26/22
Iron	6520	ug/g		0.15	EPA 6010D	CM	09/26/22

AMTEST Identification Number **22-A014900**
Client Identification **DPT-18**
Sampling Date **08/31/22, 09:34**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	5.33	mg/l		0.05	EPA 300.0	AY	09/06/22
Fluoride	< 0.05	mg/l		0.05	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.182	mg/l		0.02	EPA 350.1	MD	09/15/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	553.	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	2.14	ug/L		1	EPA 200.8	AY	10/07/22

AMTEST Identification Number **22-A014901**
Client Identification **DPT-19 6-8'**
Sampling Date **08/31/22, 10:20**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	12.	ug/g		10	EPA 300.0	AY	09/07/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	156.	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	16900	ug/g		0.5	EPA 6010D	CM	10/17/22
Iron	16900	ug/g		0.15	EPA 6010D	CM	10/17/22

AMTEST Identification Number 22-A014902
Client Identification DPT-19 12.5-15'
Sampling Date 08/31/22, 10:25

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 10	ug/g		10	EPA 300.0	AY	09/07/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	136.	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	7410	ug/g		0.5	EPA 6010D	CM	09/26/22
Iron	8030	ug/g		0.15	EPA 6010D	CM	09/26/22

AMTEST Identification Number **22-A014903**
Client Identification **DPT-20 6.5-7.5'**
Sampling Date **08/31/22, 11:35**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	12.	ug/g		10	EPA 300.0	AY	09/07/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	301.	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	13200	ug/g		0.5	EPA 6010D	CM	09/28/22
Iron	16600	ug/g		0.15	EPA 6010D	CM	09/28/22

AMTEST Identification Number **22-A014904**
Client Identification **DPT-20 13.5-15'**
Sampling Date **08/31/22, 11:40**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 10	ug/g		10	EPA 300.0	AY	09/07/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/07/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	399.	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	7930	ug/g		0.5	EPA 6010D	CM	09/28/22
Iron	10500	ug/g		0.15	EPA 6010D	CM	09/28/22

AMTEST Identification Number **22-A014905**
Client Identification **DPT-20**
Sampling Date **08/31/22, 11:55**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	2.47	mg/l		0.05	EPA 300.0	AY	09/06/22
Fluoride	< 0.05	mg/l		0.05	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.072	mg/l		0.02	EPA 350.1	MD	09/15/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	84.5	ug/L		5	EPA 200.8	CM	10/17/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	1.67	ug/L		1	EPA 200.8	AY	10/07/22

AMTEST Identification Number **22-A014906**
Client Identification **DPT-19**
Sampling Date **08/31/22, 12:35**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	3.42	mg/l		0.05	EPA 300.0	AY	09/06/22
Fluoride	0.06	mg/l		0.05	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.286	mg/l		0.02	EPA 350.1	MD	09/15/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	3720	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	3.74	ug/L		1	EPA 200.8	AY	10/07/22

AMTEST Identification Number **22-A014907**
Client Identification **DPT-21 6-10'**
Sampling Date **08/31/22, 13:30**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	13.	ug/g		10	EPA 300.0	AY	09/12/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/12/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	161.	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	4990	ug/g		0.5	EPA 6010D	CM	09/28/22
Iron	8150	ug/g		0.15	EPA 6010D	CM	09/28/22

AMTEST Identification Number **22-A014908**
Client Identification **DPT-21 11.5-14'**
Sampling Date **08/31/22, 13:35**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 10	ug/g		10	EPA 300.0	AY	09/12/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/12/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	94.1	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	5390	ug/g		0.5	EPA 6010D	CM	09/28/22
Iron	8220	ug/g		0.15	EPA 6010D	CM	09/28/22

AMTEST Identification Number	**22-A014909**
Client Identification	**DPT-21**
Sampling Date	**08/31/22, 13:50**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	6.02	mg/l		0.05	EPA 300.0	AY	09/06/22
Fluoride	0.05	mg/l		0.05	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.077	mg/l		0.02	EPA 350.1	MD	09/15/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	1800	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	1.67	ug/L		1	EPA 200.8	AY	10/07/22

AMTEST Identification Number **22-A014910**
Client Identification **DPT-22 3.5-5'**
Sampling Date **08/31/22, 14:50**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	12.	ug/g		10	EPA 300.0	AY	09/12/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/12/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	129.	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	10400	ug/g		0.5	EPA 6010D	CM	09/28/22
Iron	15000	ug/g		0.15	EPA 6010D	CM	09/28/22

AMTEST Identification Number **22-A014911**
Client Identification **DPT-22 5-7'**
Sampling Date **08/31/22, 14:55**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	12.	ug/g		10	EPA 300.0	AY	09/12/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/12/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	155.	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	9160	ug/g		0.5	EPA 6010D	CM	09/28/22
Iron	8310	ug/g		0.15	EPA 6010D	CM	09/28/22

AMTEST Identification Number **22-A014912**
Client Identification **DPT-22 11-13.2'**
Sampling Date **08/31/22, 15:00**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	10.	ug/g		10	EPA 300.0	AY	09/12/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/12/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	193.	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	4390	ug/g		0.5	EPA 6010D	CM	09/28/22
Iron	9290	ug/g		0.15	EPA 6010D	CM	09/28/22

AMTEST Identification Number **22-A014913**
Client Identification **DPT-22**
Sampling Date **08/31/22, 15:15**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	4.81	mg/l		0.05	EPA 300.0	AY	09/06/22
Fluoride	0.12	mg/l		0.05	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.088	mg/l		0.02	EPA 350.1	MD	09/15/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	634.	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	< 1	ug/L		1	EPA 200.8	AY	10/07/22

AMTEST Identification Number	**22-A014914**
Client Identification	**DUP01-220831**
Sampling Date	**08/31/22, 08:00**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 10	ug/g		10	EPA 300.0	AY	09/12/22
Fluoride	< 5	ug/g		5	EPA 300.0	AY	09/12/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia	156.	ug/g		5	SM 4500NH3-E	MD	09/08/22

Total Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Acid Digestion	Y				SW-846 3050B	CM	09/26/22
Aluminum	3690	ug/g		0.5	EPA 6010D	CM	09/28/22
Iron	5520	ug/g		0.15	EPA 6010D	CM	09/28/22

Friedman & Bruya, Inc.
Project Name: 209011
AmTest ID: 22-A014915

AMTEST Identification Number **22-A014915**
Client Identification **DUP02-220831**
Sampling Date **08/31/22, 08:15**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	6.08	mg/l		0.05	EPA 300.0	AY	09/06/22
Fluoride	0.05	mg/l		0.05	EPA 300.0	AY	09/06/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.086	mg/l		0.02	EPA 350.1	MD	09/15/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	632.	ug/L		5	EPA 200.8	CM	09/20/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	< 1	ug/L		1	EPA 200.8	AY	10/07/22

Aaron W Young

Aaron W. Young
Vice President

Am Test Inc.
13600 NE 126th PL
Suite C
Kirkland, WA, 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

QC Summary for sample numbers: 22-A014898 to 22-A014915

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
22-A014884	Chloride	mg/l	0.06	0.06	0.00
22-A014921	Chloride	mg/l	2.35	2.35	0.00
22-A014915	Chloride	mg/l	6.08	6.11	0.49
22-A014902	Chloride	ug/g	< 10	< 10	
22-A014917	Chloride	ug/g	< 10	10.	
22-A014919	Chloride	ug/g	< 10	< 10	
22-A014921	Fluoride	mg/l	< 0.05	< 0.05	
22-A014915	Fluoride	mg/l	0.05	0.05	0.00
22-A014902	Fluoride	ug/g	< 5	< 5	
22-A014917	Fluoride	ug/g	< 5	< 5	
22-A014919	Fluoride	ug/g	< 5	< 5	
22-A014960	Ammonia Nitrogen	mg/l	32.2	32.1	0.31
22-A014984	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
22-A015170	Ammonia Nitrogen	mg/l	0.083	0.098	17.
22-A014910	Ammonia	ug/g	129.	131.	1.5
22-A014957	Ammonia	ug/g	242.	261.	7.6

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
22-A014884	Chloride	mg/l	0.06	2.10	2.00	102.00 %
22-A014921	Chloride	mg/l	2.35	4.42	2.00	103.50 %
22-A014915	Chloride	mg/l	6.08	8.06	2.00	99.00 %
22-A014902	Chloride	ug/g	< 10	70.	64.	109.38 %
22-A014917	Chloride	ug/g	< 10	69.	63.	109.52 %
22-A014919	Chloride	ug/g	< 10	61.	60.	101.67 %
22-A014921	Fluoride	mg/l	< 0.05	2.04	2.00	102.00 %
22-A014915	Fluoride	mg/l	0.05	2.09	2.00	102.00 %
22-A014902	Fluoride	ug/g	< 5	65.	64.	101.56 %
22-A014917	Fluoride	ug/g	< 5	67.	63.	106.35 %
22-A014919	Fluoride	ug/g	< 5	62.	60.	103.33 %
22-A014960	Ammonia Nitrogen	mg/l	32.2	52.1	20.0	99.50 %
22-A014984	Ammonia Nitrogen	mg/l	< 0.02	0.957	1.00	95.70 %
22-A015170	Ammonia Nitrogen	mg/l	0.083	1.02	1.00	93.70 %
22-A014909	Dissolved Aluminum	ug/L	1.67	103.	100.	101.33 %
22-A014909	Dissolved Aluminum	ug/L	1.67	107.	100.	105.33 %
22-A014915	Dissolved Aluminum	ug/L	< 1	102.	100.	102.00 %
22-A014915	Dissolved Aluminum	ug/L	< 1	99.8	100.	99.80 %

QC Summary for sample numbers: 22-A014898 to 22-A014915...

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Dissolved Aluminum	ug/L	103.	107.	3.8
Spike	Dissolved Aluminum	ug/L	102.	99.8	2.2

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Chloride	mg/l	2.00	2.12	106. %
Chloride	mg/l	2.00	2.09	104. %
Chloride	ug/g	2.0	1.9	95.0 %
Chloride	ug/g	2.0	2.2	110. %
Chloride	ug/g	2.0	1.9	95.0 %
Fluoride	mg/l	2.00	2.04	102. %
Fluoride	mg/l	2.00	2.10	105. %
Fluoride	ug/g	2.0	2.0	100. %
Fluoride	ug/g	2.0	2.2	110. %
Fluoride	ug/g	2.0	2.1	105. %
Ammonia Nitrogen	mg/l	1.00	0.986	98.6 %
Ammonia Nitrogen	mg/l	1.00	0.944	94.4 %
Ammonia	ug/g	20.0	20.2	101. %
Aluminum	ug/g	2.00	2.14	107. %
Aluminum	ug/g	2.00	2.00	100. %
Aluminum	ug/g	2.00	2.13	106. %
Aluminum	ug/g	2.00	2.00	100. %
Iron	ug/g	2.00	2.01	100. %
Iron	ug/g	2.00	1.96	98.0 %
Iron	ug/g	2.00	2.20	110. %
Iron	ug/g	2.00	1.92	96.0 %
Aluminum	ug/L	25.0	25.3	101. %
Aluminum	ug/L	25.0	27.0	108. %
Dissolved Aluminum	ug/L	25.0	25.9	104. %
Dissolved Aluminum	ug/L	25.0	23.7	94.8 %

BLANKS

ANALYTE	UNITS	RESULT
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Chloride	ug/g	< 10
Chloride	ug/g	< 10
Chloride	ug/g	< 10
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	ug/g	< 5
Fluoride	ug/g	< 5
Fluoride	ug/g	< 5
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia	ug/g	< 5
Aluminum	ug/g	< 0.5

QC Summary for sample numbers: 22-A014898 to 22-A014915...

BLANKS continued....

ANALYTE	UNITS	RESULT
Aluminum	ug/g	< 0.5
Aluminum	ug/g	< 0.5
Aluminum	ug/g	< 0.5
Iron	ug/g	< 0.15
Iron	ug/g	< 0.15
Iron	ug/g	< 0.15
Iron	ug/g	< 0.15
Aluminum	ug/L	< 5
Aluminum	ug/L	< 5
Dissolved Aluminum	ug/L	< 1
Dissolved Aluminum	ug/L	< 1

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

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

SUBCONTRACTOR Amtest

PROJECT NAME/NO. 209011

PO # C-343

REMARKS

Page # 1 of 2

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

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Containers	Metals: Al	Fluoride/Chloride	Ammonia							
DPT-18 5-7.2'	14898	8/31/22	0915	S	1	X	X	X							
DPT-18 14-15'	14899	↓	0920	S	1	↓	↓	↓							
DPT-18	14900		0934	W	2										
DPT-19 6-8'	14901		1020	S	1										
DPT-19 12.5-15'	14902		1025	S	1										
DPT-20 6.5-7.5'	14903		1135	S	1										
DPT-20 13.5-15'	14904		1140	S	1										
DPT-20	14905		1155	W	2										
DPT-19	14906		1235	W	2										
DPT-21 6-10'	14907	↓	1330	S	1	↓	↓	↓							

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: Ann W	Ann Webber-Bruya	Friedman & Bruya	9/1/22	1300
Received by:				
Relinquished by:				
Received by:				

FORMS\COC\Subcontract.DOC

FedEx KH 9/2/22 1511 0.1°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.

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

October 10, 2022

Rusty Jones, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Jones:

Included are the results from the testing of material submitted on September 14, 2022 from the Maralco R.I, F&BI 209195 project. There are 45 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Grant Hainsworth, Jamie Stevens
CTC1010R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on September 14, 2022 by Friedman & Bruya, Inc. from the Crete Consulting Maralco R.I, F&BI 209195 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
209195 -01	Dup-220913
209195 -02	MW-3A
209195 -03	MW-6
209195 -04	MW-4
209195 -05	MW-5R
209195 -06	MW-7
209195 -07	MW-8
209195 -08	MW-1
209195 -09	MW-2

The samples were sent to Amtest for fluoride, chloride, ammonia, and aluminum analyses. The report will be forwarded upon receipt.

Lead in the 6020B matrix spike failed the acceptance criteria. The laboratory control sample passed the acceptance criteria, therefore the results were due to matrix effect.

All other quality control requirements were acceptable.

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Dup-220913	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-01
Date Analyzed:	09/20/22	Data File:	209195-01.210
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Chromium	2.00
Cobalt	1.79
Copper	<5
Lead	<1
Nickel	2.03
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Dup-220913	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-01 x5
Date Analyzed:	09/22/22	Data File:	209195-01 x5.149
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	5.94

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Dup-220913	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-01 x25
Date Analyzed:	09/20/22	Data File:	209195-01 x25.195
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	9,100

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-3A	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-02
Date Analyzed:	09/20/22	Data File:	209195-02.208
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Chromium	1.90
Cobalt	<1
Copper	<5
Lead	<1
Nickel	1.13
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-3A	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-02 x5
Date Analyzed:	09/22/22	Data File:	209195-02 x5.150
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-3A	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-02 x10
Date Analyzed:	09/20/22	Data File:	209195-02 x10.196
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	695

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-6	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-03
Date Analyzed:	09/21/22	Data File:	209195-03.211
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Chromium	3.44
Cobalt	2.58
Copper	<5
Nickel	1.32
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-6	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-03 x5
Date Analyzed:	09/22/22	Data File:	209195-03 x5.151
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	33.8
Lead	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-6	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-03 x100
Date Analyzed:	09/20/22	Data File:	209195-03 x100.197
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	49,900

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-4	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-04
Date Analyzed:	09/21/22	Data File:	209195-04.212
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Chromium	3.66
Cobalt	<1
Copper	<5
Nickel	<1
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-4	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-04 x5
Date Analyzed:	09/22/22	Data File:	209195-04 x5.152
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	11.0
Lead	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-4	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-04 x100
Date Analyzed:	09/20/22	Data File:	209195-04 x100.198
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	48,000

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-5R	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-05
Date Analyzed:	09/21/22	Data File:	209195-05.220
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Chromium	3.06
Cobalt	2.84
Copper	<5
Lead	<1
Nickel	4.81
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-5R	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-05 x5
Date Analyzed:	09/22/22	Data File:	209195-05 x5.153
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	12.6
Iron	1,980

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-7	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-06
Date Analyzed:	09/21/22	Data File:	209195-06.221
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Chromium	2.13
Cobalt	1.89
Copper	<5
Lead	<1
Nickel	2.13
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-7	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-06 x5
Date Analyzed:	09/22/22	Data File:	209195-06 x5.154
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	6.17

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-7	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-06 x25
Date Analyzed:	09/20/22	Data File:	209195-06 x25.200
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	10,000

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-8	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-07 x10
Date Analyzed:	09/22/22	Data File:	209195-07 x10.162
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<10
Cadmium	<10
Chromium	<10
Cobalt	17.5
Copper	<50
Lead	<10
Nickel	19.2
Zinc	155

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-8	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-07 x200
Date Analyzed:	09/22/22	Data File:	209195-07 x200.155
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	74,300

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-1	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-08
Date Analyzed:	09/20/22	Data File:	209195-08.202
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	1.12
Copper	<5
Iron	<50
Lead	<1
Nickel	2.79
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-2	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-09
Date Analyzed:	09/20/22	Data File:	209195-09.209
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Cadmium	<1
Chromium	<1
Cobalt	2.70
Copper	<5
Lead	<1
Nickel	5.02
Zinc	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-2	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-09 x5
Date Analyzed:	09/22/22	Data File:	209195-09 x5.117
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<5

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	MW-2	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	209195-09 x50
Date Analyzed:	09/23/22	Data File:	209195-09 x50.076
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	9,410

Analysis For Dissolved Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/20/22	Lab ID:	I2-662 mb
Date Analyzed:	09/20/22	Data File:	I2-662 mb.153
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Iron	<50
Lead	<1
Nickel	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	Dup-220913	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-01
Date Analyzed:	09/16/22	Data File:	209195-01.138
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	5.16
Cadmium	<1
Chromium	2.68
Cobalt	1.78
Copper	<5
Lead	<1
Nickel	2.46
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	Dup-220913	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-01 x100
Date Analyzed:	09/16/22	Data File:	209195-01 x100.078
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	11,100

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-3A	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-02
Date Analyzed:	09/16/22	Data File:	209195-02.127
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.03
Cadmium	<1
Chromium	2.99
Cobalt	<1
Copper	12.4
Iron	1,150
Lead	<1
Nickel	1.66
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-6	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-03
Date Analyzed:	09/16/22	Data File:	209195-03.139
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	2.84
Cobalt	2.03
Copper	<5
Lead	<1
Nickel	1.26
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-6	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-03 x10
Date Analyzed:	09/16/22	Data File:	209195-03 x10.124
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	35.3
Cadmium	<10

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-6	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-03 x100
Date Analyzed:	09/16/22	Data File:	209195-03 x100.111
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	54,200

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-4	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-04
Date Analyzed:	09/16/22	Data File:	209195-04.140
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Chromium	2.99
Cobalt	<1
Copper	5.11
Lead	1.24
Nickel	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-4	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-04 x10
Date Analyzed:	09/16/22	Data File:	209195-04 x10.125
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	12.9
Cadmium	<10
Iron	48,600

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-5R	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-05
Date Analyzed:	09/16/22	Data File:	209195-05.151
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	11.7
Cadmium	<1
Chromium	3.18
Cobalt	2.74
Copper	<5
Iron	2,190
Lead	<1
Nickel	5.26
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-7	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-06
Date Analyzed:	09/16/22	Data File:	209195-06.152
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	5.84
Cadmium	<1
Chromium	2.40
Cobalt	1.66
Copper	<5
Lead	<1
Nickel	2.26
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-7	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-06 x100
Date Analyzed:	09/16/22	Data File:	209195-06 x100.079
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	11,000

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-8	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-07 x10
Date Analyzed:	09/16/22	Data File:	209195-07 x10.160
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<10
Cadmium	<10
Chromium	<10
Cobalt	14.9
Copper	<50
Lead	<10
Nickel	20.0
Zinc	130

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-8	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-07 x200
Date Analyzed:	09/16/22	Data File:	209195-07 x200.129
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	75,400

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-1	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-08
Date Analyzed:	09/16/22	Data File:	209195-08.128
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	1.15
Copper	<5
Iron	93.6
Lead	<1
Nickel	2.97
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-2	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-09
Date Analyzed:	09/16/22	Data File:	209195-09.135
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.69
Cadmium	<1
Chromium	<1
Cobalt	2.51
Copper	<5
Lead	<1
Nickel	4.97
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	MW-2	Client:	Crete Consulting
Date Received:	09/14/22	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	209195-09 x50
Date Analyzed:	09/16/22	Data File:	209195-09 x50.113
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Iron	9,430

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco R.I, F&BI 209195
Date Extracted:	09/15/22	Lab ID:	I2-650 mb
Date Analyzed:	09/15/22	Data File:	I2-650 mb.046
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Cobalt	<1
Copper	<5
Iron	<50
Lead	<1
Nickel	<1
Zinc	<5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/10/22
Date Received: 09/14/22
Project: Maralco R.I, F&BI 209195

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

Laboratory Code: 209277-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	4.20	90	92	75-125	2
Cadmium	ug/L (ppb)	5	<1	96	98	75-125	2
Chromium	ug/L (ppb)	20	<1	83	85	75-125	2
Cobalt	ug/L (ppb)	20	4.02	80	83	75-125	4
Copper	ug/L (ppb)	20	<5	80	83	75-125	4
Iron	ug/L (ppb)	100	9,940	109	509 b	75-125	129 b
Lead	ug/L (ppb)	10	<1	74 vo	75	75-125	1
Nickel	ug/L (ppb)	20	3.10	76	79	75-125	4
Zinc	ug/L (ppb)	50	<5	80	81	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	100	80-120
Cadmium	ug/L (ppb)	5	95	80-120
Chromium	ug/L (ppb)	20	91	80-120
Cobalt	ug/L (ppb)	20	96	80-120
Copper	ug/L (ppb)	20	92	80-120
Iron	ug/L (ppb)	100	87	80-120
Lead	ug/L (ppb)	10	98	80-120
Nickel	ug/L (ppb)	20	95	80-120
Zinc	ug/L (ppb)	50	95	80-120

Date of Report: 10/10/22
Date Received: 09/14/22
Project: Maralco R.I, F&BI 209195

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

Laboratory Code: 209183-01 x10 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	11.8	89	95	75-125	7
Cadmium	ug/L (ppb)	5	<10	98	96	75-125	2
Chromium	ug/L (ppb)	20	<10	94	95	75-125	1
Cobalt	ug/L (ppb)	20	<10	99	100	75-125	1
Copper	ug/L (ppb)	20	<50	94	92	75-125	2
Iron	ug/L (ppb)	100	<500	59 b	104	75-125	55 b
Lead	ug/L (ppb)	10	<10	82	80	75-125	2
Nickel	ug/L (ppb)	20	<10	99	97	75-125	2
Zinc	ug/L (ppb)	50	<50	90	88	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	91	80-120
Cadmium	ug/L (ppb)	5	97	80-120
Chromium	ug/L (ppb)	20	99	80-120
Cobalt	ug/L (ppb)	20	97	80-120
Copper	ug/L (ppb)	20	100	80-120
Iron	ug/L (ppb)	100	114	80-120
Lead	ug/L (ppb)	10	104	80-120
Nickel	ug/L (ppb)	20	98	80-120
Zinc	ug/L (ppb)	50	96	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. 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.

209195

SAMPLE CHAIN OF CUSTODY 09/14/22

BZY

Page # 1 of 1

Report To R. Jones/G. Hainsworth/J. Steven

Company CRETE CONSULTING, Inc.

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME: Maralco R.I.

PO #

REMARKS: *See email for metals list.*

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
- [x] 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	Select Metals	Fluoride/Chloride	Ammonia		Notes
DUP-220913	01 A-D	9.13.2022	0800	WATER	4								X	X	X		Total & Dissolved Metals
MW-3A	02		0916		4								X	X	X		
MW-6	03		1012		4								X	X	X		
MW-4	04		1144		4								X	X	X		
MW-5R	05		1248		4								X	X	X		
MW-7	06		1344		4								X	X	X		
MW-8	07	9.14.22	1004		4								X	X	X		
MW-1	08		1053		4								X	X	X		
MW-2	09		1214		4								X	X	X		

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	CRETE	9/14/2022	1432
Received by:	[signature]	ANH PHAN	F&B	09/14/22	14:32
Relinquished by:					
Received by:			Samples received at 0 °C		

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

AMTEST LABORATORIES

Professional Analytical Services

Oct 20 2022
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL

Dear MICHAEL ERDAHL:

Enclosed please find the analytical data for your project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
DUP-220913	Water	22-A015743	MIN, NUT, MET, Dissolved MET
MW-3A	Water	22-A015744	MIN, NUT, MET, Dissolved MET
MW-6	Water	22-A015745	MIN, NUT, MET, Dissolved MET
MW-4	Water	22-A015746	MIN, NUT, MET, Dissolved MET
MW-5R	Water	22-A015747	MIN, NUT, MET, Dissolved MET
MW-7	Water	22-A015748	MIN, NUT, MET, Dissolved MET
MW-8	Water	22-A015749	MIN, NUT, MET, Dissolved MET
MW-1	Water	22-A015750	MIN, NUT, MET, Dissolved MET
MW-2	Water	22-A015751	MIN, NUT, MET, Dissolved MET

Your samples were received on Thursday, September 15, 2022. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Aaron W Young

Aaron W. Young
Vice President

Project #: 209195
PO Number: C-363

BACT = Bacteriological	MET = Metals	NUT=Nutrients	MIN=Minerals
CONV = Conventionals	ORG = Organics	DEM=Demand	

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project #: 209195
PO Number: C-363
All results reported on an as received basis.

Date Received: 09/15/22
Date Reported: 10/20/22

AMTEST Identification Number **22-A015743**
Client Identification **DUP-220913**
Sampling Date **09/13/22, 08:00**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	482.	mg/l		0.05	EPA 300.0	AY	09/20/22
Fluoride	6.96	mg/l	D	0.5	EPA 300.0	AY	09/16/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	4.90	mg/l		0.02	EPA 350.1	MD	09/29/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	1270	ug/L		5	EPA 200.8	CM	10/06/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	41.2	ug/L		1	EPA 200.8	AY	09/21/22

AMTEST Identification Number **22-A015744**
Client Identification **MW-3A**
Sampling Date **09/13/22, 09:16**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	17.2	mg/l		0.05	EPA 300.0	AY	09/16/22
Fluoride	14.4	mg/l	D	0.5	EPA 300.0	AY	09/16/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.095	mg/l		0.02	EPA 350.1	MD	09/29/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	993.	ug/L		5	EPA 200.8	CM	10/06/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	493.	ug/L		1	EPA 200.8	AY	09/21/22

AMTEST Identification Number 22-A015745
Client Identification MW-6
Sampling Date 09/13/22, 10:12

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	156.	mg/l		0.05	EPA 300.0	AY	09/20/22
Fluoride	22.2	mg/l	D	0.5	EPA 300.0	AY	09/16/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	5.91	mg/l		0.02	EPA 350.1	MD	09/29/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	308.	ug/L		5	EPA 200.8	CM	10/06/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	61.2	ug/L		1	EPA 200.8	AY	09/21/22

AMTEST Identification Number **22-A015746**
Client Identification **MW-4**
Sampling Date **09/13/22, 11:44**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	350.	mg/l		0.05	EPA 300.0	AY	09/20/22
Fluoride	1.39	mg/l	D	0.5	EPA 300.0	AY	09/16/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	3.99	mg/l		0.02	EPA 350.1	MD	09/29/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	159.	ug/L		5	EPA 200.8	CM	10/06/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	8.50	ug/L		1	EPA 200.8	AY	09/21/22

AMTEST Identification Number **22-A015747**
Client Identification **MW-5R**
Sampling Date **09/13/22, 12:48**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	145.	mg/l		0.05	EPA 300.0	AY	09/20/22
Fluoride	0.53	mg/l	D	0.5	EPA 300.0	AY	09/16/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	5.01	mg/l		0.02	EPA 350.1	MD	09/29/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	1500	ug/L		5	EPA 200.8	CM	10/06/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	72.3	ug/L		1	EPA 200.8	AY	09/21/22

AMTEST Identification Number **22-A015748**
Client Identification **MW-7**
Sampling Date **09/13/22, 13:44**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	475.	mg/l		0.05	EPA 300.0	AY	09/20/22
Fluoride	7.98	mg/l	D	0.5	EPA 300.0	AY	09/16/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	4.75	mg/l		0.02	EPA 350.1	MD	09/29/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	487.	ug/L		5	EPA 200.8	CM	10/06/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	43.0	ug/L		1	EPA 200.8	AY	09/21/22

AMTEST Identification Number **22-A015749**
Client Identification **MW-8**
Sampling Date **09/14/22, 10:04**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	3960	mg/l		0.05	EPA 300.0	AY	09/20/22
Fluoride	< 0.5	mg/l	D	0.5	EPA 300.0	AY	09/16/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	35.4	mg/l		0.02	EPA 350.1	MD	09/29/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	13.4	ug/L		5	EPA 200.8	CM	10/06/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	< 1	ug/L		1	EPA 200.8	AY	09/21/22

AMTEST Identification Number **22-A015750**
Client Identification **MW-1**
Sampling Date **09/14/22, 10:53**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	20.3	mg/l		0.05	EPA 300.0	AY	09/16/22
Fluoride	< 0.5	mg/l	D	0.5	EPA 300.0	AY	09/16/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.076	mg/l		0.02	EPA 350.1	MD	09/29/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	33.0	ug/L		5	EPA 200.8	CM	10/06/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	5.84	ug/L		1	EPA 200.8	AY	09/21/22

AMTEST Identification Number **22-A015751**
Client Identification **MW-2**
Sampling Date **09/14/22, 12:14**

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	12.9	mg/l		0.05	EPA 300.0	AY	09/16/22
Fluoride	< 0.5	mg/l	D	0.5	EPA 300.0	AY	09/16/22

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.208	mg/l		0.02	EPA 350.1	MD	09/29/22

ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Aluminum	65.0	ug/L		5	EPA 200.8	CM	10/06/22

Dissolved ICP/MS Metals 200.8

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Aluminum	< 1	ug/L		1	EPA 200.8	AY	09/21/22

D = The reported value is from a dilution.

Aaron W. Young
Aaron W. Young
Vice President

Am Test Inc.
13600 NE 126th PL
Suite C
Kirkland, WA, 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

QC Summary for sample numbers: 22-A015743 to 22-A015751

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
22-A015748	Fluoride	mg/l	7.98	7.92	0.75
22-A015714	Ammonia Nitrogen	mg/l	23.0	22.3	3.1
22-A015777	Ammonia Nitrogen	mg/l	0.147	0.146	0.68
22-A015829	Ammonia Nitrogen	mg/l	0.022	0.022	0.00
22-A015980	Ammonia Nitrogen	mg/l	39.0	39.0	0.00
22-A016016	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
22-A016061	Ammonia Nitrogen	mg/l	32.7	32.8	0.31
22-A016104	Ammonia Nitrogen	mg/l	0.024	0.024	0.00
22-A016118	Ammonia Nitrogen	mg/l	63.2	62.8	0.63
22-A016193	Ammonia Nitrogen	mg/l	1.95	1.93	1.0

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
22-A015748	Fluoride	mg/l	7.98	27.8	20.0	99.10 %
22-A015714	Ammonia Nitrogen	mg/l	23.0	41.2	20.0	91.00 %
22-A015777	Ammonia Nitrogen	mg/l	0.147	1.13	1.00	98.30 %
22-A015829	Ammonia Nitrogen	mg/l	0.022	1.01	1.00	98.80 %
22-A015980	Ammonia Nitrogen	mg/l	39.0	59.2	20.0	101.00 %
22-A016016	Ammonia Nitrogen	mg/l	< 0.02	0.989	1.00	98.90 %
22-A016061	Ammonia Nitrogen	mg/l	32.7	52.0	20.0	96.50 %
22-A016104	Ammonia Nitrogen	mg/l	0.024	0.996	1.00	97.20 %
22-A016118	Ammonia Nitrogen	mg/l	63.2	83.8	20.0	103.00 %
22-A016193	Ammonia Nitrogen	mg/l	1.95	2.91	1.00	96.00 %
22-A015751	Dissolved Aluminum	ug/L	< 1	84.8	100.	84.80 %
22-A015751	Dissolved Aluminum	ug/L	< 1	81.8	100.	81.80 %

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Dissolved Aluminum	ug/L	84.8	81.8	3.6

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Chloride	mg/l	2.00	2.00	100. %
Chloride	mg/l	2.00	1.96	98.0 %
Chloride	mg/l	2.00	1.92	96.0 %
Chloride	mg/l	2.00	1.97	98.5 %
Chloride	mg/l	2.00	2.10	105. %
Chloride	mg/l	2.00	2.08	104. %
Fluoride	mg/l	2.00	1.99	99.5 %
Fluoride	mg/l	2.00	1.98	99.0 %
Fluoride	mg/l	2.00	1.98	99.0 %

QC Summary for sample numbers: 22-A015743 to 22-A015751...

STANDARD REFERENCE MATERIALS continued....

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Fluoride	mg/l	2.00	2.00	100. %
Ammonia Nitrogen	mg/l	1.00	0.947	94.7 %
Ammonia Nitrogen	mg/l	1.00	0.945	94.5 %
Ammonia Nitrogen	mg/l	1.00	0.961	96.1 %
Ammonia Nitrogen	mg/l	1.00	0.965	96.5 %
Aluminum	ug/L	25.0	25.9	104. %
Dissolved Aluminum	ug/L	25.0	28.2	113. %

BLANKS

ANALYTE	UNITS	RESULT
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Fluoride	mg/l	< 0.05
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Aluminum	ug/L	< 5
Dissolved Aluminum	ug/L	< 1

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl
Company Friedman and Bruya, Inc.
Address 3012 16th Ave W
City, State, ZIP Seattle, WA 98119
Phone # (206) 285-8282 Fax # (206) 283-5044

SUBCONTRACTOR Amtest

PROJECT NAME/NO.	PO #
209195	C-363

REMARKS

Page # 1 of 1

TURNAROUND TIME
☒ Standard (~~1 Week~~) 2weeks
☐ RUSH
Rush charges authorized by:

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Containers	Total+Dissolved Metals: Al	Ammonia	Fluoride/chloride								
Dup-220913		9-13-22	0800	Water	2	X	X	X								15743
MW-3A		↓	0916	↓	2	↓	↓	↓								15744
MW-6			1012		2											15745
MW-4			1144		2											15746
MW-5R			1248		2											15747
MW-7			1344		2											15748
MW-8		9-14-22	1004		2											15749
MW-1		↓	1053		2											15750
MW-2			1214		2											15751

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: [signature]	Ann Webber-Bruya	Friedman & Bruya	9/15/22	0800
Received by: [signature]	Kylie Otani	Amtest	9/15/22	14:12
Relinquished by:				
Received by:				

FORMS\COC\Subcontract.DOC

1.6°C Fedex

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

August 2, 2023

Rusty Jones, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Jones:

Included are the results from the testing of material submitted on July 14, 2023 from the Maralco, F&BI 307139 project. There are 43 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Grant Hainsworth
CTC0802R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on July 14, 2023 by Friedman & Bruya, Inc. from the Crete Consulting Maralco, F&BI 307139 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
307139 -01	SED-04 0-0.5'
307139 -02	SED-04 0.5-1'
307139 -03	SED-04 1-1.5'
307139 -04	SED-04 1.5-2'
307139 -05	SED-05N 0-0.5'
307139 -06	SED-05N 0.5-1'
307139 -07	SED-05N 1-1.5'
307139 -08	SED-05N 1.5-2'
307139 -09	SED-05 0-0.5'
307139 -10	SED-05 0.5-1'
307139 -11	SED-05 1-1.5'
307139 -12	SED-05 1.5-2'
307139 -13	SED-05S1 0-0.5'
307139 -14	SED-05S1 0.5-1'
307139 -15	SED-05S1 1-1.5'
307139 -16	SED-05S1 1.5-2'
307139 -17	SED-05S2 0-0.5'
307139 -18	SED-05S2 0.5-1'
307139 -19	SED-05S2 1-1.5'
307139 -20	SED-05S2 1.5-2'
307139 -21	SED-05S3 0-0.5'
307139 -22	SED-05S3 0.5-1'
307139 -23	SED-05S3 1-1.5'
307139 -24	SED-05S3 1.5-2'
307139 -25	SED-06 0-0.5'
307139 -26	SED-06 0.5-1'
307139 -27	SED-06 1-1.5'
307139 -28	SED-06 1.5-2'
307139 -29	SED-07N 0-0.5'
307139 -30	SED-07N 0.5-1'
307139 -31	SED-07N 1-1.5'
307139 -32	SED-07N 1.5-2'
307139 -33	SED-07 0-0.5'
307139 -34	SED-07 0.5-1'
307139 -35	SED-07 1-1.5'

CASE NARRATIVE (continued)

Laboratory ID	Crete Consulting
307139 -36	SED-07 1.5-2'
307139 -37	SED-07S1 0-0.5'
307139 -38	SED-07S1 0.5-1'
307139 -39	SED-07S1 1-1.5'
307139 -40	SED-07S1 1.5-2'
307139 -41	SED-07S2 0-0.5'
307139 -42	SED-07S2 0.5-1'
307139 -43	SED-07S2 1-1.5'
307139 -44	SED-07S2 1.5-2'
307139 -45	SED-07S3 0-0.5'
307139 -46	SED-07S3 0.5-1'
307139 -47	SED-07S3 1-1.5'
307139 -48	SED-07S3 1.5-2'
307139 -49	SED-08 0-0.5'
307139 -50	SED-08 0.5-1'
307139 -51	SED-08 1-1.5'
307139 -52	SED-08 1.5-2'
307139 -53	EB-071123

A 6020B internal standard failed the acceptance criteria for sample SED-05S1 0.5-1'. The sample was diluted and reanalyzed with acceptable results. Both data sets were reported.

Several metals in the 6020B soil matrix spike and matrix spike duplicate failed the acceptance criteria. The laboratory control sample passed the acceptance criteria, therefore the results were due to matrix effect.

All other quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-04 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-01
Date Analyzed:	07/14/23	Data File:	307139-01.169
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	16.3
Cadmium	1.04
Mercury	<0.66
Silver	<0.57

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-04 0-0.5'	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-01 x5
Date Analyzed:	07/14/23	Data File:	307139-01 x5.164
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	14.9
Copper	82.6
Nickel	8.12

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-04 0.5-1'	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/24/23	Lab ID:	307139-02
Date Analyzed:	07/25/23	Data File:	307139-02.054
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	MG

Analyte:	Concentration mg/kg (ppm)
Arsenic	6.86
Cadmium	<1
Mercury	<0.66
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-04 0.5-1'	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/24/23	Lab ID:	307139-02 x5
Date Analyzed:	07/25/23	Data File:	307139-02 x5.041
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	MG

Analyte:	Concentration mg/kg (ppm)
Chromium	11.7
Copper	44.0
Nickel	9.74

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05N 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-05
Date Analyzed:	07/14/23	Data File:	307139-05.172
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	7.10
Cadmium	<1
Chromium	11.6
Copper	18.6
Mercury	<0.66
Nickel	10.3
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-09
Date Analyzed:	07/14/23	Data File:	307139-09.173
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	28.6
Cadmium	1.99
Mercury	<0.66
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-09 x5
Date Analyzed:	07/20/23	Data File:	307139-09 x5.076
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	26.1
Copper	149
Nickel	16.4

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05 0.5-1'	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/24/23	Lab ID:	307139-10
Date Analyzed:	07/25/23	Data File:	307139-10.057
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	MG

Analyte:	Concentration mg/kg (ppm)
Arsenic	15.2
Cadmium	<1
Mercury	<0.66
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05 0.5-1’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/24/23	Lab ID:	307139-10 x5
Date Analyzed:	07/26/23	Data File:	307139-10 x5.102
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	16.0
Copper	68.0
Nickel	9.20

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05S1 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-13
Date Analyzed:	07/14/23	Data File:	307139-13.174
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	45.8
Cadmium	1.15
Mercury	<0.66
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05S1 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-13 x5
Date Analyzed:	07/20/23	Data File:	307139-13 x5.131
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	10.3
Copper	30.8
Nickel	6.58

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05S1 0.5-1’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/24/23	Lab ID:	307139-14
Date Analyzed:	07/25/23	Data File:	307139-14.058
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	MG

Analyte:	Concentration mg/kg (ppm)
Arsenic	40.7
Cadmium	<1
Chromium	2.35 J
Copper	<5 J
Mercury	<0.66
Nickel	1.31 J
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05S1 0.5-1’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/24/23	Lab ID:	307139-14 x10
Date Analyzed:	07/27/23	Data File:	307139-14 x10.097
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	<10
Copper	<50
Nickel	<10

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05S2 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-17
Date Analyzed:	07/14/23	Data File:	307139-17.175
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	2.64
Cadmium	<1
Chromium	9.40
Copper	14.8
Mercury	<0.66
Nickel	6.95
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05S3 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-21
Date Analyzed:	07/14/23	Data File:	307139-21.176
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	2.89
Cadmium	<1
Chromium	8.18
Copper	16.0
Mercury	<0.66
Nickel	7.25
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-06 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-25
Date Analyzed:	07/14/23	Data File:	307139-25.177
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	25.9
Cadmium	1.92
Mercury	<0.66
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-06 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-25 x5
Date Analyzed:	07/20/23	Data File:	307139-25 x5.078
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	12.3
Copper	89.4
Nickel	6.96

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-06 0.5-1'	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/24/23	Lab ID:	307139-26
Date Analyzed:	07/25/23	Data File:	307139-26.059
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	MG

Analyte:	Concentration mg/kg (ppm)
Arsenic	9.63
Cadmium	2.51
Mercury	<0.66
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-06 0.5-1'	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/24/23	Lab ID:	307139-26 x5
Date Analyzed:	07/26/23	Data File:	307139-26 x5.104
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	26.3
Copper	277
Nickel	13.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-07N 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-29
Date Analyzed:	07/14/23	Data File:	307139-29.178
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	3.28
Cadmium	<1
Chromium	13.6
Copper	24.9
Mercury	<0.66
Nickel	12.6
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-07 0-0.5'	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-33
Date Analyzed:	07/14/23	Data File:	307139-33.181
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	19.6
Cadmium	1.24
Mercury	<0.66
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-07 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-33 x5
Date Analyzed:	07/20/23	Data File:	307139-33 x5.132
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	12.9
Copper	120
Nickel	8.27

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-07 0.5-1’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-34
Date Analyzed:	07/14/23	Data File:	307139-34.182
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	3.73
Cadmium	4.45
Chromium	77.2
Copper	495
Mercury	<0.66
Nickel	24.3
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-07 1-1.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-35
Date Analyzed:	07/14/23	Data File:	307139-35.183
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	2.97
Cadmium	<1
Chromium	7.58
Copper	34.7
Mercury	<0.66
Nickel	4.88
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-07S1 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-37
Date Analyzed:	07/14/23	Data File:	307139-37.184
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	6.82
Cadmium	<1
Chromium	9.49
Copper	23.9
Mercury	<0.66
Nickel	6.89
Silver	<0.57

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ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-07S2 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-41
Date Analyzed:	07/14/23	Data File:	307139-41.185
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	4.78
Cadmium	<1
Chromium	8.33
Copper	14.3
Mercury	<0.66
Nickel	6.53
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-07S3 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-45
Date Analyzed:	07/14/23	Data File:	307139-45.186
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	5.71
Cadmium	<1
Chromium	8.05
Copper	16.0
Mercury	<0.66
Nickel	6.46
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-08 0-0.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-49
Date Analyzed:	07/14/23	Data File:	307139-49.187
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	19.8
Cadmium	1.34
Mercury	<0.66
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-08 0-0.5'	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-49 x5
Date Analyzed:	07/20/23	Data File:	307139-49 x5.080
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	18.9
Copper	137
Nickel	9.62

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-08 0.5-1’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-50
Date Analyzed:	07/14/23	Data File:	307139-50.188
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	9.50
Cadmium	1.78
Mercury	<0.66
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-08 0.5-1’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-50 x5
Date Analyzed:	07/20/23	Data File:	307139-50 x5.081
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	30.6
Copper	196
Nickel	14.8

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-08 1-1.5'	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-51
Date Analyzed:	07/14/23	Data File:	307139-51.189
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	5.85
Cadmium	<1
Mercury	<0.66
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-08 1-1.5'	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-51 x5
Date Analyzed:	07/17/23	Data File:	307139-51 x5.158
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	16.2
Copper	95.6
Nickel	7.18

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	I3-552 mb
Date Analyzed:	07/17/23	Data File:	I3-552 mb.093
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Mercury	<0.66
Nickel	<1
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 307139
Date Extracted:	07/24/23	Lab ID:	I3-572 mb
Date Analyzed:	07/25/23	Data File:	I3-572 mb.035
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Mercury	<0.66
Nickel	<1
Silver	<0.57

Analysis For Total Metals By EPA Method 6020B

Client ID:	EB-071123	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	307139-53
Date Analyzed:	07/17/23 18:55:23	Data File:	307139-53.135
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	2.78
Copper	<5
Mercury	<1
Nickel	<1
Silver	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 307139
Date Extracted:	07/14/23	Lab ID:	I3-551 mb rr
Date Analyzed:	07/17/23 15:47:57	Data File:	I3-551 mb rr.094
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Mercury	<1
Nickel	<1
Silver	<1

Date of Report: 08/02/23
Date Received: 07/14/23
Project: Maralco, F&BI 307139

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

Laboratory Code: 307139-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	10.1	15 b	38 b	75-125	87 b
Cadmium	mg/kg (ppm)	10	<5	81	85	75-125	5
Chromium	mg/kg (ppm)	50	8.93	71 vo	78	75-125	9
Copper	mg/kg (ppm)	50	49.5	54 b	83 b	75-125	42 b
Mercury	mg/kg (ppm	5	<5	78	83	75-125	6
Nickel	mg/kg (ppm)	25	<5	73 vo	80	75-125	9
Silver	mg/kg (ppm)	10	<5	79	85	75-125	7

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	106	80-120
Cadmium	mg/kg (ppm)	10	96	80-120
Chromium	mg/kg (ppm)	50	95	80-120
Copper	mg/kg (ppm)	50	98	80-120
Mercury	mg/kg (ppm)	5	91	80-120
Nickel	mg/kg (ppm)	25	98	80-120
Silver	mg/kg (ppm)	10	97	80-120

Date of Report: 08/02/23
Date Received: 07/14/23
Project: Maralco, F&BI 307139

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

Laboratory Code: 307139-02 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	5.05	87 b	89 b	75-125	2 b
Cadmium	mg/kg (ppm)	10	<5	97	94	75-125	3
Chromium	mg/kg (ppm)	50	8.86	91	86	75-125	6
Copper	mg/kg (ppm)	50	33.4	84 b	78 b	75-125	7 b
Mercury	mg/kg (ppm	5	<5	93	88	75-125	6
Nickel	mg/kg (ppm)	25	7.40	96 b	91 b	75-125	5 b
Silver	mg/kg (ppm)	10	<5	96	95	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	91	80-120
Cadmium	mg/kg (ppm)	10	92	80-120
Chromium	mg/kg (ppm)	50	92	80-120
Copper	mg/kg (ppm)	50	91	80-120
Mercury	mg/kg (ppm)	5	86	80-120
Nickel	mg/kg (ppm)	25	91	80-120
Silver	mg/kg (ppm)	10	92	80-120

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/02/23
Date Received: 07/14/23
Project: Maralco, F&BI 307139

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

Laboratory Code: 307139-53 rr (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<1	99	101	75-125	2
Cadmium	ug/L (ppb)	5	<1	92	92	75-125	0
Chromium	ug/L (ppb)	20	2.78	96	97	75-125	1
Copper	ug/L (ppb)	20	<5	96	98	75-125	2
Mercury	ug/L (ppb)	5	<1	83	85	75-125	2
Nickel	ug/L (ppb)	20	<1	96	97	75-125	1
Silver	ug/L (ppb)	5	<1	92	93	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	102	80-120
Cadmium	ug/L (ppb)	5	92	80-120
Chromium	ug/L (ppb)	20	93	80-120
Copper	ug/L (ppb)	20	96	80-120
Mercury	ug/L (ppb)	5	89	80-120
Nickel	ug/L (ppb)	20	96	80-120
Silver	ug/L (ppb)	5	95	80-120

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.

307139

SAMPLE CHAIN OF CUSTODY 07/14/23

[redacted]

M4

Report To R. Jones / G. Hainsworth

Company Crete Consulting

Address 16300 Christensen Rd, Ste 214

City, State, ZIP Tukwila, WA 98188

Phone 832.330.1359 Email

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME	PO #
Maralco	Maralco

REMARKS	INVOICE TO
Metals Lists: Arsenic, cadmium, chromium, copper, mercury, nickel, silver. Project specific RLs? - Yes / No	CRETE

Page # 1 of 6

TURNAROUND TIME
- X Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- X 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	METALS				Notes
SED-04 0-0.5'	01	7/11/2023	0935	SEDIMENT/SOIL	1								X				
SED-04 0.5-1'	02		0940		1												A-per RJ 07/24/23 ME
SED-04 1-1.5'	03		0945		1								A				
SED-04 1.5-2'	04		0950		1												B-per RJ 08/02/23 ME
SED-05N 0-0.5'	05		1030		1								X				
SED-05N 0.5-1'	06		1035		1												
SED-05N 1-1.5'	07		1040		1												
SED-05N 1.5-2'	08		1045		1												
SED-05 0-0.5'	09		1050		1								X				
SED-05 0.5-1'	10		1055		1								A				

Samples received at 0 °C

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	7/14/2023	0924
Received by: [signature]	NHUT TRUONG	F&BI	7/14/23	0924
Relinquished by:				
Received by:				

SAMPLE CHAIN OF CUSTODY 07/14/23

307139 [redacted]

M4

Page # 2 of 6

Report To R. Jones / G. Hainsworth

Company Crete Consulting

Address

City, State, ZIP

Phone ______ Email ______

SAMPLERS (signature) Rusty Jones R Jones [redacted]

PROJECT NAME Maralco

PO #

REMARKS See Metals List page 1.

Project specific RLs? - Yes / No

INVOICE TO CRETE

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	METALS				Notes
SED-05 1-1.5'	11	7/11/2023	1100	SEDIMENT/SOIL	1								B				
SED-05 1.5-2'	12		1105		1								B				
SED-05S1 0-0.5'	13		1120		1								X				
SED-05S1 0.5-1'	14		1125		1								A				
SED-05S1 1-1.5'	15		1130		1								B				
SED-05S1 1.5-2'	16		1135		1								B				
SED-05S2 0-0.5'	17		1140		1								X				
SED-05S2 0.5-1'	18		1145		1												
SED-05S2 1-1.5'	19		1150		1												Samples received at 0 °C
SED-05S2 1.5-2'	20		1155		1												

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R Jones	Rusty Jones	CRETE	7/14/2023	0924
Received by:		NHUT TRUONG	F&BI	7/14/23	924
Relinquished by:					
Received by:					

307139

SAMPLE CHAIN OF CUSTODY 07/14/23

M4

Page # 3 of 6

Report To R. Jones / G. Hainsworth

Company Crete Consulting

Address

City, State, ZIP

Phone ____ Email ____

SAMPLERS (signature) Rusty Jones R. Jones [redacted]	
PROJECT NAME: Maralco	PO #
REMARKS: See METALS list Page 1 Project specific RLs? - Yes / No	INVOICE TO: CRETE

TURNAROUND TIME
- [X] Standard turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [X] 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	METALS				Notes
SED-0553 0-0.5'	21	7/11/2023	1200	SEDIMENT/SOIL	1								X				
SED-0553 0.5-1'	22		1205		1												
SED-0553 1-1.5'	23		1210		1												
SED-0553 1.5-2'	24		1215		1												
SED-06 0-0.5'	25		1250	SEDIMENT/SOIL	1								X				
SED-06 0.5-1'	26		1255		1								A				
SED-06 1-1.5'	27		1300		1								B				
SED-06 1.5-2'	28		1305		1								B				
SED-07N 0-0.5'	29		1320		1								X				
SED-07N 0.5-1'	30		1325		1												

Samples received at 0 °C

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	7/14/2023	0924
Received by: [signature]	NHUT TRUONG	F&BI	7/14/23	924
Relinquished by:				
Received by:				

30 7139

SAMPLE CHAIN OF CUSTODY 07/14/23

M4

Page # 4 of 6

Report To R. Jones / G. Hainsworth

Company Crete Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME: Maraleo

PO #

REMARKS: See METALS list Page 1

Project specific RLs? - Yes / No

INVOICE TO: Crete

TURNAROUND TIME
- [x] Standard turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [x] 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	METALS				Notes
SED-07N 1-1.5'	31	7/11/2023	1330	SEDIMENT/ SOIL	1												
SED-07N 1.5-2'	32		1335		1												
SED-07 0-0.5'	33		1350		1								X				
SED-07 0.5-1'	34		1355		1								X				
SED-07 1-1.5'	35		1400		1								X				
SED-07 1.5-2'	36		1405		1												
SED-07S1 0-0.5'	37		1420		1								X				
SED-07S1 0.5-1'	38		1425		1												
SED-07S1 1-1.5'	39		1430		1												
SED-07S1 1.5-2'	40		1435		1												

Samples received at 0 °C

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	CRETE	7/14/23	0924
Received by:	[signature]	NHUTTRUONG	F&BI	7/14/23	924
Relinquished by:					
Received by:					

307139 [redacted]

SAMPLE CHAIN OF CUSTODY 07/14/23 M4

Report To R. Jones / G. Hairsworth

Company Crete Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones [redacted]

PROJECT NAME: Marako

PO #

REMARKS: See METALS list Page 1.

Project specific RLs? - Yes / No

INVOICE TO: Crete

Page # 5 of 6

TURNAROUND TIME
- X Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- X 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	METALS				Notes
SED-07S2 0-0.5'	41	7/11/2023	1440	SEDIMENT/SOIL	1								X				
SED-07S2 0.5-1'	42		1445		1												
SED-07S2 1-1.5'	43		1450		1												
SED-07S2 1.5-2'	44		1455		1												
SED-07S3 0-0.5'	45		1500		1								X				
SED-07S3 0.5-1'	46		1505		1												
SED-07S3 1-1.5'	47		1510		1												
SED-07S3 1.5-2'	48		1515		1												
SED-08 0-0.5'	49		1545		1								X				
SED-08 0.5-1'	50		1550		1								X				

Samples received at 0 °C

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	Crete	7/14/23	0924
Received by:	[signature]	NHUT TRUONG	F&BI	7/14/23	924
Relinquished by:					
Received by:					

307139

SAMPLE CHAIN OF CUSTODY 07/14/23 M4

Report To R. Jones / G. Hainsworth

Company Crete Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones [redacted]	
PROJECT NAME Maralco	PO#
REMARKS See METALS list Page 1 Project specific RLs? · Yes / No	INVOICE TO CRETE

Page # 6 of 6

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	METALS				Notes
SED-08 1-1.5'	51	7/11/2023	1555	SEDIMENT/SOIL	1								X				
SED-08 1.5-2'	52	↓	1600	↓	1												
EB-071123	53	↓	1620	WATER	1								X				

Samples received at Ø °C

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	CRETE	7/14/23	0924
Received by:		NHUT TRUONG	F&BI	7/14/23	924
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

August 14, 2023

Rusty Jones, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Jones:

Included are the additional results from the testing of material submitted on July 14, 2023 from the Maralco, F&BI 307139 project. There are 13 pages included in this report.

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

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Grant Hainsworth
CTC0814R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on July 14, 2023 by Friedman & Bruya, Inc. from the Crete Consulting Maralco, F&BI 307139 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
307139 -01	SED-04 0-0.5'
307139 -02	SED-04 0.5-1'
307139 -03	SED-04 1-1.5'
307139 -04	SED-04 1.5-2'
307139 -05	SED-05N 0-0.5'
307139 -06	SED-05N 0.5-1'
307139 -07	SED-05N 1-1.5'
307139 -08	SED-05N 1.5-2'
307139 -09	SED-05 0-0.5'
307139 -10	SED-05 0.5-1'
307139 -11	SED-05 1-1.5'
307139 -12	SED-05 1.5-2'
307139 -13	SED-05S1 0-0.5'
307139 -14	SED-05S1 0.5-1'
307139 -15	SED-05S1 1-1.5'
307139 -16	SED-05S1 1.5-2'
307139 -17	SED-05S2 0-0.5'
307139 -18	SED-05S2 0.5-1'
307139 -19	SED-05S2 1-1.5'
307139 -20	SED-05S2 1.5-2'
307139 -21	SED-05S3 0-0.5'
307139 -22	SED-05S3 0.5-1'
307139 -23	SED-05S3 1-1.5'
307139 -24	SED-05S3 1.5-2'
307139 -25	SED-06 0-0.5'
307139 -26	SED-06 0.5-1'
307139 -27	SED-06 1-1.5'
307139 -28	SED-06 1.5-2'
307139 -29	SED-07N 0-0.5'
307139 -30	SED-07N 0.5-1'
307139 -31	SED-07N 1-1.5'
307139 -32	SED-07N 1.5-2'
307139 -33	SED-07 0-0.5'
307139 -34	SED-07 0.5-1'
307139 -35	SED-07 1-1.5'
307139 -36	SED-07 1.5-2'

CASE NARRATIVE (continued)

Laboratory ID	Crete Consulting
307139 -37	SED-07S1 0-0.5'
307139 -38	SED-07S1 0.5-1'
307139 -39	SED-07S1 1-1.5'
307139 -40	SED-07S1 1.5-2'
307139 -41	SED-07S2 0-0.5'
307139 -42	SED-07S2 0.5-1'
307139 -43	SED-07S2 1-1.5'
307139 -44	SED-07S2 1.5-2'
307139 -45	SED-07S3 0-0.5'
307139 -46	SED-07S3 0.5-1'
307139 -47	SED-07S3 1-1.5'
307139 -48	SED-07S3 1.5-2'
307139 -49	SED-08 0-0.5'
307139 -50	SED-08 0.5-1'
307139 -51	SED-08 1-1.5'
307139 -52	SED-08 1.5-2'
307139 -53	EB-071123

All quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05 1-1.5'	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	08/03/23	Lab ID:	307139-11
Date Analyzed:	08/03/23	Data File:	307139-11.199
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	30.8
Cadmium	1.73
Mercury	<0.66
Silver	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05 1-1.5’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	08/03/23	Lab ID:	307139-11 x5
Date Analyzed:	08/10/23	Data File:	307139-11 x5.277
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	26.9
Copper	207
Nickel	13.9

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05 1.5-2’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	08/03/23	Lab ID:	307139-12
Date Analyzed:	08/03/23	Data File:	307139-12.200
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	16.0
Cadmium	1.01
Mercury	<0.33
Silver	<0.25

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05 1.5-2’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	08/03/23	Lab ID:	307139-12 x5
Date Analyzed:	08/10/23	Data File:	307139-12 x5.280
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	23.1
Copper	118
Nickel	12.3

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05S1 1-1.5'	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	08/03/23	Lab ID:	307139-15
Date Analyzed:	08/03/23	Data File:	307139-15.203
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	7.50
Cadmium	<1
Chromium	7.86
Copper	11.5
Mercury	<0.33
Nickel	4.44
Silver	<0.25

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-05S1 1.5-2’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	08/03/23	Lab ID:	307139-16
Date Analyzed:	08/03/23	Data File:	307139-16.204
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	2.34
Cadmium	<1
Chromium	6.44
Copper	7.82
Mercury	<0.33
Nickel	3.93
Silver	<0.25

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-06 1-1.5'	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	08/03/23	Lab ID:	307139-27
Date Analyzed:	08/03/23	Data File:	307139-27.205
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	11.4
Cadmium	4.65
Chromium	23.1
Copper	189
Mercury	<0.66
Nickel	14.7
Silver	<0.5

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	SED-06 1.5-2’	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307139
Date Extracted:	08/03/23	Lab ID:	307139-28
Date Analyzed:	08/04/23	Data File:	307139-28.206
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	3.36
Cadmium	<1
Chromium	8.35
Copper	16.1
Mercury	<0.33
Nickel	5.15
Silver	<0.25

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 307139
Date Extracted:	08/03/23	Lab ID:	I3-608 mb
Date Analyzed:	08/04/23	Data File:	I3-608 mb.109
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Cadmium	<1
Chromium	<1
Copper	<5
Mercury	<0.33
Nickel	<1
Silver	<0.25

Date of Report: 08/14/23
Date Received: 07/14/23
Project: Maralco, F&BI 307139

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

Laboratory Code: 308021-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	<5	97	103	75-125	6
Cadmium	mg/kg (ppm)	10	<5	100	106	75-125	6
Chromium	mg/kg (ppm)	50	19.2	105 b	109 b	75-125	4 b
Copper	mg/kg (ppm)	50	37.1	128 b	110 b	75-125	15 b
Mercury	mg/kg (ppm	5	<5	95	106	75-125	11
Nickel	mg/kg (ppm)	25	21.0	117 b	120 b	75-125	3 b
Silver	mg/kg (ppm)	10	<5	98	107	75-125	9

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	94	80-120
Cadmium	mg/kg (ppm)	10	93	80-120
Chromium	mg/kg (ppm)	50	95	80-120
Copper	mg/kg (ppm)	50	93	80-120
Mercury	mg/kg (ppm)	5	94	80-120
Nickel	mg/kg (ppm)	25	96	80-120
Silver	mg/kg (ppm)	10	93	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.

307139

SAMPLE CHAIN OF CUSTODY 07/14/23

M4

[redacted]
Report To R. Jones / G. Hainsworth
Company Crete Consulting
Address 16300 Christensen Rd, Ste 214
City, State, ZIP Tukwila, WA 98188
Phone 832.330.1359 Email

SAMPLERS (signature) Rusty Jones R. Jones [redacted]

PROJECT NAME Maralco | PO # Maralco

REMARKS Metals List: Arsenic, cadmium, chromium, copper, mercury, nickel, silver.
Project specific RLs? - Yes / No

INVOICE TO CRETE

Page # 1 of 6

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	METALS				Notes
SED-04 0-0.5'	01	7/11/2023	0935	SEDIMENT/SOIL	1								X				
SED-04 0.5-1'	02		0940		1												A-per RJ 07/24/23 ME
SED-04 1-1.5'	03		0945		1								A				
SED-04 1.5-2'	04		0950		1												B-per RJ 08/02/23 ME
SED-05N 0-0.5'	05		1030		1								X				
SED-05N 0.5-1'	06		1035		1												
SED-05N 1-1.5'	07		1040		1												
SED-05N 1.5-2'	08		1045		1												
SED-05 0-0.5'	09		1050		1								X				
SED-05 0.5-1'	10	↓	1055	↓	1								A				

Samples received at 0 °C

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

SIGNATURE		PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	CRETE	7/14/2023	0924
Received by:	[signature]	NHUT TRUONG	F&BI	7/14/23	0924
Relinquished by:					
Received by:					

307139 [redacted]

Report To R. Jones / G. Hainsworth

Company Crete Consulting

Address

City, State, ZIP

Phone Email

SAMPLE CHAIN OF CUSTODY 07/14/23

M4

SAMPLERS (signature) Rusty Jones R Jones [redacted]

PROJECT NAME Maralco

PO #

REMARKS See Metals List page 1.

INVOICE TO CRETE

Project specific RLs? - Yes / No

TURNAROUND TIME
- X Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- X 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	METALS				Notes
SED-05 1-1.5'	11	7/11/2023	1100	SEDIMENT/SOIL	1								B				
SED-05 1.5-2'	12	↓	1105	↓	1								B				
SED-05S1 0-0.5'	13		1120		1								X				
SED-05S1 0.5-1'	14		1125		1								A				
SED-05S1 1-1.5'	15		1130		1								B				
SED-05S1 1.5-2'	16		1135		1								B				
SED-05S2 0-0.5'	17		1140		1								X				
SED-05S2 0.5-1'	18		1145		1												
SED-05S2 1-1.5'	19		1150		1												Samples received at 0 °C
SED-05S2 1.5-2'	20	↓	1155	↓	1												

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R Jones	Rusty Jones	CRETE	7/14/2023	0924
Received by:	[signature]	NHUT TRUONG	F&BI	7/14/23	924
Relinquished by:					
Received by:					

307139

SAMPLE CHAIN OF CUSTODY 07/14/23

M4

Page # 3 of 6

Report To R. Jones / G. Hainsworth

Company Crete Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones	[redacted]
PROJECT NAME Maralco	PO #
REMARKS See METALS list Page 1 Project specific RLs? - Yes / No	INVOICE TO CRETE

TURNAROUND TIME
- [x] Standard turnaround
- [ ] RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
- [x] 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	METALS				Notes
SED-0553 0-0.5'	21	7/11/2023	1200	SEDIMENT/SOIL	1								X				
SED-0553 0.5-1'	22		1205		1												
SED-0553 1-1.5'	23		1210		1												
SED-0553 1.5-2'	24		1215		1												
SED-06 0-0.5'	25		1250	SEDIMENT/SOIL	1								X				
SED-06 0.5-1'	26		1255		1								A				
SED-06 1-1.5'	27		1300		1								B				
SED-06 1.5-2'	28		1305		1								B				
SED-07N 0-0.5'	29		1320		1								X				
SED-07N 0.5-1'	30		1325		1												Samples received at 0 °C

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	7/14/2023	0924
Received by: [signature]	NHUT TRUONG	F&BI	7/14/23	924
Relinquished by:				
Received by:				

30 7139

SAMPLE CHAIN OF CUSTODY 07/14/23

M4

Page # 4 of 6

Report To R. Jones / G. Hainsworth

Company Crete Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones

PROJECT NAME Maraleo

PO#

REMARKS See METALS list Page 1

Project specific RLs? - Yes / No

INVOICE TO Crete

TURNAROUND TIME
- X Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- X 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	METALS				Notes
SED-07N 1-1.5'	31	7/11/2023	1330	SEDIMENT/SOIL	1												
SED-07N 1.5-2'	32	↓	1335	↓	1												
SED-07 0-0.5'	33	↓	1350	↓	1								X				
SED-07 0.5-1'	34	↓	1355	↓	1								X				
SED-07 1-1.5'	35	↓	1400	↓	1								X				
SED-07 1.5-2'	36	↓	1405	↓	1												
SED-07S1 0-0.5'	37	↓	1420	↓	1								X				
SED-07S1 0.5-1'	38	↓	1425	↓	1												
SED-07S1 1-1.5'	39	↓	1430	↓	1												
SED-07S1 1.5-2'	40	↓	1435	↓	1								Samples received at 0 °C				

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	7/14/23	0924
Received by: [signature]	NHUT TRUONG	F&B +	7/14/23	924
Relinquished by:				
Received by:				

307139 [redacted]

SAMPLE CHAIN OF CUSTODY 07/14/23

M4

Page # 5 of 6

Report To R. Jones/G. Hairsworth

Company Crete Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones [redacted]	
PROJECT NAME Marako	PO #
REMARKS See METALS list Page 1. Project specific RLs? - Yes / No	INVOICE TO Crete

TURNAROUND TIME
- [x] Standard turnaround
- [ ] RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
- [x] 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	METALS				Notes
SED-07S2 0-0.5'	41	7/11/2023	1440	SEDIMENT/SOIL	1								X				
SED-07S2 0.5-1'	42		1445		1												
SED-07S2 1-1.5'	43		1450		1												
SED-07S2 1.5-2'	44		1455		1												
SED-07S3 0-0.5'	45		1500		1								X				
SED-07S3 0.5-1'	46		1505		1												
SED-07S3 1-1.5'	47		1510		1												
SED-07S3 1.5-2'	48		1515		1												
SED-08 0-0.5'	49		1545		1								X				
SED-08 0.5-1'	50		1550		1								X				

Samples received at 0 °C

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	Crete	7/14/23	0924
Received by: [signature]	NHUT TRUONG	F&BI	7/14/23	924
Relinquished by:				
Received by:				

307139

SAMPLE CHAIN OF CUSTODY 07/14/23 [redacted] M4

Report To R. Jones / G. Hainsworth

Company Crete Consulting

Address

City, State, ZIP

Phone Email

SAMPLERS (signature) Rusty Jones R. Jones	
PROJECT NAME Maralco	PO#
REMARKS See METALS list Page 1 Project specific RLs? · Yes / No	INVOICE TO CRETE

Page # 6 of 6

TURNAROUND TIME
- X Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- X 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	METALS				Notes
SED-08 1-1.5'	51	7/11/2023	1555	SEDIMENT/SOIL	1								X				
SED-08 1.5-2'	52	↓	1600	↓	1												
EB-071123	53	↓	1620	WATER	1								X				

Samples received at Ø °C

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	CRETE	7/14/23	0924
Received by:		NHUT TRUONG	F&BI	7/14/23	924
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

August 3, 2023

Grant Hainsworth, Project Manager
Crete Consulting
16300 Christensen Road, Suite 214
Tukwila, WA 98188

Dear Mr Hainsworth:

Included are the results from the testing of material submitted on July 14, 2023 from the Maralco, F&BI 307140 project. There are 47 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Rusty Jones, Jamie Stevens
CTC0803R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on July 14, 2023 by Friedman & Bruya, Inc. from the Crete Consulting Maralco, F&BI 307140 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Crete Consulting
307140 -01	Pile-A
307140 -02	Pile-B
307140 -03	Pile-E
307140 -04	Pile-F
307140 -05	Conex-Drums
307140 -06	Pile-C
307140 -07	Pile-C-Drums
307140 -08	Pile-D
307140 -09	Silo-4-Bins
307140 -10	Silo-3-Bins
307140 -11	Silo-2-Bins
307140 -12	Silo-1-Bins
307140 -13	Bins
307140 -14	EB-071223-1
307140 -15	EB-071223-2

Samples Pile-A, Pile-B, Pile-E, Pile-F, Conex-Drums, Pile-C, Pile-C-Drums, Pile-D, and Bins were sent to Fremont Analytical for ammonia, potassium, sodium, and chloride analyses. In addition, the same samples were sent to Amtest for sulfide, flashpoint, and cyanide analyses. Samples Pile-B, Pile-E, Conex-Drums, Pile-D, and Bins were sent to Rainier Environmental for dangerous waste testing by fish bioassay analysis. The reports are enclosed.

The 6020B selenium calibration standard exceeded the acceptance criteria in sample Conex-Drums. The metal was not detected, therefore this did not represent an out of control condition.

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 08/03/23
Date Received: 07/14/23
Project: Maralco, F&BI 307140
Date Extracted: 07/12/23
Date Analyzed: 07/19/23

RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR pH USING EPA METHOD 9045D

Sample ID Laboratory ID	pH
Pile-A 307140-01	8.8
Pile-B 307140-02	8.3
Pile-E 307140-03	9.0
Pile-F 307140-04	8.3
Conex-Drums 307140-05	8.1
Pile-C 307140-06	8.2
Pile-C-Drums 307140-07	7.5
Pile-D 307140-08	8.0
Bins 307140-13	7.3

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-A	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-01
Date Analyzed:	07/14/23	Data File:	307140-01.122
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	8.16
Barium	124
Cadmium	6.31
Chromium	222
Lead	155
Mercury	<1
Nickel	67.6
Selenium	<1
Silver	1.36

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-A	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-01 x5
Date Analyzed:	07/14/23	Data File:	307140-01 x5.119
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	2,420
Zinc	1,790

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-B	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-02
Date Analyzed:	07/14/23	Data File:	307140-02.125
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	2.80
Barium	96.8
Cadmium	5.73
Chromium	225
Mercury	<1
Nickel	103
Selenium	<1
Silver	1.64

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-B	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-02 x20
Date Analyzed:	07/18/23	Data File:	307140-02 x20.178
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	4,130
Lead	198
Zinc	2,650

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-E	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-03
Date Analyzed:	07/14/23	Data File:	307140-03.126
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	3.63
Barium	166
Cadmium	7.94
Chromium	195
Mercury	<1
Nickel	68.3
Selenium	<1
Silver	1.13

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-E	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-03 x20
Date Analyzed:	07/18/23	Data File:	307140-03 x20.179
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	3,710
Lead	254
Zinc	2,660

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-F	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-04
Date Analyzed:	07/14/23	Data File:	307140-04.131
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Barium	90.0
Cadmium	4.26
Chromium	166
Lead	108
Mercury	<1
Nickel	68.0
Silver	2.63

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-F	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-04 x5
Date Analyzed:	07/17/23	Data File:	307140-04 x5.044
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	12.6
Selenium	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-F	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-04 x20
Date Analyzed:	07/18/23	Data File:	307140-04 x20.182
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	3,080
Zinc	2,160

Analysis For Total Metals By EPA Method 6020B

Client ID:	Conex-Drums	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-05
Date Analyzed:	07/14/23	Data File:	307140-05.132
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Barium	211
Cadmium	5.03
Lead	145
Mercury	<1
Silver	2.35

Analysis For Total Metals By EPA Method 6020B

Client ID:	Conex-Drums	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-05 x5
Date Analyzed:	07/17/23	Data File:	307140-05 x5.137
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	9.96
Selenium	<5 k

Analysis For Total Metals By EPA Method 6020B

Client ID:	Conex-Drums	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-05 x20
Date Analyzed:	07/18/23	Data File:	307140-05 x20.183
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	1,590
Copper	4,660
Nickel	1,020
Zinc	4,150

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-C	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-06
Date Analyzed:	07/14/23	Data File:	307140-06.133
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Barium	71.6
Cadmium	7.20
Chromium	154
Mercury	<1
Nickel	96.1
Silver	1.90

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-C	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-06 x5
Date Analyzed:	07/17/23	Data File:	307140-06 x5.138
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<5
Lead	210
Selenium	<5 k

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-C	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-06 x50
Date Analyzed:	07/18/23	Data File:	307140-06 x50.184
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Copper	6,140
Zinc	4,240

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-C-Drums	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-07
Date Analyzed:	07/14/23	Data File:	307140-07.134
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Barium	74.2
Cadmium	8.39
Mercury	<1
Selenium	<1
Silver	1.77

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-C-Drums	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-07 x5
Date Analyzed:	07/17/23	Data File:	307140-07 x5.055
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	16.9

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-C-Drums	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-07 x20
Date Analyzed:	07/20/23	Data File:	307140-07 x20.069
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	153
Copper	2,850
Lead	247
Nickel	129
Zinc	2,560

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-D	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-08
Date Analyzed:	07/14/23	Data File:	307140-08.135
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Barium	43.5
Cadmium	5.96
Lead	123
Mercury	<1
Nickel	83.2
Selenium	<1
Silver	1.41

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-D	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-08 x5
Date Analyzed:	07/17/23	Data File:	307140-08 x5.056
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	Pile-D	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-08 x20
Date Analyzed:	07/18/23	Data File:	307140-08 x20.188
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Chromium	2,690
Copper	7,190
Zinc	3,140

Analysis For Total Metals By EPA Method 6020B

Client ID:	Bins	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-13
Date Analyzed:	07/14/23	Data File:	307140-13.136
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Barium	43.1
Cadmium	38.2
Lead	127
Mercury	4.66
Selenium	10.8
Silver	2.21

Analysis For Total Metals By EPA Method 6020B

Client ID:	Bins	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-13 x10
Date Analyzed:	07/18/23	Data File:	307140-13 x10.191
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	11.8
Chromium	219
Copper	1,730

Analysis For Total Metals By EPA Method 6020B

Client ID:	Bins	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-13 x20
Date Analyzed:	07/20/23	Data File:	307140-13 x20.070
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Nickel	137
Zinc	16,000

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	I3-550 mb
Date Analyzed:	07/14/23	Data File:	I3-550 mb.117
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<1
Selenium	<1
Silver	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	EB-071223-1	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-14
Date Analyzed:	07/14/23	Data File:	307140-14.148
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Barium	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<1
Selenium	<1
Silver	<1
Zinc	<5

Analysis For Total Metals By EPA Method 6020B

Client ID:	EB-071223-1	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-14
Date Analyzed:	07/17/23	Data File:	307140-14.050
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	EB-071223-2	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-15
Date Analyzed:	07/14/23	Data File:	307140-15.149
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Barium	7.05
Cadmium	3.11
Chromium	5.20
Copper	61.9
Lead	10.1
Mercury	<1
Nickel	3.68
Selenium	1.23
Silver	<1
Zinc	947

Analysis For Total Metals By EPA Method 6020B

Client ID:	EB-071223-2	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	307140-15
Date Analyzed:	07/17/23	Data File:	307140-15.051
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	1.75

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 307140
Date Extracted:	07/14/23	Lab ID:	I3-551 mb
Date Analyzed:	07/17/23	Data File:	I3-551 mb.094
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1
Barium	<1
Cadmium	<1
Chromium	<1
Copper	<5
Lead	<1
Mercury	<1
Nickel	<1
Selenium	<1
Silver	<1
Zinc	<5

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Pile-A	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/18/23	Lab ID:	307140-01
Date Analyzed:	07/19/23	Data File:	307140-01.060
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Chromium	<1	5.0
Lead	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Pile-B	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/18/23	Lab ID:	307140-02
Date Analyzed:	07/19/23	Data File:	307140-02.063
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Chromium	<1	5.0
Lead	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Pile-E	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/18/23	Lab ID:	307140-03
Date Analyzed:	07/19/23	Data File:	307140-03.064
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Chromium	<1	5.0
Lead	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Pile-F	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/18/23	Lab ID:	307140-04
Date Analyzed:	07/19/23	Data File:	307140-04.070
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Chromium	<1	5.0
Lead	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Conex-Drums	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/18/23	Lab ID:	307140-05
Date Analyzed:	07/19/23	Data File:	307140-05.071
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Chromium	<1	5.0
Lead	<1	5.0

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Pile-C	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/18/23	Lab ID:	307140-06
Date Analyzed:	07/19/23	Data File:	307140-06.072
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Chromium	<1	5.0
Lead	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Pile-C-Drums	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/18/23	Lab ID:	307140-07
Date Analyzed:	07/19/23	Data File:	307140-07.073
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Lead	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Pile-D	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/18/23	Lab ID:	307140-08
Date Analyzed:	07/19/23	Data File:	307140-08.074
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Chromium	<1	5.0
Lead	<1	5.0

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Bins	Client:	Crete Consulting
Date Received:	07/14/23	Project:	Maralco, F&BI 307140
Date Extracted:	07/18/23	Lab ID:	307140-13
Date Analyzed:	07/19/23	Data File:	307140-13.075
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1	0.2

Analysis for TCLP Metals By EPA Method 6020B and 1311

Client ID:	Method Blank	Client:	Crete Consulting
Date Received:	Not Applicable	Project:	Maralco, F&BI 307140
Date Extracted:	07/18/23	Lab ID:	I3-557 mb
Date Analyzed:	07/19/23	Data File:	I3-557 mb.058
Matrix:	Soil/Solid	Instrument:	ICPMS2
Units:	mg/L (ppm)	Operator:	SP

Analyte:	Concentration mg/L (ppm)	TCLP Limit
Cadmium	<1	1.0
Chromium	<1	5.0
Lead	<1	5.0
Mercury	<0.1	0.2

Date of Report: 08/03/23
Date Received: 07/14/23
Project: Maralco, F&BI 307140

QUALITY ASSURANCE RESULTS FROM THE ANALYSIS OF SOIL SAMPLES FOR pH BY METHOD 9045D

Laboratory Code: 307140-01

Analyte	Sample Result	Duplicate Result	Relative Percent Difference	Acceptance Criteria
pH	8.8	8.8	0	0-20

Date of Report: 08/03/23
Date Received: 07/14/23
Project: Maralco, F&BI 307140

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

Laboratory Code: 307140-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	6.28	67 b	67 b	75-125	0 b
Barium	mg/kg (ppm)	50	95.6	129 b	142 b	75-125	10 b
Cadmium	mg/kg (ppm)	10	4.86	116 b	106 b	75-125	9 b
Chromium	mg/kg (ppm)	50	171	113 b	101 b	75-125	11 b
Copper	mg/kg (ppm)	50	1,540	298 b	444 b	75-125	39 b
Lead	mg/kg (ppm)	50	119	107 b	106 b	75-125	1 b
Mercury	mg/kg (ppm	5	<1	94	96	75-125	2
Nickel	mg/kg (ppm)	25	52.1	127 b	92 b	75-125	32 b
Selenium	mg/kg (ppm)	5	<1	34 vo	31 vo	75-125	9
Silver	mg/kg (ppm)	10	1.05	95	96	75-125	1
Zinc	mg/kg (ppm)	50	1,240	281 b	751 b	75-125	91 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	92	80-120
Barium	mg/kg (ppm)	50	94	80-120
Cadmium	mg/kg (ppm)	10	97	80-120
Chromium	mg/kg (ppm)	50	101	80-120
Copper	mg/kg (ppm)	50	98	80-120
Lead	mg/kg (ppm)	50	99	80-120
Mercury	mg/kg (ppm)	5	99	80-120
Nickel	mg/kg (ppm)	25	98	80-120
Selenium	mg/kg (ppm)	5	93	80-120
Silver	mg/kg (ppm)	10	96	80-120
Zinc	mg/kg (ppm)	50	97	80-120

Date of Report: 08/03/23
Date Received: 07/14/23
Project: Maralco, F&BI 307140

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

Laboratory Code: 307139-53 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	<1	99	101	75-125	2
Barium	ug/L (ppb)	50	<1	96	96	75-125	0
Cadmium	ug/L (ppb)	5	<1	92	92	75-125	0
Chromium	ug/L (ppb)	20	3.10	96	97	75-125	1
Copper	ug/L (ppb)	20	<5	96	98	75-125	2
Lead	ug/L (ppb)	10	<1	88	88	75-125	0
Mercury	ug/L (ppb)	5	<1	83	85	75-125	2
Nickel	ug/L (ppb)	20	<1	96	97	75-125	1
Selenium	ug/L (ppb)	5	<1	98	99	75-125	1
Silver	ug/L (ppb)	5	<1	92	93	75-125	1
Zinc	ug/L (ppb)	50	<5	93	93	75-125	0

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	102	80-120
Barium	ug/L (ppb)	50	96	80-120
Cadmium	ug/L (ppb)	5	92	80-120
Chromium	ug/L (ppb)	20	93	80-120
Copper	ug/L (ppb)	20	96	80-120
Lead	ug/L (ppb)	10	92	80-120
Mercury	ug/L (ppb)	5	89	80-120
Nickel	ug/L (ppb)	20	96	80-120
Selenium	ug/L (ppb)	5	104	80-120
Silver	ug/L (ppb)	5	95	80-120
Zinc	ug/L (ppb)	50	95	80-120

Date of Report: 08/03/23
Date Received: 07/14/23
Project: Maralco, F&BI 307140

**QUALITY ASSURANCE RESULTS
FOR THE ANALYSIS OF SOIL/SOLID SAMPLES
FOR TCLP METALS USING
EPA METHODS 6020B AND 1311**

Laboratory Code: 307140-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Cadmium	mg/L (ppm)	0.5	<1	92	91	75-125	1
Chromium	mg/L (ppm)	2.0	<1	92	89	75-125	3
Lead	mg/L (ppm)	1.0	<1	85	83	75-125	2
Mercury	mg/L (ppm)	1.0	<0.1	88	87	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Cadmium	mg/L (ppm)	0.5	92	80-120
Chromium	mg/L (ppm)	2.0	89	80-120
Lead	mg/L (ppm)	1.0	84	80-120
Mercury	mg/L (ppm)	1.0	88	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.

307139 (AD) 307149

SAMPLE CHAIN OF CUSTODY 07/14/23 J2/M4

Page # 1 of 2

Report To: R. Jones / G. Hainsworth

Company: CRETE Consulting

Address: 16300 Christensen Rd., Ste. 214

City, State, ZIP: Tukwila, WA 98188

Phone: 832.330.1359 Email:

SAMPLERS (signature): Rusty Jones R. Jones

PROJECT NAME	PO #
MARALCO	MARALCO

REMARKS: X Fish Bioassay per GH. Hold/archive extra jars. 7/14/23 ME

Project specific RLs? - Yes / No

INVOICE TO: CRETE

TURNAROUND TIME
X Standard turnaround
X RUSH Metals
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	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	NWTPH-HCID	VOCs EPA 8260	~~PAHs EPA 8270~~ ammonia	~~PCBs EPA 8082~~ Potassium, Sodium, Chloride	RCI, pH	TCLP Cr/Pb	Metals RCRA Cu, Ni, Zn	Fish Bioassay	Notes: X - Per GH EJ 7/18; X - TCLP Pb only; * HOLD ZF
PILE-A	01 A-D	7/12/2023	0925	SOLIDS	4						✓	X	X	X	X	*	BIO 435PM
PILE-B	02		1010		4						✓	X	X	X	X	X	+ TCLP
PILE-E	03		1045		4						✓	X	X	X	X	X	EJ 7/14
PILE-F	04		1115		4						✓	X	X	X	X	*	
CONEX-DRUMS	05		1125		4						✓	X	X	X	X	X	✓ - per GH
PILE-C	06		1210		4						✓	X	X	X	X	*	EJ 7/14
PILE-C-DRUMS	07		1220		4						✓	X	X	*	X		NEXT DAY
PILE-D	08		1240		4						✓	X	X	X	X	X	ON Cl, K, NH4, Na
SILO-4-BINS	09		1300		4												HOLD
SILO-3-BINS	10	↓	1315	↓	4												HOLD

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

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: R. Jones	Rusty Jones	CRETE	7/14/2023	0928
Received by: [signature]	NHUT TRUONG	F&BI	7/14/23	928
Relinquished by:		Samples received at 0 °C		
Received by:				

SAMPLE CHAIN OF CUSTODY 07/14/23 J2/ M4

307140

Report To: R. Jones / G. Hainsworth
Company: Crete Consulting
Address:
City, State, ZIP:
Phone: Email:

SAMPLERS (*signature*) Rusty Jones R. Jones	
PROJECT NAME: MARALCO	PO #: MARALCO
REMARKS: Hold/archive extra jars.	INVOICE TO: CRETE
Project specific RLs? - Yes / No	

Page # 2 of 2

TURNAROUND TIME
- [x] Standard turnaround
- [x] RUSH Metals

Rush charges authorized by:

SAMPLE DISPOSAL
- [x] 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	Ammonia ~~PAHs EPA 8270~~	Potassium, Sulfur, Chloride ~~PCBs EPA 8082~~	RCI, pH	TCLP Cr, Pb, Cd, Hg	Metals RCRA Cu, Ni, Zn	Fish Bioassay	Notes
SILO-~~3~~2-BINS	11 A-D	7/12/2023	1325	SOLIDS	4												HOLD
SILO-1-BINS	12 ↓	↓	1335 ~~1315~~	↓	4												HOLD
BINS	13 A-H	↓	1345	↓	8						✓	X	X	X	X	X	
EB-071223-1	14	7/12/2023	1225	WATER	1										X		
EB-071223-2	15	↓	1305	↓	1										X		

Samples received at 0 °C

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

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	R. Jones	Rusty Jones	CRETE	7/14/2023	0928
Received by:	[signature]	NHUT TRUONG	F & BI	7/14/23	928
Relinquished 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: 307140
Work Order Number: 2307182

July 18, 2023

Attention Michael Erdahl:

Fremont Analytical, Inc. received 9 sample(s) on 7/14/2023 for the analyses presented in the following report.

> ***Ammonia by SM 4500 NH3 E***
> ***Ion Chromatography by EPA Method 300.0***
> ***Sample Moisture (Percent Moisture)***
> ***Total Metals by EPA Method 6020B***

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

Date: *07/18/2023*

CLIENT:	Friedman & Bruya
Project:	307140
Work Order:	2307182

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2307182-001	PILE-A	07/12/2023 9:25 AM	07/14/2023 12:03 PM
2307182-002	PILE-B	07/12/2023 10:10 AM	07/14/2023 12:03 PM
2307182-003	PILE-E	07/12/2023 10:45 AM	07/14/2023 12:03 PM
2307182-004	PILE-F	07/12/2023 11:15 AM	07/14/2023 12:03 PM
2307182-005	CONEX-DRUMS	07/12/2023 11:25 AM	07/14/2023 12:03 PM
2307182-006	PILE-C	07/12/2023 12:10 PM	07/14/2023 12:03 PM
2307182-007	PILE-C DRUMS	07/12/2023 12:20 PM	07/14/2023 12:03 PM
2307182-008	PILE-D	07/12/2023 12:40 PM	07/14/2023 12:03 PM
2307182-009	BINS	07/12/2023 1:45 PM	07/14/2023 12:03 PM

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

Fremont Analytical
An Alliance Technical Group Company

Case Narrative

WO#: **2307182**
Date: **7/18/2023**

CLIENT: Friedman & Bruya
Project: 307140

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.

7/18/2023: Revision 1 includes re-analysis of Ammonia by SM 4500 NH3 E.

Qualifiers & Acronyms

WO#: **2307182**

Date Reported: **7/18/2023**

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

Analytical Report

Fremont Analytical
An Alliance Technical Group Company

Work Order: **2307182**
Date Reported: **7/18/2023**

CLIENT: Friedman & Bruya
Project: 307140

Lab ID: 2307182-001 **Collection Date:** 7/12/2023 9:25:00 AM
Client Sample ID: **PILE-A** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 40914		Analyst: SS
Chloride	5,030	469	D	mg/Kg-dry	200	7/17/2023 11:31:00 AM
Total Metals by EPA Method 6020B				Batch ID: 40921		Analyst: JR
Potassium	15,000	107	D	mg/Kg-dry	20	7/17/2023 3:04:00 PM
Sodium	12,700	534	D	mg/Kg-dry	20	7/17/2023 3:04:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R85323		Analyst: MP
Percent Moisture	25.1	0.500		wt%	1	7/17/2023 8:17:54 AM
Ammonia by SM 4500 NH3 E				Batch ID: 40916		Analyst: AM
Nitrogen, Ammonia	1.80	1.33		mg/Kg-dry	1	7/17/2023 10:45:00 AM

Lab ID: 2307182-002 **Collection Date:** 7/12/2023 10:10:00 AM
Client Sample ID: **PILE-B** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 40914		Analyst: SS
Chloride	94,000	8,450	D	mg/Kg-dry	4000	7/17/2023 2:59:00 PM
Total Metals by EPA Method 6020B				Batch ID: 40921		Analyst: JR
Potassium	50,600	229	D	mg/Kg-dry	50	7/17/2023 3:06:00 PM
Sodium	38,700	1,150	D	mg/Kg-dry	50	7/17/2023 3:06:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R85323		Analyst: MP
Percent Moisture	16.7	0.500		wt%	1	7/17/2023 8:17:54 AM
Ammonia by SM 4500 NH3 E				Batch ID: 40931		Analyst: SS
Nitrogen, Ammonia	344	1.20		mg/Kg-dry	1	7/18/2023 10:45:00 AM

Analytical Report

Work Order: **2307182**
Date Reported: **7/18/2023**

CLIENT: Friedman & Bruya
Project: 307140

Lab ID: 2307182-003 **Collection Date:** 7/12/2023 10:45:00 AM
Client Sample ID: **PILE-E** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 40914		Analyst: SS
Chloride	3,600	409	D	mg/Kg-dry	200	7/17/2023 12:17:00 PM
Total Metals by EPA Method 6020B				Batch ID: 40921		Analyst: JR
Potassium	15,200	94.7	D	mg/Kg-dry	20	7/17/2023 3:09:00 PM
Sodium	13,600	473	D	mg/Kg-dry	20	7/17/2023 3:09:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R85323		Analyst: MP
Percent Moisture	14.8	0.500		wt%	1	7/17/2023 8:17:54 AM
Ammonia by SM 4500 NH3 E				Batch ID: 40916		Analyst: AM
Nitrogen, Ammonia	12.4	1.17		mg/Kg-dry	1	7/17/2023 10:45:00 AM

Lab ID: 2307182-004 **Collection Date:** 7/12/2023 11:15:00 AM
Client Sample ID: **PILE-F** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 40914		Analyst: SS
Chloride	7,470	951	D	mg/Kg-dry	500	7/17/2023 12:40:00 PM
Total Metals by EPA Method 6020B				Batch ID: 40921		Analyst: JR
Potassium	7,610	21.6	D	mg/Kg-dry	5	7/17/2023 2:32:00 PM
Sodium	6,860	108	D	mg/Kg-dry	5	7/17/2023 2:32:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R85323		Analyst: MP
Percent Moisture	7.99	0.500		wt%	1	7/17/2023 8:17:54 AM
Ammonia by SM 4500 NH3 E				Batch ID: 40916		Analyst: AM
Nitrogen, Ammonia	9.41	1.08		mg/Kg-dry	1	7/17/2023 10:45:00 AM

Analytical Report

Fremont Analytical — An Alliance Technical Group Company

Work Order: **2307182**
Date Reported: **7/18/2023**

CLIENT: Friedman & Bruya
Project: 307140

Lab ID: 2307182-005 | **Collection Date:** 7/12/2023 11:25:00 AM
Client Sample ID: **CONEX-DRUMS** | **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 40914		Analyst: SS
Chloride	46,600	7,890	D	mg/Kg-dry	4000	7/17/2023 1:04:00 PM
Total Metals by EPA Method 6020B				Batch ID: 40921		Analyst: JR
Potassium	41,500	225	D	mg/Kg-dry	50	7/17/2023 3:11:00 PM
Sodium	16,500	1,120	D	mg/Kg-dry	50	7/17/2023 3:11:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R85323		Analyst: MP
Percent Moisture	12.3	0.500		wt%	1	7/17/2023 8:17:54 AM
Ammonia by SM 4500 NH3 E				Batch ID: 40916		Analyst: AM
Nitrogen, Ammonia	16.1	1.14		mg/Kg-dry	1	7/17/2023 10:45:00 AM

Lab ID: 2307182-006 | **Collection Date:** 7/12/2023 12:10:00 PM
Client Sample ID: **PILE-C** | **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 40914		Analyst: SS
Chloride	44,800	7,720	D	mg/Kg-dry	4000	7/17/2023 1:27:00 PM
Total Metals by EPA Method 6020B				Batch ID: 40921		Analyst: JR
Potassium	21,700	216	D	mg/Kg-dry	50	7/17/2023 3:18:00 PM
Sodium	33,900	1,080	D	mg/Kg-dry	50	7/17/2023 3:18:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R85323		Analyst: MP
Percent Moisture	9.01	0.500		wt%	1	7/17/2023 8:17:54 AM
Ammonia by SM 4500 NH3 E				Batch ID: 40931		Analyst: SS
Nitrogen, Ammonia	189	1.10		mg/Kg-dry	1	7/18/2023 10:45:00 AM

Analytical Report

Work Order: **2307182**
Date Reported: **7/18/2023**

CLIENT: Friedman & Bruya
Project: 307140

Lab ID: 2307182-007 **Collection Date:** 7/12/2023 12:20:00 PM
Client Sample ID: **PILE-C DRUMS** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 40914		Analyst: SS
Chloride	69,700	7,400	D	mg/Kg-dry	4000	7/17/2023 1:50:00 PM
Total Metals by EPA Method 6020B				Batch ID: 40921		Analyst: JR
Potassium	27,900	215	D	mg/Kg-dry	50	7/17/2023 3:21:00 PM
Sodium	28,100	1,080	D	mg/Kg-dry	50	7/17/2023 3:21:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R85323		Analyst: MP
Percent Moisture	6.39	0.500		wt%	1	7/17/2023 8:17:54 AM
Ammonia by SM 4500 NH3 E				Batch ID: 40931		Analyst: SS
Nitrogen, Ammonia	58.4	1.07		mg/Kg-dry	1	7/18/2023 10:45:00 AM

Lab ID: 2307182-008 **Collection Date:** 7/12/2023 12:40:00 PM
Client Sample ID: **PILE-D** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 40914		Analyst: SS
Chloride	67,600	8,750	D	mg/Kg-dry	4000	7/17/2023 2:13:00 PM
Total Metals by EPA Method 6020B				Batch ID: 40921		Analyst: JR
Potassium	40,300	244	D	mg/Kg-dry	50	7/17/2023 3:23:00 PM
Sodium	28,900	1,220	D	mg/Kg-dry	50	7/17/2023 3:23:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R85323		Analyst: MP
Percent Moisture	19.2	0.500		wt%	1	7/17/2023 8:17:54 AM
Ammonia by SM 4500 NH3 E				Batch ID: 40931		Analyst: SS
Nitrogen, Ammonia	501	1.23		mg/Kg-dry	1	7/18/2023 10:45:00 AM

Analytical Report

Work Order: **2307182**
Date Reported: **7/18/2023**

CLIENT: Friedman & Bruya
Project: 307140

Lab ID: 2307182-009 **Collection Date:** 7/12/2023 1:45:00 PM
Client Sample ID: **BINS** **Matrix:** Soil

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ion Chromatography by EPA Method 300.0				Batch ID: 40914		Analyst: SS
Chloride	43,500	4,840	D	mg/Kg-dry	2000	7/17/2023 2:36:00 PM
Total Metals by EPA Method 6020B				Batch ID: 40921		Analyst: JR
Potassium	43,100	107	D	mg/Kg-dry	20	7/17/2023 3:26:00 PM
Sodium	12,200	533	D	mg/Kg-dry	20	7/17/2023 3:26:00 PM
Sample Moisture (Percent Moisture)				Batch ID: R85323		Analyst: MP
Percent Moisture	27.3	0.500		wt%	1	7/17/2023 8:17:54 AM
Ammonia by SM 4500 NH3 E				Batch ID: 40931		Analyst: SS
Nitrogen, Ammonia	196	1.37		mg/Kg-dry	1	7/18/2023 10:45:00 AM

Fremont Analytical
An Alliance Technical Group Company

Date: *7/18/2023*

Work Order: 2307182
CLIENT: Friedman & Bruya
Project: 307140

QC SUMMARY REPORT

Ammonia by SM 4500 NH3 E

Sample ID: **MB-40916** SampType: **MBLK** Units: **mg/Kg** Prep Date: **7/14/2023** RunNo: **85346**
Client ID: **MBLKS** Batch ID: **40916** Analysis Date: **7/17/2023** SeqNo: **1780743**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia	ND	1.00									

Sample ID: **LCS-40916** SampType: **LCS** Units: **mg/Kg** Prep Date: **7/14/2023** RunNo: **85346**
Client ID: **LCSS** Batch ID: **40916** Analysis Date: **7/17/2023** SeqNo: **1780744**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia	20.3	1.00	20.00	0	101	86.6	115				

Sample ID: **2307182-009ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **7/14/2023** RunNo: **85346**
Client ID: **BINS** Batch ID: **40916** Analysis Date: **7/17/2023** SeqNo: **1780754**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia	171	1.37						173.6	1.54	30	

Sample ID: **2307182-009AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **7/14/2023** RunNo: **85346**
Client ID: **BINS** Batch ID: **40916** Analysis Date: **7/17/2023** SeqNo: **1780755**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia	216	1.37	27.44	173.6	155	35.1	114				S

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

Sample ID: **2307182-009AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **7/14/2023** RunNo: **85346**
Client ID: **BINS** Batch ID: **40916** Analysis Date: **7/17/2023** SeqNo: **1780756**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia	203	1.37	27.47	173.6	105	35.1	114	216.2	6.53	20	

Fremont Analytical
An Alliance Technical Group Company

Date: *7/18/2023*

Work Order: 2307182
CLIENT: Friedman & Bruya
Project: 307140

QC SUMMARY REPORT

Ammonia by SM 4500 NH3 E

Sample ID: **MB-40931** SampType: **MBLK** Units: **mg/Kg** Prep Date: **7/17/2023** RunNo: **85366**
Client ID: **MBLKS** Batch ID: **40931** Analysis Date: **7/18/2023** SeqNo: **1781198**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia	ND	1.00									

Sample ID: **LCS-40931** SampType: **LCS** Units: **mg/Kg** Prep Date: **7/17/2023** RunNo: **85366**
Client ID: **LCSS** Batch ID: **40931** Analysis Date: **7/18/2023** SeqNo: **1781199**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia	18.5	1.00	20.00	0	92.4	86.6	115				

Sample ID: **2307182-009ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **7/17/2023** RunNo: **85366**
Client ID: **BINS** Batch ID: **40931** Analysis Date: **7/18/2023** SeqNo: **1781205**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia	181	1.38						196.1	7.84	30	

Sample ID: **2307182-009AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **7/17/2023** RunNo: **85366**
Client ID: **BINS** Batch ID: **40931** Analysis Date: **7/18/2023** SeqNo: **1781206**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia	181	1.37	27.50	196.1	-54.5	35.1	114				S

NOTES:
S - Outlying spike recovery observed. A duplicate analysis was performed with similar results indicating a possible matrix effect or inhomogeneity.

Sample ID: **2307182-009AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **7/17/2023** RunNo: **85366**
Client ID: **BINS** Batch ID: **40931** Analysis Date: **7/18/2023** SeqNo: **1781207**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nitrogen, Ammonia	229	1.38	27.52	196.1	119	35.1	114	181.1	23.2	20	RS

NOTES:
SR - Outlying spike recovery(ies) and high RPD due to sample inhomogeneity.

Work Order: 2307182
CLIENT: Friedman & Bruya
Project: 307140

QC SUMMARY REPORT

Ion Chromatography by EPA Method 300.0

Sample ID: **MB-40914** SampType: **MBLK** Units: **mg/Kg** Prep Date: **7/14/2023** RunNo: **85351**
Client ID: **MBLKS** Batch ID: **40914** Analysis Date: **7/14/2023** SeqNo: **1780849**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	ND	1.75									

Sample ID: **LCS-40914** SampType: **LCS** Units: **mg/Kg** Prep Date: **7/14/2023** RunNo: **85351**
Client ID: **LCSS** Batch ID: **40914** Analysis Date: **7/14/2023** SeqNo: **1780850**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	7.38	1.75	7.500	0	98.4	90	110				

Sample ID: **2307182-009ADUP** SampType: **DUP** Units: **mg/Kg-dry** Prep Date: **7/14/2023** RunNo: **85351**
Client ID: **BINS** Batch ID: **40914** Analysis Date: **7/14/2023** SeqNo: **1780864**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	67,600	48.5						61,500	9.51	30	DE

Sample ID: **2307182-009AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **7/14/2023** RunNo: **85351**
Client ID: **BINS** Batch ID: **40914** Analysis Date: **7/14/2023** SeqNo: **1780865**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chloride	74,900	48.6	10.40	61,500	128,000	80	120				DES

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

Work Order: 2307182
CLIENT: Friedman & Bruya
Project: 307140

QC SUMMARY REPORT

Total Metals by EPA Method 6020B

Sample ID: **MB-40921** SampType: **MBLK** Units: **mg/Kg** Prep Date: **7/17/2023** RunNo: **85347**
Client ID: **MBLKS** Batch ID: **40921** Analysis Date: **7/17/2023** SeqNo: **1780772**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Potassium	ND	5.00									
Sodium	ND	25.0									

Sample ID: **LCS-40921** SampType: **LCS** Units: **mg/Kg** Prep Date: **7/17/2023** RunNo: **85347**
Client ID: **LCSS** Batch ID: **40921** Analysis Date: **7/17/2023** SeqNo: **1780773**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Potassium	371	3.79	378.8	0	97.9	80	120				
Sodium	361	18.9	378.8	0	95.2	80	120				

Sample ID: **2307182-004AMS** SampType: **MS** Units: **mg/Kg-dry** Prep Date: **7/17/2023** RunNo: **85347**
Client ID: **PILE-F** Batch ID: **40921** Analysis Date: **7/17/2023** SeqNo: **1780776**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Potassium	7,750	4.28	427.9	7,416	77.4	75	125				E
Sodium	6,630	21.4	427.9	6,536	21.7	75	125				ES

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

Sample ID: **2307182-004AMSD** SampType: **MSD** Units: **mg/Kg-dry** Prep Date: **7/17/2023** RunNo: **85347**
Client ID: **PILE-F** Batch ID: **40921** Analysis Date: **7/17/2023** SeqNo: **1780777**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Potassium	9,130	4.28	427.9	7,416	400	75	125	7,747	16.3	20	ES
Sodium	7,790	21.4	427.9	6,536	294	75	125	6,629	16.1	20	ES

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

Sample Log-In Check List

Client Name:	FB	Work Order Number:	2307182
Logged by:	Clare Griggs	Date Received:	7/14/2023 12:03:00 PM

Chain of Custody

1.	Is Chain of Custody complete?	Yes [x]	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 [x]
4.	Was an attempt made to cool the samples?	Yes [x]	No [ ]	NA [ ]
5.	Were all items received at a temperature of >2°C to 6°C *	Yes [x]	No [ ]	NA [ ]
6.	Sample(s) in proper container(s)?	Yes [x]	No [ ]	
7.	Sufficient sample volume for indicated test(s)?	Yes [x]	No [ ]	
8.	Are samples properly preserved?	Yes [x]	No [ ]	
9.	Was preservative added to bottles?	Yes [ ]	No [x]	NA [ ]
10.	Is there headspace in the VOA vials?	Yes [ ]	No [ ]	NA [x]
11.	Did all samples containers arrive in good condition(unbroken)?	Yes [x]	No [ ]	
12.	Does paperwork match bottle labels?	Yes [x]	No [ ]	
13.	Are matrices correctly identified on Chain of Custody?	Yes [x]	No [ ]	
14.	Is it clear what analyses were requested?	Yes [x]	No [ ]	
15.	Were all holding times able to be met?	Yes [x]	No [ ]	

Special Handling (if applicable)

16.	Was client notified of all discrepancies with this order?	Yes [x]	No [ ]	NA [ ]

Person Notified:	Eric Young	Date:	7/14/2023
By Whom:	Brianna Barnes	Via:	[x] eMail [ ] Phone [ ] Fax [ ] In Person
Regarding:	Requesting signature on COC		
Client Instructions:			

17. Additional remarks:

Item Information

Item #	Temp ºC
Sample	2.5

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

2307182

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER FREMONT	
PROJECT NAME/NO. 307140	PO # D-382
REMARKS Please Email Results	

Page # ______ of ______

TURNAROUND TIME
~~Standard TAT~~ ef RUSH by MON 7/17 Rush charges authorized by: ef
SAMPLE DISPOSAL Dispose after 30 days Return samples Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	POTASSIUM	SODIUM	CHLORIDE	AMMONIA				Notes
PILE-A		7/12/23	0925	S	1				X	X	X	L				
PILE-B			1010		1											
PILE-E			1045		1											
PILE-F			1115		1											
CONEX-DRUMS			~~1210~~ 1125		1											
PILE-C			~~1220~~ 1210		1											
PILE-C-DRUMS			~~1240~~ 1220		1											
PILE-D			~~1300~~ 1240		1											
BINS			~~1215~~ 1345		1											
			ef													
			7/14													

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		
Received by:	[signature]	Alli Miller	FAI	7/14/23	1203
Relinquished by:					
Received by:					

2307182

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER FREMONT

PROJECT NAME/NO.	PO #
307140	D-382

REMARKS

Please Email Results

Page # ____ of ____

TURNAROUND TIME

X ~~Standard TAT~~

X RUSH by MAN 7/17

Rush charges authorized by: EJ

SAMPLE DISPOSAL

Dispose after 30 days

Return samples

Will call with instructions

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dioxins/Furans	EPH	VPH	POTASSIUM	SODIUM	CHLORIDE	Ammonia			Notes
PILE-A		7/12/23	0925	S	1				X	X	X	X			
PILE-B			1010		1										
PILE-E			1045		1										
PILE-F			1115		1										
CONEX-DRUMS			~~1210~~ 1125		1										
PILE-C			~~1220~~ 1210		1										
PILE-C-DRUMS			~~1240~~ 1220		1										
PILE-D			~~1300~~ 1240		1										
BINS			~~1215~~ 1345		1										
			EJ 7/14												

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~~ Eric Young	Friedman & Bruya	7/14/23	08 00
Received by:		[illegible]	[illegible]	[illegible]	[illegible]
Relinquished by:					
Received by:					

Rainier
ENVIRONMENTAL

Dangerous Waste Characterization

Sample ID: Pile-B; Pile-E; Conex-Drums; Pile-D; Bins

Report date: July 25, 2023

Submitted to:

Freidman and Bruya, Inc.
3012 16th Ave W
Seattle, WA 98119

Rainier Environmental
5013 Pacific Hwy East
Suite 20
Tacoma, WA 98424

1.0 INTRODUCTION

A dangerous waste characterization using the test organism *Oncorhynchus mykiss* (rainbow trout) was conducted on five samples submitted by Friedman and Bruya to Rainier Environmental. Testing was conducted following the Washington State Department of Ecology Publication 80-12.

2.0 METHODS

The samples, identified as Pile-B, Pile-E, Conex-Drums, Pile-D, and Bins, were received in the laboratory on July 19, 2023. Upon arrival at the laboratory the samples were inspected and contents verified against information provided on the chain-of-custody form. The samples were stored at 4°C in the dark until use. The test procedure is outlined in Table 1.

Table 1. Summary of Dangerous Waste Characterization Test Conditions

Parameter	**Standard Fish Toxicity Test**
Test numbers	2307-034; 2307-035; 2307-036; 2307-037; 2307-038
Sample ID's	Pile-B; Pile-E; Conex-Drums; Pile-D; Bins
Test initiation date; time	7/21/2023; 0930h
Test termination date; time	7/25/2023; 0930h
Endpoint	Mortality at 96-hours
Test chamber	7.5 L Plastic tank
Test temperature	12 ± 1°C
Dilution water	Moderately hard synthetic water
Test solution volume	6 L
Test concentrations (mg/L)	100, 10, 0
Number of organisms/chamber	10
Number of replicates	3
Test organism	*Oncorhynchus mykiss* (rainbow trout)
Feeding	No feeding during test
Photoperiod	16 hours light/ 8 hours dark
Extraction	Rotary agitation (30 +/- 2 rpm) for 18 hours
Reference Toxicant	Copper sulfate
Deviations	None

The test organisms used in the test are outlined in Table 2. The samples were tested using fish received on July 12, 2023.

Table 2. Test organisms (*Oncorhynchus mykiss*)

Test organism age	30 days post swim-up (hatch date 5/31/2023)
Mean weight	0.31 g
Mean length	31 mm
Ratio of longest to shortest	1.3
Loading	0.52 g/L
Test organism source	Trout Lodge; Sumner, WA

3.0 RESULTS

A summary of results for the dangerous waste characterization conducted on Pile-B, Pile-E, Conex-Drums, Pile-D, and Bins are contained in Table 3. There was no mortality during the test. Based on these results, the samples do not designate as either a dangerous or extremely hazardous waste. Copies of the laboratory bench sheets, statistical summaries of reference toxicant tests, and chain-of-custody form are provided in Appendices A through C.

Table 3. Summary of Results

Sample ID	Concentration (mg/L)	Survival (# fish, N=30)	Percent Mortality	Dangerous Waste Designation
Control	0	30	0	NA
Pile-B	10 100	30 30	0 0	None
Pile-E	10 100	30 30	0 0	None
Conex-Drums	10 100	30 30	0 0	None
Pile-D	10 100	30 30	0 0	None
Bins	10 100	30 30	0 0	None

4.0 QUALITY ASSURANCE

The most recently completed reference toxicant test was initiated July 14, 2023. The LC_{50} of 195µg/L copper fell within the acceptable range of mean ± two standard deviations of historical test results indicating that the test organisms were of an appropriate degree of sensitivity. The coefficient of variation (CV) for the last 20 tests was 28.8 percent, which is considered excellent by the Biomonitoring Science Advisory Board.

5.0 REFERENCES

WDOE. 2016. Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria. Washington State Department of Ecology. Water Quality Program. Publication number: WQ-R-95-80, Revised June 2016.

WDOE. 2020. Biological Testing Methods 80-12 for the Designation of Dangerous Waste. Washington State Department of Ecology. Hazardous Waste and Toxics Reduction Program. Publication number: 80-12, Revised September 2020.

Appendix A
Oncorhynchus mykiss Dangerous Waste Toxicity Test
Raw Bench Sheets

Dangerous Waste Toxicity Test

Client: Friedman and Bruya, Inc.
Sample ID: PILE-B ; PILE-E
Test #: 2307-034 ; 2307-035
Log In #: T23-217 ; T23-218

Start Date & Time: 7/20/2023 0940
End Date & Time: 7/24/2023 0940
Test Organism: *Oncorhynchus mykiss*
Test Protocol: **Washington State Department of Ecology Publ. 80-12**

Rep	Conc.	Cont #	Number of Live Organisms					Dissolved Oxygen (mg/L)					pH (units)					Conductivity (umhos/cm)					Temperature (°C)					Percent Survival
			0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	
1	CON	16	10	10	10	10	10	9.0	8.7	8.5	8.2	7.8	8.24	8.04	7.92	7.71	7.51	360				370	12.2	11.9	12.3	12.4	11.9	
2		5	10	10	10	10	10	8.8	8.5	8.4	8.2	7.9	8.21	8.01	7.89	7.75	7.49	363				365						
3		24	10	10	10	10	10	8.5	8.2	8.0	7.9	7.6	8.27	7.99	7.88	7.76	7.51	367				369						
1	10 PPM	14	10	10	10	10	10	8.6	8.3	8.1	8.0	7.8	8.25	8.03	7.82	7.68	7.50	365				372	12.2	11.9	12.0	12.2	11.9	
2	PILE-B	26	10	10	10	10	10	9.1	8.7	8.4	8.1	7.7	8.22	7.98	7.85	7.71	7.47	366				370						
3	T23-217	3	10	10	10	10	10	8.9	8.6	8.4	8.2	7.9	8.20	8.02	7.89	7.73	7.52	367				373						
1	100 PPM	22	10	10	10	10	10	9.0	8.8	8.5	8.2	7.8	8.24	8.01	7.81	7.68	7.54	364				375	12.3	11.8	12.2	12.1	12.1	
2	PILE-B	7	10	10	10	10	10	8.7	8.5	8.2	8.1	7.7	8.27	7.97	7.85	7.72	7.50	368				374						
3	T23-217	11	10	10	10	10	10	8.6	8.4	8.1	8.0	7.6	8.28	8.04	7.90	7.72	7.48	365				371						
1	10 PPM	23	10	10	10	10	10	8.8	8.3	8.1	7.9	7.5	8.25	8.05	7.88	7.71	7.53	361				376	12.4	11.9	12.2	12.1	12.1	
2	PILE E	4	10	10	10	10	10	9.1	8.7	8.5	8.1	7.9	8.21	8.01	7.86	7.68	7.56	364				374						
3	T23-218	15	10	10	10	10	10	8.4	8.1	8.0	7.9	7.4	8.26	8.04	7.83	7.72	7.51	362				373						
1	100 PPM	6	10	10	10	10	10	8.7	8.4	8.1	8.0	7.6	8.27	8.03	7.81	7.71	7.54	365				376	12.4	11.9	12.2	12.3	12.2	
2	PILE-E	13	10	10	10	10	10	8.6	8.5	8.4	8.2	7.9	8.24	8.06	7.90	7.68	7.56	361				378						
3	T23-218	21	10	10	10	10	10	8.5	8.2	8.0	7.9	7.7	8.29	8.07	7.87	7.72	7.59	362				375						
1																												
2																												
3																												
1																												
2																												
3																												
Technician Initials			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]																

Sample	Alk. (init.)	Hard. (init.)	Alk. (fin.)	Hard. (fin.)	Chlorine
	(mg/L as CaCO3)				(mg/L Cl2)
Control	68	100	68	100	<0.03
PILE B	68	100	68	100	
PILE E	68	100	68	100	

Animal Source: Troutlodge
Date Received: 7/12/2023

Test Volume: 6.0L
Date of Hatch: 5/31/2023
Date of Swim up: 6/21/2023

Weights (g): .31 .28 .32 .30 .31 .31 .31 .33 .29 .34 μ = .31
Lengths(mm): 30 27 31 31 31 32 31 31 34 34 μ = 31
Length max/min: 34/27 1.3
Loading: 0.52g/L

Rainier Environmental
Washington Laboratory
5013 Pacific HWY E Suite 20
Tacoma, WA 98424

Dilution Water Source: MHSW 063
QA Check [illegible]

Dangerous Waste Toxicity Test

Client: Friedman and Bruya, Inc.
Sample ID: CONEX-DRUMS ; PILED ; BINS
Test #: 2307-036 ; 2307-037 ; 2307-038
Log In #: T23-219 ; T23-220 ; T23-221

Start Date & Time: 7/21/2023 0930
End Date & Time: 7/25/2023 0930
Test Organism: *Oncorhynchus mykiss*
Test Protocol: **Washington State Department of Ecology Publ. 80-12**

Rep	Conc.	Cont #	Number of Live Organisms 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH (units) 0	24	48	72	96	Conductivity (umhos/cm) 0	24	48	72	96	Temperature (°C) 0	24	48	72	96	Percent Survival
1	CON	1	10	10	10	10	10	8.5	8.1	7.9	7.5	7.4	8.31	8.15	7.98	7.74	7.48	358				360	11.9	12.3	12.4	11.9	11.9	
2		15	10	10	10	10	10	8.8	8.5	8.2	7.7	7.3	8.27	8.11	8.02	7.78	7.52	360				362						
3		8	10	10	10	10	10	8.4	8.2	8.0	7.8	7.2	8.30	8.12	8.00	7.71	7.41	357				361						
1	10 PPM	21	10	10	10	10	10	8.6	8.3	8.1	7.9	7.5	8.26	8.08	8.01	7.73	7.46	356				364	11.8	12.1	12.5	12.1	12.1	
2	CONEX	7	10	10	10	10	10	9.0	8.4	8.1	7.6	7.3	8.34	8.10	7.95	7.76	7.49	362				366						
3	T23-219	16	10	10	10	10	10	8.9	8.7	8.5	8.0	7.9	8.32	8.11	7.97	7.10	7.41	361				361						
1	100 PPM	12	10	10	10	10	10	8.8	8.4	8.3	7.8	7.7	8.35	8.07	7.92	7.72	7.48	354				362	11.9	12.1	12.2	12.1	12.0	
2	CONEX	9	10	10	10	10	10	9.1	8.7	8.4	8.1	7.6	8.33	8.13	7.98	7.74	7.52	357				363						
3	T23-219	20	10	10	10	10	10	8.7	8.4	8.3	7.9	7.5	8.31	8.13	7.99	7.71	7.50	352				364						
1	10 PPM	3	10	10	10	10	10	8.6	8.3	8.1	7.9	7.4	8.32	8.10	8.01	7.70	7.53	354				360	11.9	12.0	12.1	12.2	12.1	
2	PILE	18	10	10	10	10	10	8.8	8.5	8.3	8.0	7.6	8.34	8.12	8.04	7.73	7.51	350				365						
3	T23-220	11	10	10	10	10	10	9.1	8.6	8.3	8.1	7.7	8.35	8.09	7.99	7.75	7.50	351				358						
1	100 PPM	2	10	10	10	10	10	9.0	8.5	8.2	7.9	7.6	8.36	8.12	7.97	7.78	7.47	355				359	11.9	12.1	12.2	12.1	12.1	
2	PILE	17	10	10	10	10	10	8.7	8.3	8.3	8.0	7.8	8.31	8.13	7.99	7.76	7.49	352				362						
3	T23-220	5	10	10	10	10	10	9.0	8.7	8.4	8.1	7.5	8.34	8.10	8.00	7.71	7.52	350				360						
1	10 PPM	10	10	10	10	10	10	8.9	8.4	8.2	7.8	7.5	8.32	8.07	7.94	7.74	7.54	352				362	11.8	12.0	12.3	12.4	12.2	
2	BINS	4	10	10	10	10	10	8.7	8.3	8.1	7.9	7.6	8.34	8.04	7.91	7.72	7.56	356				364						
3	T23-221	13	10	10	10	10	10	8.6	8.3	8.0	7.8	7.4	8.30	8.10	7.87	7.73	7.51	353				362						
1	100 PPM	19	10	10	10	10	10	8.8	8.5	8.2	7.9	7.5	8.35	8.08	7.93	7.76	7.53	353				360	11.9	12.1	12.2	12.2	12.2	
2	BINS	6	10	10	10	10	10	8.9	8.4	8.2	8.0	7.8	8.37	8.11	7.95	7.71	7.55	354				357						
3	T23-221	14	10	10	10	10	10	8.6	8.3	8.0	7.7	7.5	8.31	8.09	7.96	7.72	7.51	353				362						
Technician Initials			AJ	Rt	Rt	AJ	AJ	AJ	Rt	Rt	AJ	AJ																

Sample	Alk. (init.)	Hard. (init.)	Alk. (fin.)	Hard. (fin.)	Chlorine
	(mg/L as CaCO3)				(mg/L Cl2)
Control	~~[illegible]~~ 68	~~68~~ 100	~~[illegible]~~ 68	100	<0.03
CONEX	68	100	68	100	
PILE	68	100	68	100	
BINS	68	100	~~[illegible]~~ 68	100	

Animal Source: Troutlodge
Date Received: 7/12/2023

Test Volume: 6.0 L
Date of Hatch: 5/31/2023
Date of Swim up: 6/21/2023

Weights (g): .31 .29 .32 .30 .31 .31 .31 .33 .29 .34 — μ = .31
Lengths(mm): 30 37 31 31 31 32 31 31 29 34 — μ = 31
Length max/min: 34/27 1.3
Loading: 0.52 g/L

Rainier Environmental
Washington Laboratory
5013 Pacific HWY E Suite 20
Tacoma, WA 98424

Dilution Water Source: MHSW 064
QA Check: RJ

Appendix B

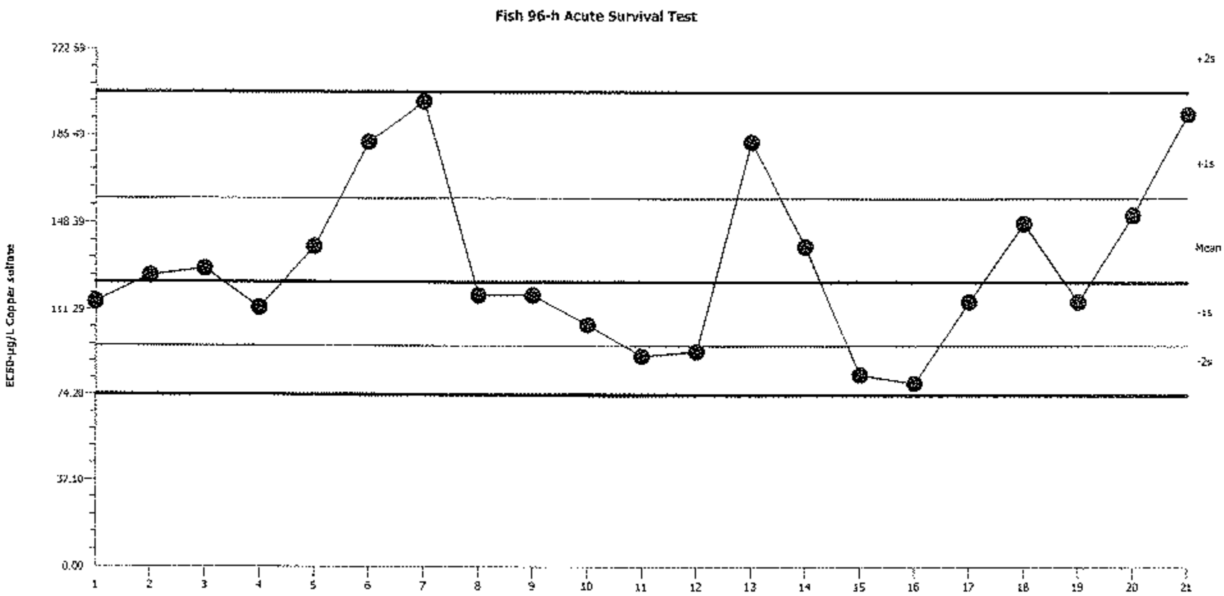
Reference Toxicant Test

Control Chart and Statistical Summary

CETIS QC Plot

Fish 96-h Acute Survival Test — **Rainier Environmental Laboratory**

Test Type:	Survival (96h)	**Organism:**	Oncorhynchus mykiss (Rainbow Tro	**Material:**	Copper sulfate
Protocol:	Not Applicable	**Endpoint:**	96h Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	123.1	**Count:**	20	**-1s Warning Limit:**	95.56	**-2s Action Limit:**	74.19
Sigma:	NA	**CV:**	28.80%	**+1s Warning Limit:**	158.6	**+2s Action Limit:**	204.3

Quality Control Data

Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2021	Nov	5	114.9	-8.231	-0.2733			04-8669-6249	15-6834-1433
2		Dec	6	126	2.892	0.0917			13-8732-0751	08-1557-4326
3	2022	Jan	5	128.9	5.837	0.183			08-2261-8669	03-7761-6146
4		Feb	5	112.2	-10.85	-0.3646			01-7899-0440	09-8784-8920
5		Mar	7	138.2	15.09	0.4567			15-8880-5349	18-5703-0746
6		Apr	11	182.3	59.24	1.552	(+)		19-4475-1025	00-2732-4149
7		May	11	200	76.9	1.917	(+)		04-3686-1214	17-7144-4708
8		Jun	13	117.6	-5.546	-0.1821			02-1194-6933	14-6655-2671
9		Jul	11	117.6	-5.546	-0.1821			18-9490-6426	20-8229-8763
10		Aug	12	104.7	-18.37	-0.6383			16-1269-6384	20-8498-8487
11		Sep	14	91.17	-31.93	-1.186	(-)		21-3997-4244	00-3631-7496
12		Oct	10	93.3	-29.8	-1.095	(-)		01-3925-6404	03-9134-1193
13		Nov	14	182.3	59.24	1.552	(+)		09-0829-7750	07-1545-0995
14		Dec	12	138.2	15.09	0.4567			02-0643-2090	02-3247-9401
15	2023	Jan	12	83.12	-39.98	-1.551	(-)		10-5717-9012	06-2162-7195
16		Feb	13	79.37	-43.73	-1.733	(-)		19-2977-9552	20-0081-1333
17		Mar	13	114.9	-8.231	-0.2733			14-1992-9075	20-3196-8530
18		Apr	14	148.1	25.01	0.7305			00-0643-4903	11-5830-8594
19		May	15	114.9	-8.231	-0.2733			06-5181-9947	15-0207-5859
20		Jun	13	151.6	28.47	0.8217			16-7900-9504	12-9379-3365
21		Jul	14	194.7	71.64	1.811	(+)		19-5463-0764	04-3793-4724

Analyst: it QA: it

CETIS Summary Report

Report Date: 19 Jul-23 10:53 (p 1 of 1)
Test Code: RA071423OM | 19-5463-0764

Fish 96-h Acute Survival Test — **Rainier Environmental Laboratory**

Batch ID:	02-3369-1552	**Test Type:**	Survival (96h)	**Analyst:**	Eric Tollefson
Start Date:	14 Jul-23 09:30	**Protocol:**	Not Applicable	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	18 Jul-23 09:30	**Species:**	Oncorhynchus mykiss	**Brine:**	
Duration:	96h	**Source:**	Trout Lodge Fish Farm	**Age:**	101

Sample ID:	13-9857-5154	**Code:**	RA071423OM	**Client:**	Internal Lab
Sample Date:	14 Jul-23	**Material:**	Copper sulfate	**Project:**	
Receive Date:	14 Jul-23	**Source:**	Reference Toxicant		
Sample Age:	10h	**Station:**	In House		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
17-5796-0681	96h Survival Rate	100	200	141.4	11.9%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
04-3793-4724	96h Survival Rate	LC50	194.7	166.9	227.3		Trimmed Spearman-Kärber

96h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	3	1	1	1	1	1	0	0	0.0%	0.0%
25		3	1	1	1	1	1	0	0	0.0%	0.0%
50		3	1	1	1	1	1	0	0	0.0%	0.0%
100		3	0.9333	0.9118	0.9549	0.9	1	0.03333	0.05774	6.19%	6.67%
200		3	0.4667	0.4235	0.5098	0.4	0.6	0.06667	0.1155	24.74%	53.33%
400		3	0.06667	0.02355	0.1098	0	0.2	0.06667	0.1155	173.2%	93.33%

96h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1	1	1
25		1	1	1
50		1	1	1
100		0.9	0.9	1
200		0.6	0.4	0.4
400		0	0.2	0

96h Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	10/10	10/10	10/10
25		10/10	10/10	10/10
50		10/10	10/10	10/10
100		9/10	9/10	10/10
200		6/10	4/10	4/10
400		0/10	2/10	0/10

Appendix C

Chain-of-Custody Form

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

Phone # (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER Rainier	
PROJECT NAME/NO. 307140	PO # D-388
REMARKS	

Page # 1 of 1

TURNAROUND TIME
☒ Standard TAT RUSH Rush charges authorized by:
SAMPLE DISPOSAL Dispose after 30 days Return samples Will call with instructions

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	Dangerous Waste by Fish	Bioassay									Notes
																Log in:
PILE-B		7/12/2023	1010	solid	1	x										T23-217
PILE-E		7/12/2023	1045	solid	1	x										T23-218
CONEX-DRUMS		7/12/2023	1125	solid	1	x										T23-219
PILE-D		7/12/2023	1240	solid	1	x										T23-220
BINS		7/12/2023	1345	solid	1	x										T23-221

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	7/19/23	0815
Received by:	Annie Lee	Rainier	7/19/23	1300
Relinquished by:				
Received by:				

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664

Professional Analytical Services

Aug 3 2023
Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL

Dear MICHAEL ERDAHL:

Enclosed please find the analytical data for your 307140 project.

The following is a cross correlation of client and laboratory identifications for your convenience.

CLIENT ID	MATRIX	AMTEST ID	TEST
PILE-A	Soil	23-A012218	CN, H2S-S, CONV
PILE-B	Soil	23-A012219	CN, H2S-S, CONV
PILE-E	Soil	23-A012220	CN, H2S-S, CONV
PILE-F	Soil	23-A012221	CN, H2S-S, CONV
CONEX-DRUMS	Soil	23-A012222	CN, H2S-S, CONV
PILE-C	Soil	23-A012223	CN, H2S-S, CONV
PILE-C-DRUMS	Soil	23-A012224	CN, H2S-S, CONV
PILE-D	Soil	23-A012225	CN, H2S-S, CONV
BINS	Soil	23-A012226	CN, H2S-S, CONV

Your samples were received on Monday, July 17, 2023. At the time of receipt, the samples were logged in and properly maintained prior to the subsequent analysis.

The analytical procedures used at AmTest are well documented and are typically derived from the protocols of the EPA, USDA, FDA or the Army Corps of Engineers.

Following the analytical data you will find the Quality Control (QC) results.

Please note that the detection limits that are listed in the body of the report refer to the Practical Quantitation Limits (PQL's), as opposed to the Method Detection Limits (MDL's).

If you should have any questions pertaining to the data package, please feel free to contact me.

Sincerely,

Aaron W Young

Aaron Young
Vice President

Project #: 307140
PO Number: D-385

BACT = Bacteriological
CONV = Conventionals
MET = Metals
ORG = Organics
NUT=Nutrients
DEM=Demand
MIN=Minerals

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Attention: MICHAEL ERDAHL
Project Name: 307140
Project #: 307140
PO Number: D-385
All results reported on an as received basis.

Date Received: 07/17/23
Date Reported: 8/ 3/23

AMTEST Identification Number **23-A012218**
Client Identification **PILE-A**
Sampling Date **07/12/23, 09:25**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Cyanide	< 0.05	ug/g		0.05	SM 4500-CN G	AE	07/27/23
Sulfide	< 2.5	ug/g		2.5	SM 4500 S2	AJS	07/18/23
Flash Point	> 212	degrees F			EPA 1020	HV	07/19/23

AMTEST Identification Number **23-A012219**
Client Identification **PILE-B**
Sampling Date **07/12/23, 10:10**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Cyanide	< 0.05	ug/g		0.05	SM 4500-CN G	AE	07/27/23
Sulfide	< 2.5	ug/g		2.5	SM 4500 S2	AJS	07/18/23
Flash Point	> 212	degrees F			EPA 1020	HV	07/19/23

AMTEST Identification Number **23-A012220**
Client Identification **PILE-E**
Sampling Date **07/12/23, 10:45**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Cyanide	< 0.05	ug/g		0.05	SM 4500-CN G	AE	07/27/23
Sulfide	< 2.5	ug/g		2.5	SM 4500 S2	AJS	07/18/23
Flash Point	> 212	degrees F			EPA 1020	HV	07/19/23

AMTEST Identification Number **23-A012221**
Client Identification **PILE-F**
Sampling Date **07/12/23, 11:15**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Cyanide	< 0.13	ug/g		0.13	SM 4500-CN G	KF	08/02/23
Sulfide	< 2.5	ug/g		2.5	SM 4500 S2	AJS	07/18/23
Flash Point	> 212	degrees F			EPA 1020	HV	07/19/23

AMTEST Identification Number 23-A012222
Client Identification CONEX-DRUMS
Sampling Date 07/12/23, 11:25

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Cyanide	< 0.41	ug/g		0.41	SM 4500-CN G	KF	08/02/23
Sulfide	< 2.5	ug/g		2.5	SM 4500 S2	AJS	07/18/23
Flash Point	> 212	degrees F			EPA 1020	HV	07/19/23

AMTEST Identification Number 23-A012223
Client Identification PILE-C
Sampling Date 07/12/23, 12:10

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Cyanide	0.24	ug/g		0.05	SM 4500-CN G	KF	08/02/23
Sulfide	< 2.5	ug/g		2.5	SM 4500 S2	AJS	07/18/23
Flash Point	> 212	degrees F			EPA 1020	HV	07/19/23

AMTEST Identification Number 23-A012224
Client Identification PILE-C-DRUMS
Sampling Date 07/12/23, 12:20

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Cyanide	0.41	ug/g		0.05	SM 4500-CN G	KF	08/02/23
Sulfide	14.	ug/g		2.5	SM 4500 S2	AJS	07/18/23
Flash Point	> 212	degrees F			EPA 1020	HV	07/19/23

AMTEST Identification Number 23-A012225
Client Identification PILE-D
Sampling Date 07/12/23, 12:40

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Cyanide	< 0.05	ug/g		0.05	SM 4500-CN G	AE	07/27/23
Sulfide	< 2.5	ug/g		2.5	SM 4500 S2	AJS	07/18/23
Flash Point	> 212	degrees F			EPA 1020	HV	07/19/23

Friedman & Bruya, Inc.
Project Name: 307140
AmTest ID: 23-A012226

AMTEST Identification Number 23-A012226
Client Identification BINS
Sampling Date 07/12/23, 13:45

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Cyanide	< 0.05	ug/g		0.05	SM 4500-CN G	AE	07/27/23
Sulfide	< 2.5	ug/g		2.5	SM 4500 S2	AJS	07/18/23
Flash Point	> 212	degrees F			EPA 1020	HV	07/19/23

Aaron W Young
Aaron Young
Vice President

Am Test Inc.
13600 NE 126th PL
Suite C
Kirkland, WA, 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

QC Summary for sample numbers: 23-A012218 to 23-A012226

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
23-A012221	Total Cyanide	ug/g	< 0.13	< 0.23	
23-A012224	Sulfide	ug/g	14.	14.	0.00
23-A012226	Sulfide	ug/g	< 2.5	< 2.5	
23-A012226	Flash Point	degrees F	> 212	> 212	

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
23-A012221	Total Cyanide	ug/g	< 0.13	1.8	2.3	78.26 %

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Total Cyanide	ug/g	0.10	0.096	96.0 %
Total Cyanide	ug/g	1.0	0.97	97.0 %
Sulfide	ug/g	0.50	0.50	100. %
Sulfide	ug/g	0.50	0.53	106. %
Flash Point	degrees F	109.	108.	99.1 %

BLANKS

ANALYTE	UNITS	RESULT
Total Cyanide	ug/g	< 0.05
Total Cyanide	ug/g	< 0.05
Sulfide	ug/g	< 2.5
Sulfide	ug/g	< 2.5

SUBCONTRACT SAMPLE CHAIN OF CUSTODY

Send Report To Michael Erdahl

Company Friedman and Bruya, Inc.

Address 3012 16th Ave W

City, State, ZIP Seattle, WA 98119

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

SUBCONTRACTOR Amtest	
PROJECT NAME/NO. 307140	PO # D-385
REMARKS	

Page # 1 of 1

TURNAROUND TIME
X Standard (1 Week)
RUSH
Rush charges authorized by:
SAMPLE DISPOSAL
Dispose after 30 days
Return samples
Will call with instructions

						ANALYSES REQUESTED										
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Containers	Flash point	CN-	Sulfide								T=12.5°C
PILE-A	12218	7/12/2023	0925	Solids	1	X	X	X								
PILE-B	12219		1010													
PILE-E	12220		1045													
PILE-F	12221		1115													
CONEX-DRUMS	12222		1125													
PILE-C	12223		1210													
PILE-C-DRUMS	12224		1220													
PILE-D	12225		1240													
BINS	12226		1345													
		X														

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:	[signature]	Ann Webber-Bruya	Friedman & Bruya	7/17/23	1300
Received by:	KL	Kathryn Lunsford	AmTest	7/17/23	13:23
Relinquished by:					
Received by:					

FORMS\COC\Subcontract.DOC

Rainier
ENVIRONMENTAL

Dangerous Waste Characterization

Sample ID: Pile-B; Pile-E; Conex-Drums; Pile-D; Bins

Report date: July 25, 2023

Submitted to:

Freidman and Bruya, Inc.
3012 16th Ave W
Seattle, WA 98119

Rainier Environmental
5013 Pacific Hwy East
Suite 20
Tacoma, WA 98424

1.0 INTRODUCTION

A dangerous waste characterization using the test organism *Oncorhynchus mykiss* (rainbow trout) was conducted on five samples submitted by Friedman and Bruya to Rainier Environmental. Testing was conducted following the Washington State Department of Ecology Publication 80-12.

2.0 METHODS

The samples, identified as Pile-B, Pile-E, Conex-Drums, Pile-D, and Bins, were received in the laboratory on July 19, 2023. Upon arrival at the laboratory the samples were inspected and contents verified against information provided on the chain-of-custody form. The samples were stored at 4°C in the dark until use. The test procedure is outlined in Table 1.

Table 1. Summary of Dangerous Waste Characterization Test Conditions

Parameter	Standard Fish Toxicity Test
Test numbers	2307-034; 2307-035; 2307-036; 2307-037; 2307-038
Sample ID's	Pile-B; Pile-E; Conex-Drums; Pile-D; Bins
Test initiation date; time	7/21/2023; 0930h
Test termination date; time	7/25/2023; 0930h
Endpoint	Mortality at 96-hours
Test chamber	7.5 L Plastic tank
Test temperature	12 ± 1°C
Dilution water	Moderately hard synthetic water
Test solution volume	6 L
Test concentrations (mg/L)	100, 10, 0
Number of organisms/chamber	10
Number of replicates	3
Test organism	*Oncorhynchus mykiss* (rainbow trout)
Feeding	No feeding during test
Photoperiod	16 hours light/ 8 hours dark
Extraction	Rotary agitation (30 +/- 2 rpm) for 18 hours
Reference Toxicant	Copper sulfate
Deviations	None

The test organisms used in the test are outlined in Table 2. The samples were tested using fish received on July 12, 2023.

Table 2. Test organisms (*Oncorhynchus mykiss*)

Test organism age	30 days post swim-up (hatch date 5/31/2023)
Mean weight	0.31 g
Mean length	31 mm
Ratio of longest to shortest	1.3
Loading	0.52 g/L
Test organism source	Trout Lodge; Sumner, WA

3.0 RESULTS

A summary of results for the dangerous waste characterization conducted on Pile-B, Pile-E, Conex-Drums, Pile-D, and Bins are contained in Table 3. There was no mortality during the test. Based on these results, the samples do not designate as either a dangerous or extremely hazardous waste. Copies of the laboratory bench sheets, statistical summaries of reference toxicant tests, and chain-of-custody form are provided in Appendices A through C.

Table 3. Summary of Results

Sample ID	Concentration (mg/L)	Survival (# fish, N=30)	Percent Mortality	Dangerous Waste Designation
Control	0	30	0	NA
Pile-B	10 100	30 30	0 0	None
Pile-E	10 100	30 30	0 0	None
Conex-Drums	10 100	30 30	0 0	None
Pile-D	10 100	30 30	0 0	None
Bins	10 100	30 30	0 0	None

4.0 QUALITY ASSURANCE

The most recently completed reference toxicant test was initiated July 14, 2023. The LC_{50} of 195µg/L copper fell within the acceptable range of mean ± two standard deviations of historical test results indicating that the test organisms were of an appropriate degree of sensitivity. The coefficient of variation (CV) for the last 20 tests was 28.8 percent, which is considered excellent by the Biomonitoring Science Advisory Board.

5.0 REFERENCES

WDOE. 2016. Laboratory Guidance and Whole Effluent Toxicity Test Review Criteria. Washington State Department of Ecology. Water Quality Program. Publication number: WQ-R-95-80, Revised June 2016.

WDOE. 2020. Biological Testing Methods 80-12 for the Designation of Dangerous Waste. Washington State Department of Ecology. Hazardous Waste and Toxics Reduction Program. Publication number: 80-12, Revised September 2020.

Appendix A

Oncorhynchus mykiss Dangerous Waste Toxicity Test

Raw Bench Sheets

Dangerous Waste Toxicity Test

Client: Friedman and Bruya, Inc.
Sample ID: PILE-B ; PILE-E
Test #: 2307-034 ; 2307-035
Log In #: T23-217 ; T23-218

Start Date & Time: 7/20/2023 0940
End Date & Time: 7/24/2023 0940
Test Organism: *Oncorhynchus mykiss*
Test Protocol: **Washington State Department of Ecology Publ. 80-12**

Rep	Conc.	Cont #	Number of Live Organisms 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH (units) 0	24	48	72	96	Conductivity (umhos/cm) 0	24	48	72	96	Temperature (°C) 0	24	48	72	96	Percent Survival
1	CON	16	10	10	10	10	10	9.0	8.7	8.5	8.2	7.8	8.24	8.04	7.92	7.71	7.51	360				370	12.2	11.9	12.3	12.4	11.9	
2		5	10	10	10	10	10	8.8	8.5	8.4	8.2	7.9	8.21	8.01	7.89	7.75	7.49	363				365						
3		24	10	10	10	10	10	8.5	8.2	8.0	7.9	7.6	8.27	7.99	7.88	7.76	7.51	367				369						
1	10 PPM	14	10	10	10	10	10	8.6	8.3	8.1	8.0	7.8	8.25	8.03	7.83	7.68	7.50	365				372	12.2	11.9	12.0	12.2	11.9	
2	PILE-B	26	10	10	10	10	10	9.1	8.7	8.4	8.1	7.7	8.22	7.98	7.85	7.71	7.47	366				370						
3	T23-217	3	10	10	10	10	10	8.9	8.6	8.4	8.2	7.9	8.20	8.02	7.89	7.73	7.52	367				373						
1	100 PPM	22	10	10	10	10	10	9.0	8.8	8.5	8.2	7.8	8.24	8.01	7.81	7.68	7.54	364				375	12.3	11.8	12.2	12.1	12.1	
2	PILE-B	7	10	10	10	10	10	8.7	8.5	8.2	8.1	7.7	8.27	7.97	7.85	7.72	7.50	368				374						
3	T23-217	11	10	10	10	10	10	8.6	8.4	8.1	8.0	7.6	8.28	8.04	7.90	7.72	7.48	365				371						
1	10 PPM	23	10	10	10	10	10	8.8	8.3	8.1	7.9	7.5	8.25	8.05	7.98	7.71	7.53	361				376	12.4	11.9	12.2	13.1	12.1	
2	PILE-E	4	10	10	10	10	10	9.1	8.7	8.5	8.1	7.9	8.21	8.01	7.96	7.68	7.56	364				374						
3	T23-218	15	10	10	10	10	10	8.4	8.1	8.0	7.9	7.4	8.26	8.01	7.83	7.72	7.51	362				373						
1	100 PPM	6	10	10	10	10	10	8.7	8.4	8.1	8.0	7.6	8.27	8.03	7.81	7.71	7.54	365				376	12.4	11.9	12.2	12.3	12.2	
2	PILE-E	13	10	10	10	10	10	8.6	8.5	8.4	8.2	7.9	8.24	8.06	7.90	7.68	7.56	361				378						
3	T23-218	21	10	10	10	10	10	8.5	8.2	8.0	7.9	7.7	8.29	8.07	7.87	7.72	7.59	362				375						
1																												
2																												
3																												
1																												
2																												
3																												
Technician Initials			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]																

Sample	Alk. (init.)	Hard. (init.)	Alk. (fin.)	Hard. (fin.)	Chlorine
	(mg/L as CaCO3)				(mg/L Cl2)
Control	68	100	68	100	<0.03
PILE B	68	100	68	100	
PILE E	68	100	68	100	

Animal Source: Troutlodge
Date Received: 7/12/2023

Test Volume: 6.0L
Date of Hatch: 5/31/2023
Date of Swim up: 6/21/2023

Weights (g): .31 .28 .32 .30 .31 .31 .31 .33 .29 .34 μ = .31
Lengths(mm): 30 27 31 31 31 32 31 31 34 34 μ = 31
Length max/min: 34/27 1.3 Loading: 0.52 g/L

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Washington Laboratory
5013 Pacific HWY E Suite 20
Tacoma, WA 98424

Dilution Water Source: MHSW 063 QA Check [illegible]

Dangerous Waste Toxicity Test

Client: Friedman and Bruya, Inc.
Sample ID: CONEX-DRUMS ; PILED ; BINS
Test #: 2307-036 ; 2307-037 ; 2307-038
Log In #: T23-219 ; T23-220 ; T23-221

Start Date & Time: 7/21/2023 0930
End Date & Time: 7/25/2023 0930
Test Organism: *Oncorhynchus mykiss*
Test Protocol: **Washington State Department of Ecology Publ. 80-12**

Rep	Conc.	Cont #	Number of Live Organisms 0	24	48	72	96	Dissolved Oxygen (mg/L) 0	24	48	72	96	pH (units) 0	24	48	72	96	Conductivity (umhos/cm) 0	24	48	72	96	Temperature (°C) 0	24	48	72	96	Percent Survival
1	CON	1	10	10	10	10	10	8.5	8.1	7.9	7.5	7.4	8.31	8.15	7.98	7.74	7.48	358				360	11.9	12.3	12.4	11.9	11.9	
2		15	10	10	10	10	10	8.8	8.5	8.2	7.7	7.3	8.27	8.11	8.02	7.78	7.52	360				362						
3		8	10	10	10	10	10	8.4	8.2	8.0	7.8	7.2	8.30	8.12	8.00	7.71	7.41	357				361						
1	10 PPM	21	10	10	10	10	10	8.6	8.3	8.1	7.9	7.5	8.26	8.08	8.01	7.73	7.46	356				364	11.8	12.1	12.5	12.1	12.1	
2	CONEX	7	10	10	10	10	10	9.0	8.4	8.1	7.6	7.3	8.34	8.10	7.95	7.76	7.49	362				366						
3	T23-219	16	10	10	10	10	10	8.9	8.7	8.5	8.0	7.9	8.32	8.11	7.97	7.70	7.41	361				361						
1	100 PPM	12	10	10	10	10	10	8.8	8.4	8.3	7.8	7.7	8.35	8.07	7.92	7.72	7.48	354				362	11.9	12.1	12.2	12.1	12.0	
2	CONEX	9	10	10	10	10	10	9.1	8.7	8.4	8.1	7.6	8.33	8.12	7.98	7.74	7.51	357				363						
3	T23-219	20	10	10	10	10	10	8.7	8.4	8.3	7.9	7.5	8.31	8.13	7.99	7.71	7.50	352				364						
1	10 PPM	3	10	10	10	10	10	8.6	8.3	8.1	7.9	7.4	8.32	8.10	8.01	7.70	7.53	354				360	11.9	12.0	12.1	12.2	12.1	
2	PILE	18	10	10	10	10	10	8.8	8.5	8.3	8.0	7.6	8.34	8.12	8.04	7.73	7.51	350				365						
3	T23-220	11	10	10	10	10	10	9.1	8.6	8.3	8.1	7.7	8.35	8.09	7.99	7.75	7.50	351				358						
1	100 PPM	2	10	10	10	10	10	9.0	8.5	8.2	7.9	7.6	8.36	8.12	7.97	7.78	7.47	355				359	11.9	12.1	12.2	12.1	12.1	
2	PILE	17	10	10	10	10	10	8.7	8.3	8.3	8.0	7.8	8.31	8.13	7.99	7.76	7.49	352				362						
3	T23-220	5	10	10	10	10	10	9.0	8.7	8.4	8.1	7.5	8.34	8.10	8.00	7.71	7.52	350				360						
1	10 PPM	10	10	10	10	10	10	8.9	8.4	8.2	7.8	7.5	8.32	8.07	7.94	7.74	7.54	352				362	11.8	12.0	12.3	12.4	12.2	
2	BINS	4	10	10	10	10	10	8.7	8.3	8.1	7.9	7.6	8.34	8.04	7.91	7.72	7.56	356				364						
3	T23-221	13	10	10	10	10	10	8.6	8.3	8.0	7.8	7.4	8.30	8.10	7.87	7.73	7.51	353				362						
1	100 PPM	19	10	10	10	10	10	8.8	8.5	8.2	7.9	7.5	8.35	8.08	7.93	7.76	7.53	353				360	11.9	12.1	12.2	12.2	12.2	
2	BINS	6	10	10	10	10	10	8.9	8.4	8.2	8.0	7.8	8.37	8.11	7.95	7.71	7.55	354				357						
3	T23-221	14	10	10	10	10	10	8.6	8.3	8.0	7.7	7.5	8.31	8.09	7.96	7.72	7.51	353				362						
Technician Initials			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]																

Sample	Alk. (init.)	Hard. (init.)	Alk. (fin.)	Hard. (fin.)	Chlorine
	(mg/L as CaCO3)				(mg/L Cl2)
Control	~~100~~ 68	~~68~~ 100	~~100~~ 68	100	<0.03
CONEX	68	100	68	100	
PILE	68	100	68	100	
BINS	68	100	~~100~~ 68	100	

Animal Source: Troutlodge
Date Received: 7/12/2023

Test Volume: 6.0 L
Date of Hatch: 5/31/2023
Date of Swim up: 6/21/2023

Weights (g): .31 .29 .32 .30 .31 .31 .31 .33 .29 .34   μ = .31
Lengths(mm): 30 37 31 31 31 32 31 31 29 34   μ = 31
Length max/min: 34/27 1.3   Loading: 0.52 g/L

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Washington Laboratory
5013 Pacific HWY E Suite 20
Tacoma, WA 98424

Dilution Water Source: MHSW 064   QA Check [illegible]

Appendix B

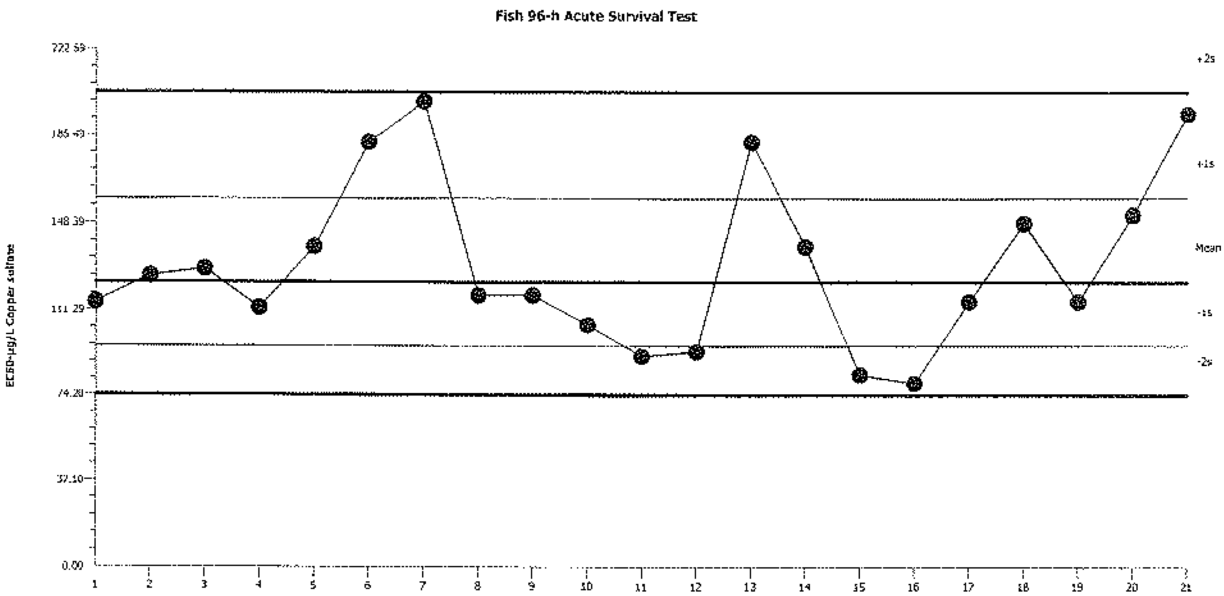
Reference Toxicant Test

Control Chart and Statistical Summary

CETIS QC Plot

Fish 96-h Acute Survival Test — **Rainier Environmental Laboratory**

Test Type:	Survival (96h)	**Organism:**	Oncorhynchus mykiss (Rainbow Tro	**Material:**	Copper sulfate
Protocol:	Not Applicable	**Endpoint:**	96h Survival Rate	**Source:**	Reference Toxicant-REF



Mean:	123.1	**Count:**	20	**-1s Warning Limit:**	95.56	**-2s Action Limit:**	74.19
Sigma:	NA	**CV:**	28.80%	**+1s Warning Limit:**	158.6	**+2s Action Limit:**	204.3

Quality Control Data

Point	Year	Month	Day	QC Data	Delta	Sigma	Warning	Action	Test ID	Analysis ID
1	2021	Nov	5	114.9	-8.231	-0.2733			04-8669-6249	15-6834-1433
2		Dec	6	126	2.892	0.0917			13-8732-0751	08-1557-4326
3	2022	Jan	5	128.9	5.837	0.183			08-2261-8669	03-7761-6146
4		Feb	5	112.2	-10.85	-0.3646			01-7899-0440	09-8784-8920
5		Mar	7	138.2	15.09	0.4567			15-8880-5349	18-5703-0746
6		Apr	11	182.3	59.24	1.552	(+)		19-4475-1025	00-2732-4149
7		May	11	200	76.9	1.917	(+)		04-3686-1214	17-7144-4708
8		Jun	13	117.6	-5.546	-0.1821			02-1194-6933	14-6655-2671
9		Jul	11	117.6	-5.546	-0.1821			18-9490-6426	20-8229-8763
10		Aug	12	104.7	-18.37	-0.6383			16-1269-6384	20-8498-8487
11		Sep	14	91.17	-31.93	-1.186	(-)		21-3997-4244	00-3631-7496
12		Oct	10	93.3	-29.8	-1.095	(-)		01-3925-6404	03-9134-1193
13		Nov	14	182.3	59.24	1.552	(+)		09-0829-7750	07-1545-0995
14		Dec	12	138.2	15.09	0.4567			02-0643-2090	02-3247-9401
15	2023	Jan	12	83.12	-39.98	-1.551	(-)		10-5717-9012	06-2162-7195
16		Feb	13	79.37	-43.73	-1.733	(-)		19-2977-9552	20-0081-1333
17		Mar	13	114.9	-8.231	-0.2733			14-1992-9075	20-3196-8530
18		Apr	14	148.1	25.01	0.7305			00-0643-4903	11-5830-8594
19		May	15	114.9	-8.231	-0.2733			06-5181-9947	15-0207-5859
20		Jun	13	151.6	28.47	0.8217			16-7900-9504	12-9379-3365
21		Jul	14	194.7	71.64	1.811	(+)		19-5463-0764	04-3793-4724

CETIS Summary Report

Report Date: 19 Jul-23 10:53 (p 1 of 1)
Test Code: RA071423OM | 19-5463-0764

Fish 96-h Acute Survival Test — **Rainier Environmental Laboratory**

Batch ID:	02-3369-1552	**Test Type:**	Survival (96h)	**Analyst:**	Eric Tollefson
Start Date:	14 Jul-23 09:30	**Protocol:**	Not Applicable	**Diluent:**	Mod-Hard Synthetic Water
Ending Date:	18 Jul-23 09:30	**Species:**	Oncorhynchus mykiss	**Brine:**	
Duration:	96h	**Source:**	Trout Lodge Fish Farm	**Age:**	101

Sample ID:	13-9857-5154	**Code:**	RA071423OM	**Client:**	Internal Lab
Sample Date:	14 Jul-23	**Material:**	Copper sulfate	**Project:**	
Receive Date:	14 Jul-23	**Source:**	Reference Toxicant		
Sample Age:	10h	**Station:**	In House		

Comparison Summary

Analysis ID	Endpoint	NOEL	LOEL	TOEL	PMSD	TU	Method
17-5796-0681	96h Survival Rate	100	200	141.4	11.9%		Dunnett Multiple Comparison Test

Point Estimate Summary

Analysis ID	Endpoint	Level	µg/L	95% LCL	95% UCL	TU	Method
04-3793-4724	96h Survival Rate	LC50	194.7	166.9	227.3		Trimmed Spearman-Kärber

96h Survival Rate Summary

C-µg/L	Control Type	Count	Mean	95% LCL	95% UCL	Min	Max	Std Err	Std Dev	CV%	%Effect
0	Dilution Water	3	1	1	1	1	1	0	0	0.0%	0.0%
25		3	1	1	1	1	1	0	0	0.0%	0.0%
50		3	1	1	1	1	1	0	0	0.0%	0.0%
100		3	0.9333	0.9118	0.9549	0.9	1	0.03333	0.05774	6.19%	6.67%
200		3	0.4667	0.4235	0.5098	0.4	0.6	0.06667	0.1155	24.74%	53.33%
400		3	0.06667	0.02355	0.1098	0	0.2	0.06667	0.1155	173.2%	93.33%

96h Survival Rate Detail

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	1	1	1
25		1	1	1
50		1	1	1
100		0.9	0.9	1
200		0.6	0.4	0.4
400		0	0.2	0

96h Survival Rate Binomials

C-µg/L	Control Type	Rep 1	Rep 2	Rep 3
0	Dilution Water	10/10	10/10	10/10
25		10/10	10/10	10/10
50		10/10	10/10	10/10
100		9/10	9/10	10/10
200		6/10	4/10	4/10
400		0/10	2/10	0/10

Appendix C
Chain-of-Custody Form

SUBCONTRACT SAMPLE CHAIN OF COUSTODY

Send Report To: Michael Erdahl

Company: Friedman and Bruya, Inc.

Address: 3012 16th Ave W

City, State, ZIP: Seattle, WA 98119

Phone #: (206) 285-8282 merdahl@friedmanandbruya.com

SUBCONTRACTER	
Rainier	
PROJECT NAME/NO.	PO #
307140	D-388
REMARKS	

Page # 1 of 1

TURNAROUND TIME
☒ Standard TAT
RUSH
Rush charges authorized by:

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

Sample ID	Lab ID	Date Sampled	Time Sampled	Matrix	# of jars	ANALYSES REQUESTED: Dangerous Waste by Fish	Bioassay	Notes
								Log in:
PILE-B		7/12/2023	1010	solid	1	x		T23-217
PILE-E		7/12/2023	1045	solid	1	x		T23-218
CONEX-DRUMS		7/12/2023	1125	solid	1	x		T23-219
PILE-D		7/12/2023	1240	solid	1	x		T23-220
BINS		7/12/2023	1345	solid	1	x		T23-221

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: [signature]	Michael Erdahl	Friedman & Bruya	7/19/23	0815
Received by: Annie Lee	Annie Lee	Rainier	7/19/23	1300
Relinquished by:				
Received by:				

Appendix B

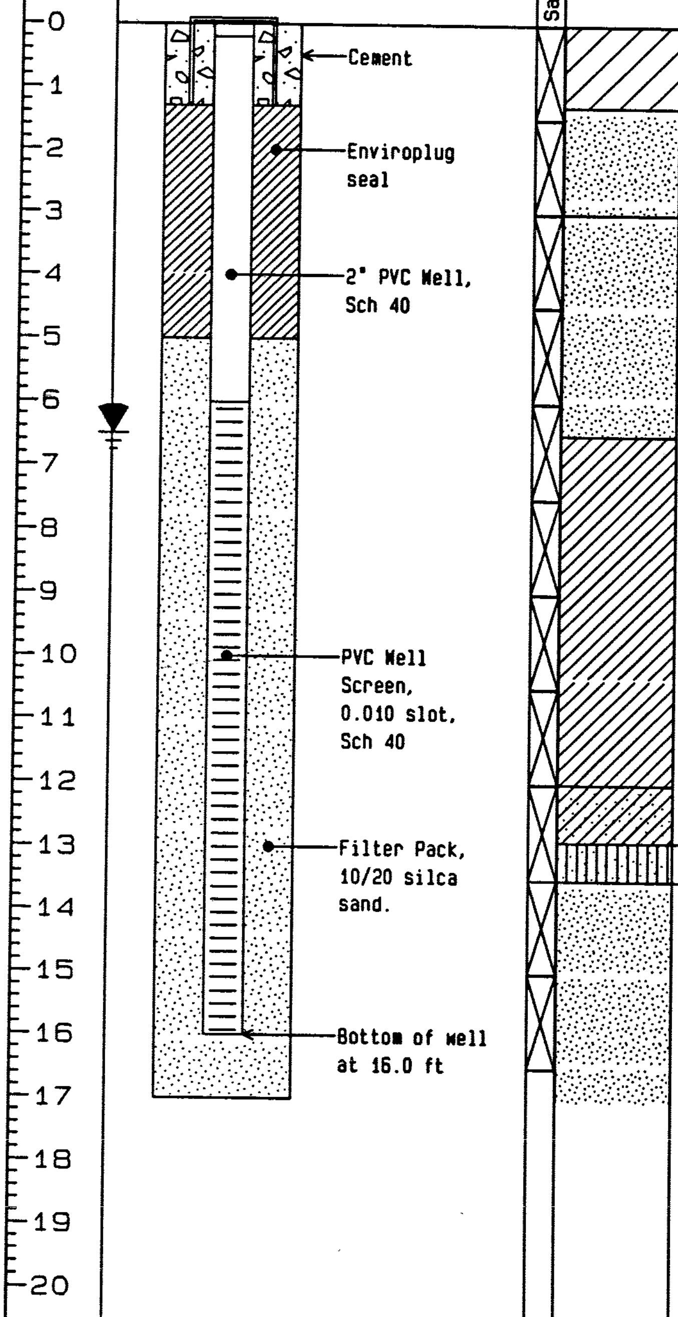
Monitoring Well Construction Logs

MK-ENVIRONMENTAL SERVICES
A DIVISION OF MK-FERGUSON

BOREHOLE LOG

PROJECT NUMBER: 2121-05	WELL NUMBER: MW-1
PROJECT: MARALCO SITE	LOCATION: Kent, Washington
COORDINATES: N156223.089 E1653339.344	DRILLING CONTRACTOR: Tacoma Pump and Drilling
DRILL MAKE AND MODEL: Hollow stem auger	DEPTH TOP OF ROCK: ft.
DEPTH CASING AND SIZES: 16.0 ft / 2" PVC	
G.S. ELEVATION: 26.4	TOP PVC ELEV.: 26.26
ANGLE FROM VERTICAL AND BEARING: Vertical	DEPTH TO BOTTOM OF HOLE: 17.0 ft.
HOLE SIZE: 4-1/4"	WATER LEVEL (INITIAL): 6.5 ft.
FLUID AND ADDITIVES: None	DATE START: 9-25-90
DATE FINISH: 9-25-90	LOGGER: Marian Allen

DEPTH IN FEET | WELL CONSTRUCTION DETAIL | Sample Int. | GRAPHIC SYMBOL



LITHOLOGIC DESCRIPTION	BLOW COUNTS
0.0-1.3' CLAY; brown, silty soil with mass of rootlets.	6,9,6
1.3-3.0' SAND; brown, slighty clayey, loose dry, minor roots, damp at 2.5-3.0'.	7,6,7
3.0-6.5' SAND; mottled tan and orange brown fine grained, silty, roots and rootlets, no structures, slightly damp.	5,6,5
- Becomes medium sand (gradational) at 4.9', then fines downward to fine sand.	4,3,3
- Fine to medium, brown to 6.5'	
6.5-12.9' CLAY; gray, high plasticity, minor silt, sharp contact, moist, roolets still present, saturated, possible shell fragments.	1,1,3
- 1.5" Brown, clayey sand stringers at 9.3' and 9.8 ft.	2,3,4
- 1" Medium black sand with red grains at 10.0-10.1' (sand contains water)	1,1,1
- Sandy partings at 11.2, 11.4-11.5'	1 (to 18")
- Increasing sand content 12.0-12.9'	
- Sharp contact at 12.9'	1,1,5
12.9-13.5' SILTY SAND; rootlets still present, slight pink coloration at contact.	10,11,19
13.5-17.0' SAND; dark gray, fine to medium grained.	3,3,6

NOTE: Problems during well installation - Borehole filled with silt/sand slurry. Set well through augers, had to lift up augers. Well development may be slow.

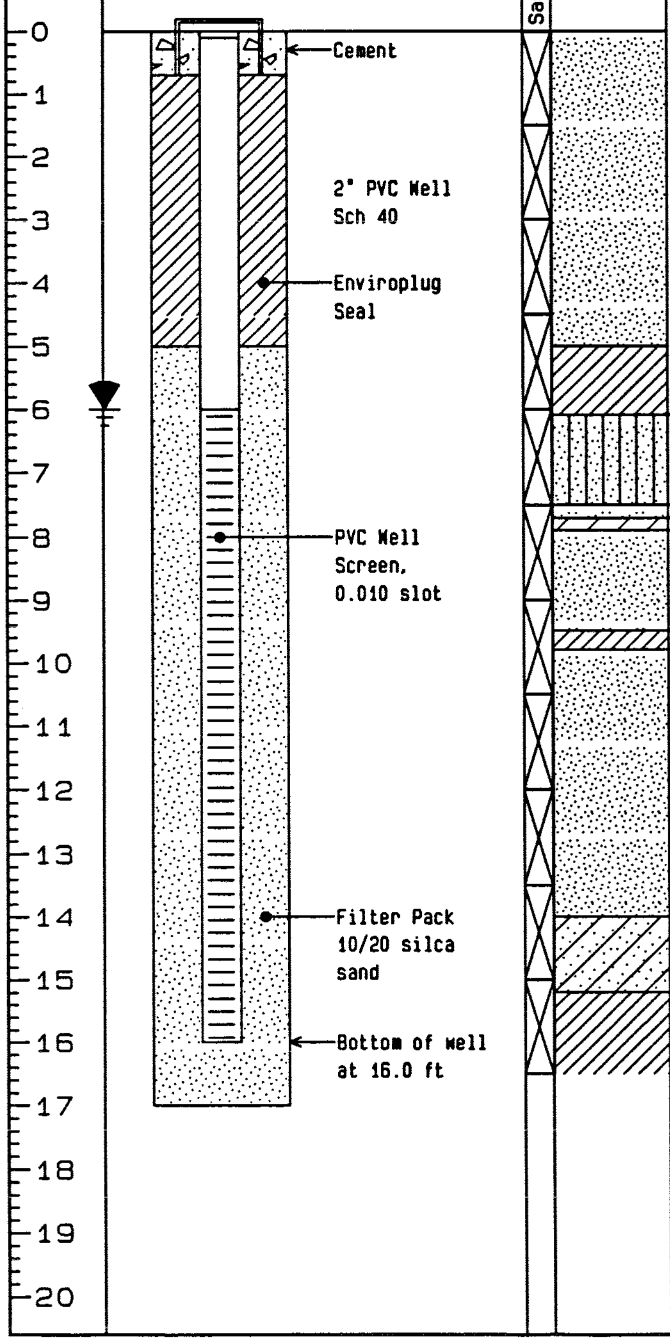
MK-ENVIRONMENTAL SERVICES
A DIVISION OF MK-FERGUSON

BOREHOLE LOG

PROJECT NUMBER: 2121-05	WELL NUMBER: MW-2

PROJECT: MARALCO SITE			LOCATION: Kent, Washington	
COORDINATES: N156749.764 E1653607.129			DRILLING CONTRACTOR: Tacoma Pump and Drilling	
DRILL MAKE AND MODEL: Hollow stem auger			DEPTH TOP OF ROCK: ft.	DEPTH CASING AND SIZES: 16.0 ft / 2" PVC
G.S. ELEVATION: 27.2	TOP PVC ELEV.: 26.99	ANGLE FROM VERTICAL AND BEARING: Vertical	DEPTH TO BOTTOM OF HOLE: 17.0 ft.	HOLE SIZE: 4-1/4"
WATER LEVEL (INITIAL): 6.0 ft.	FLUID AND ADDITIVES: None	DATE START: 9-25-90	DATE FINISH: 9-25-90	LOGGER: Marian Allen

DEPTH IN FEET | WELL CONSTRUCTION DETAIL | Sample Int. | GRAPHIC SYMBOL



LITHOLOGIC DESCRIPTION

0.0-5.0' SAND; Silty brown soil, with grass roots. 1.2-1.5' medium - fine, loose, becomes fine silty sand 2.6-3.0', damp, slightly clayey, coarsens to medium-fine at 4.0-4.5', damp fine silty sand 4.5-5.0'.

5.0-6.1' CLAY; High plasticity, mottled gray to orange-brown, damp, rootlets. 6.0-6.1' saturated sandy grey clay.

6.1-7.5' SILTY SAND; Dark gray with red grains, saturated, coarsens down to medium-fine sand. (SAMPLE 398572)

7.5-7.7' SAND; Dark gray with red grains, saturated.

7.7-7.9' CLAY; Light to medium brown gray.

7.9-9.5' SAND; Gray with red grains to dark gray, fine, coarsens down to medium-fine.

9.5-9.8' CLAY; Grey-brown, high plasticity.

9.8-14.0' SAND; Medium-dark grey sand with red grains, saturated. 10.5-12.0' fine to medium-fine to silty (SAMPLE 398573). 12.0-14.0' Silty, fine sand, slighty clayey.

14.0-15.2' SILTY SANDY CLAY; Silt content decreases down to 14.7'. 14.7-14.9' wood and and plant material. 14.9-15.0' high plasticity clay. 15.0-15.2' grey, sandy clay.

15.2-17.0' CLAY; Grey, slighty sandy to 15.5', at 15.5' 1/4" layer of plant material. 15.5-16.1' grey, high plasticity (SAMPLE 398574). 16.1-16.3' gray sandy clay to clayey clayey sand, plant material. 16.3-16.5' high high plasticity clay, grey, slightly brownish.

BLOW COUNTS

8,9,7
9,10,8
6,6,7
5,3,3
4,2,3
1,2,2
2,2,3
4,3,3
2,5,8
3,2,2
4,3,2

www.AerotechEnvironmental.com

BORING LOG #: MW3A

Site Name: Former Maralco Aluminum Property
Project Number: 217-4026

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve
ECY Well Tag:	BJP695

Site Location: 7730 South 202nd Street, Kent, Washington
AOC: Downgradient and adjacent to the southern portion of the dross pile
Borehole Location: 6' West, 4' North of SWX Building

Logged by: N. Gerkin **Boring Depth:** 16 feet **GW Encountered:** YES

Approx. Surface Elev.: 27' above MSL
Work Date: 07/21/17

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
0–0.5								Compacted Gravel Surface	
0.5–2.5							GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No distinct odor.	
2.5–3.5							ML	SILT with some very fine Sand, dark brown, damp. No distinct odor.	
5		0.1	Lab				SP/ SW	SAND, fine to medium, gray to brown, saturated and oxidized at 5', moderately graded. No distinct odor.	
10		0.0					CH	Silty CLAY, dark gray, saturated, highly plastic. No distinct odor.	
11–16							SP	SAND, very fine to fine, dark gray to black, saturated, poorly graded, trace silt. No distinct odor.	

Depth scale: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

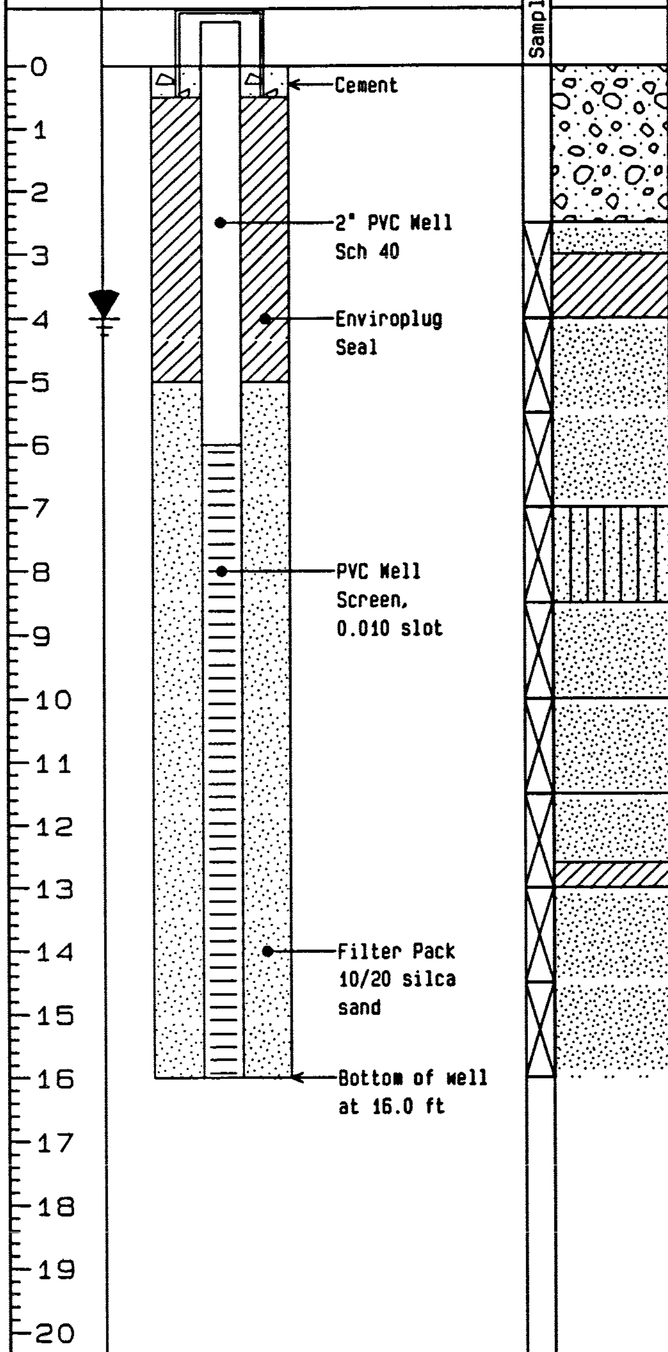
1" Diameter Schedule 80 PVC, 0.010" Screen from 4 to 14 ft bgs
Well completed with Colorado Silica Sand from 3 to 14 ft bgs
Bentonite from 1 to 3 ft bgs and Concrete from 0.5 to 1 ft bgs

MK-ENVIRONMENTAL SERVICES
A DIVISION OF MK-FERGUSON

BOREHOLE LOG

PROJECT NUMBER:	2121-05
WELL NUMBER:	MW-4
PROJECT:	MARALCO SITE
LOCATION:	Kent, Washington
COORDINATES:	N156748.788 E1652709.167
DRILLING CONTRACTOR:	Tacoma Pump and Drilling
DRILL MAKE AND MODEL:	Hollow stem auger
DEPTH TOP OF ROCK:	ft.
DEPTH CASING AND SIZES:	16.0 ft / 2" PVC
G.S. ELEVATION:	22.9
TOP PVC ELEV.:	25.02
ANGLE FROM VERTICAL AND BEARING	Vertical
DEPTH TO BOTTOM OF HOLE:	16.0 ft.
HOLE SIZE:	4-1/4"
WATER LEVEL (INITIAL):	4.0 ft.
FLUID AND ADDITIVES:	None
DATE START:	9-24-90
DATE FINISH:	9-24-90
LOGGER:	Marian Allen

DEPTH IN FEET | WELL CONSTRUCTION DETAIL | Sample Int. | GRAPHIC SYMBOL | LITHOLOGIC DESCRIPTION | BLOW COUNTS



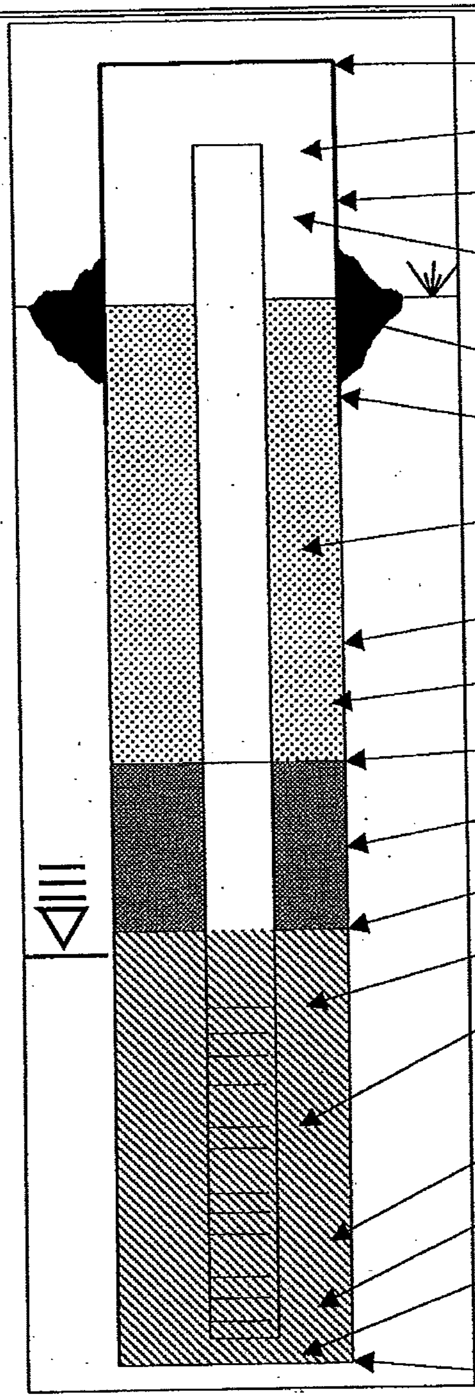
LITHOLOGIC DESCRIPTION	BLOW COUNTS
0.0-2.5' FILL	
2.5-3.0' SAND; Fine to medium, loose, fill.	3,2,3
3.0-4.0' CLAY; High plasticity at 3.2', moist, orange, no structures (SAMPLE 39851, 3.0-3.5'). Fe stained crust, 2mm at 3.8 ft.	6,6,7
4.0-7.0' SAND; Gray, fine, saturated, silty coarsens down from 5.5 to 6.5', with medium sand at 6.5', to fine slighty clayey sand at 7.0'. Oil sheen noted in water, unusual odor.	5,7,6
7.0-8.5' SILTY SAND; Gray, saturated, oil sheen in water, no odor (SAMPLE 398562)	3,4,9
8.5-10.0' SAND; Gray, fine grained, coarsens downward. 9.2-9.7' sandy clay lense, saturated.	7,5,2
10.0-11.5' SAND; Gray, saturated, silty with minor clay. Coarsens to medium at 11.2'. Sandy clay lense at 11.4-11.5'. Oil sheen.	7,5,9
11.5-12.6' SAND; Medium to fine, silty to 11.9' (SAMPLE 398563, 11.5-13.0 ft). 11.9-12.0' clay lense, silty, gray, high plasticity. 12.0-12.6' silty, slightly clayey sand, micaceous.	4,3,2
12.6-13.0' CLAY; Gray, some shells, high plasticity, sharp contact at base.	10,20,23
13.0-16.0' SAND; Dark gray to black, with red, medium, coarsens downward, moist, (SAMPLE 388564, 13.5-14.0 ft)	NA

NOTE: Last split spoon covered with greenish-brown film. No oil odor, no indication of unusual material in sample.

WELL CONSTRUCTION LOG

EMR INCORPORATED
ENVIRONMENTAL MANAGEMENT RESOURCES

Date	1-22-03	Driller	CASCADE
Project	MARALCo	Drilling License	
Project No.	6070.001-1	Drilling Method	Hollow Stem Auger
Location	N. of Dross Pile	Developement Method	Disposable Bailer
Boring I.D.	MW-5	Static Water Level	7.5'
Elevation			
Geologist	D. Welch		



Elevation of top of Casing:	SURVEY
Elevation of top of Riser Pipe:	SURVEY
Stick - up top of Protective Casing:	NONE
Stick - up Riser Pipe:	NONE
Type of Surface Seal:	CONCRETE
I.D. of Surface Casing:	8"
Type of Surface Casing:	MONUMENT (FLUSH)
I.D. of Riser Pipe:	2"
Type of Riser Pipe:	PVC
Borehole Diameter	9"
Type of Backfill:	CONCRETE
Depth of Top of Seal:	2'
Type of Seal:	BENTONITE CHIP
Depth to top of Sand Pack:	4'
Depth to top of Screen:	5'
I.D. of Screen	2"
Type of Screen:	PVC
Slot size & Length	0.01" & 10'
Type of Sand Pack:	2-12
Depth to bottom of Screen:	15'
Depth to bottom of sand pack:	16.5' (SAMPLED)
Type of Backfill below Observation Well:	SILTY SAND
Depth of Hole	16.5' (SAMPLED)

AEROTECH ENVIRONMENTAL CONSULTING
www.AerotechEnvironmental.com

BORING LOG #: MW5A

Site Name: Former Maralco Aluminum Property
Project Number: 217-4026

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve
ECY Well Tag:	BJP693

Approx. Surface Elev.: 27' above MSL
Work Date: 07/21/17

Site Location: 7730 South 202nd Street, Kent, Washington
AOC: Replacement well for MW5
Borehole Location: East Side of Parking Lot. 12' South, 3' East of MW5

Logged by: N. Gerkin **Boring Depth:** 16 feet **GW Encountered:** YES

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery		USCS Classification	Soil Classification/ Description	Well Construction
0–0.5								Bark chips, other organics, and Gravel	
0.5–2							GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No distinct odor.	
2–4							ML	SILT with some very fine Sand, dark brown, moist. No distinct odor.	
4–16								NO RECOVERY from 4 to 16 ft bgs	

Depth scale: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

1" Diameter Schedule 80 PVC, 0.010" Screen from 5 to 15 ft bgs
Well completed with Colorado Silica Sand from 4 to 16 ft bgs
Bentonite from 1 to 4 ft bgs and Concrete from 0.5 to 1 ft bgs

AEROTECH ENVIRONMENTAL CONSULTING
www.AerotechEnvironmental.com

BORING LOG #: MW4A

Site Name: Former Maralco Aluminum Property
Project Number: 217-4026

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve
ECY Well Tag:	BJP694

Approx. Surface Elev.: 27' above MSL
Work Date: 07/21/17

Site Location: 7730 South 202nd Street, Kent, Washington
AOC: Downgradient of former Diesel UST Basin
Borehole Location: 178' North of NWX Building

Logged by: N. Gerkin **Boring Depth:** 16 feet **GW Encountered:** YES

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery	USCS Classification	Soil Classification/ Description
0–0.5							Asphalt Surface
0.5–2.5						GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No distinct odor.
2.5–6.5						ML	SILT with some very fine Sand, dark brown, moist. No distinct odor.
6.5–9.5		0.5	Lab			SP	SAND, medium, gray to brown, saturated and dark gray at 8', poorly graded. No distinct odor.
9.5–10		0.9				ML	Silty CLAY, dark gray, saturated, highly plastic. No distinct odor.
10–16		0.0				SP	SAND, very fine to fine, dark gray to black, saturated, poorly graded, trace silt. No distinct odor.

Well Construction

1" Diameter Schedule 80 PVC, 0.010" Screen from 6 to 16 ft bgs
Well completed with Colorado Silica Sand from 4.5 to 16 ft bgs
Bentonite from 1 to 4.5 ft bgs and Concrete from 0.5 to 1 ft bgs

CRETE Consulting, Inc.
16300 Christensen Road, Suite 214
Tukwila, WA 98188

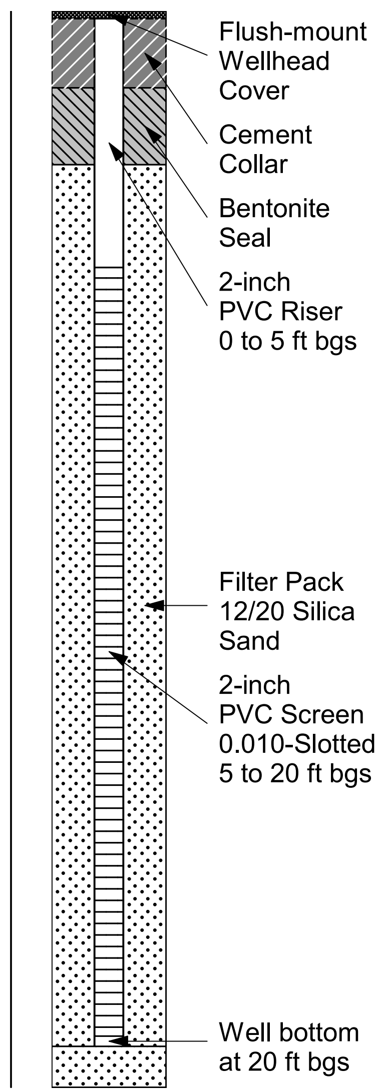
WELL LOG

BORING/WELL ID: **MW-5R**
INSTALLED DEPTH: **20.2-ft bgs**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**MARALCO Property**	DRILLING CO.:	**Cascade Drilling**
SITE LOCATION:	**7730 South 202nd St**	DRILLING METHOD:	**Hollow Stem Auger**
	Kent, WA	EQUIPMENT TYPE:	**CME-55 custom track-mounted**
LOGGED BY:	**Rusty Jones**	SAMPLING METHOD:	**4.25" ID Hollow Stem Auger**
PROJECT MANAGER:	**G. Hainsworth**		**Pre-cored with DPT probe.**
DATES DRILLED/INSTALLED:	**9/1/2022**	DRILLED DEPTH:	**21-ft bgs**
NORTHING	**156613.2742**	INITIAL WATER DEPTH:	**~7-ft bgs**
EASTING	**1293183.097**	SCREENED INTERVAL:	**0 to 20-ft bgs**

DEPTH	SOIL LOG	USCS	DESCRIPTION	SAMPLE ID	SAMPLE DEPTH (ft bgs)	PID (ppm) DPT
0		SW	GRASS at surface. SAND with GRAVEL, fine to coarse-grained, poorly-sorted, abundant subround gravel up to 1.5-inch diameter, dry, tan to dark yellowish orange. With trace ROOTS.		0.5-2 ft	4.8
					2-3.5 ft	4.3
					3.5-5 ft	6.5
5		SP	SAND, fine to medium-grained, trace organics, slightly moist, rusty brown.	MW-5R 5.5-7'	5.5-7 ft	6.7
		SP	SAND, fine-grained, abundant decomposing organics (WOOD), medium consistency, wet, brown to dark brown.		7-8.5 ft	10.6
					8.5-10 ft	10.2
10		SP	SAND, fine to medium-grained, some ORGANIC fines, wet to saturated, dark gray to black.	MW-5R 11-12'	11-12 ft	8.1
					13-14 ft	7.2
15					15-16 ft	7.5
					17-18 ft	7.3
		SP	SAND, fine-grained, firm, some decomposed WOODY DEBRIS, saturated, dark gray to tan.		19-20 ft	7.0
20		SP	SAND, medium-grained, saturated, dark gray to black.			

WELL CONSTRUCT. / WELL DESC.



NOTES: East of asphalt, adjacent to former MW-5A.
Lithology logged from Macrocore samplers on 9/1/2022. Ecology tag # BNE-750

AEROTECH ENVIRONMENTAL CONSULTING
www.AerotechEnvironmental.com

BORING LOG #: MW6

Site Name: Former Maralco Aluminum Property
Project Number: 217-4026

Drilling Information

Drilling Contractor:	SEP, Tumwater, WA
Drilling Method:	2-inch Direct Push
Sampler Type:	Core sampler + virgin poly-sleeve
ECY Well Tag:	BJP696

Site Location: 7730 South 202nd Street, Kent, Washington
AOC: Generally downgradient of dross piles
Borehole Location: 50' South, 3' West of NWX Building

Approx. Surface Elev.: 27' above MSL
Work Date: 07/21/17

Logged by: N. Gerkin **Boring Depth:** 16 feet **GW Encountered:** YES

Depth (ft)	Groundwater	PID (ppm)	Sample	Blow Counts	Recovery	USCS Classification	Soil Classification/ Description	Well Construction
0–0.5							Asphalt Surface	
0.5–2.5						GW	FILL - GRAVEL and SAND, light brown to gray, damp, fine to coarse sand and gravel, subangular to subrounded gravel, Well graded, trace silt. No distinct odor.	
2.5–7.5		0.5 (6.5)	Lab (6.5)			SP	SAND, medium, gray to brown, saturated and dark gray at 8', poorly graded. No distinct odor.	
7.5–11.5		0.0 (11)				ML	Silty CLAY, dark gray, saturated, highly plastic. No distinct odor.	
11.5–16						SP	SAND, very fine to fine, dark gray to black, saturated, poorly graded, trace silt. No distinct odor.	

1" Diameter Schedule 80 PVC, 0.010" Screen from 5 to 15 ft bgs
Well completed with Colorado Silica Sand from 4 to 16 ft bgs
Bentonite from 1 to 4 ft bgs and Concrete from 0.5 to 1 ft bgs

CRETE Consulting, Inc.

16300 Christensen Road, Suite 214
Tukwila, WA 98188

WELL LOG

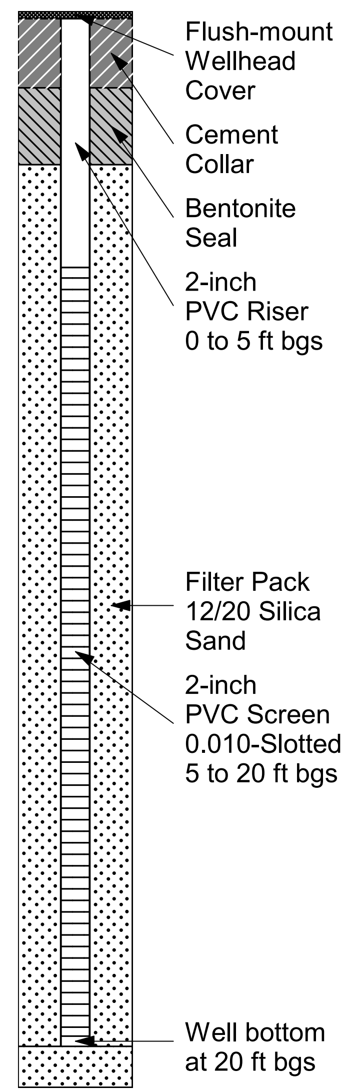
BORING/WELL ID: **MW-7**

INSTALLED DEPTH: **20.2-ft bgs**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**MARALCO Property**	DRILLING CO.:	**Cascade Drilling**
SITE LOCATION:	**7730 South 202nd St**	DRILLING METHOD:	**Hollow Stem Auger**
	Kent, WA	EQUIPMENT TYPE:	**CME-55 custom track-mounted**
LOGGED BY:	**Rusty Jones**	SAMPLING METHOD:	**4.25" ID Hollow Stem Auger**
PROJECT MANAGER:	**G. Hainsworth**		**Pre-cored with DPT probe.**
DATES DRILLED/INSTALLED:	**9/1/2022**	DRILLED DEPTH:	**21-ft bgs**
NORTHING	**156721.1256**	INITIAL WATER DEPTH:	**~7-ft bgs**
EASTING	**1293150.993**	SCREENED INTERVAL:	**0 to 20-ft bgs**

DEPTH	USCS	DESCRIPTION	SAMPLE ID	SAMPLE DEPTH (ft bgs)	PID (ppm) DPT
0		ASPHALT			
	SW	GRAVELLY SAND FILL, fine to coarse-grained, subround to round, poorly-sorted, slightly moist to moist, tan to orange brown.		0.5-2.5 ft	6.3
				2.5-5 ft	6.1
5	SP	SAND, fine to medium-grained, dark brown with dark gray pockets, moist. With soft WOODY debris and minor subangular to subround 1.25-inch GRAVEL.	MW-7 5-7'	5-7 ft	5.1
	SP	SAND, fine to mostly medium-grained, subround to round, dark brown to black, wet. With pockets of WOOD debris.		7-10 ft	5.5
10	SP	SAND, fine to mostly medium-grained, subround to round, dark brown to black, wet to saturated, drains rapidly. With trace WOODY debris.		10-11.5 ft	6.4
				11.5-13.5 ft	7.0
		At 14.5-15 ft bgs: PEATY SAND, abundant decomposing WOOD, black.	MW-7 13.5-15'	13.5-15 ft	6.5
15				15.5-16.5 ft	3.4
	SP	SAND, very fine to fine-grained, medium-firm to firm consistency, dark brown, wet. With trace decomposing WOOD.		17-18 ft	3.7
				19-20 ft	4.5
20					

WELL CONSTRUCT. / WELL DESC.



NOTES: Near front gate and right of way.
Lithology logged from Macrocore samplers on 8/30/2022. Ecology tag # BNE-751

CRETE Consulting, Inc.
16300 Christensen Road, Suite 214
Tukwila, WA 98188

WELL LOG

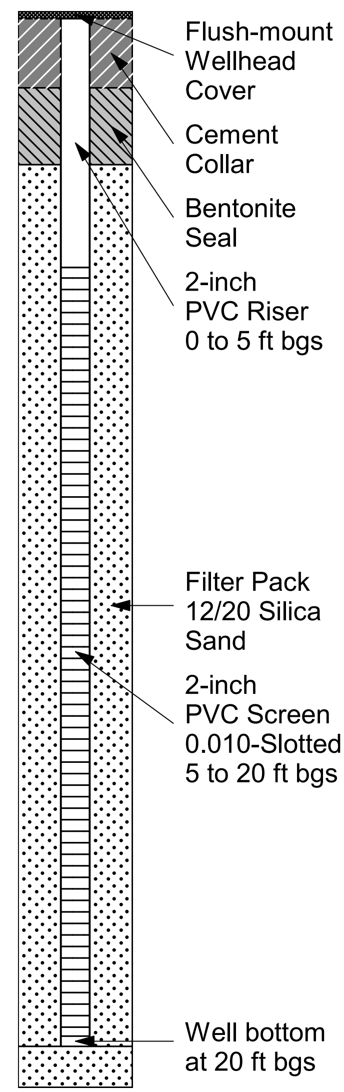
BORING/WELL ID: **MW-8**
INSTALLED DEPTH: **20.3-ft bgs**

PROJECT INFORMATION		DRILLING INFORMATION	
PROJECT:	**MARALCO Property**	DRILLING CO.:	**Cascade Drilling**
SITE LOCATION:	**7730 South 202nd St**	DRILLING METHOD:	**Hollow Stem Auger**
	Kent, WA	EQUIPMENT TYPE:	**CME-55 custom track-mounted**
LOGGED BY:	**Rusty Jones**	SAMPLING METHOD:	**4.25" ID Hollow Stem Auger**
PROJECT MANAGER:	**G. Hainsworth**		**Pre-cored with DPT probe.**
DATES DRILLED/INSTALLED:	**9/1/2022**	DRILLED DEPTH:	**21-ft bgs**
NORTHING	**156139.5286**	INITIAL WATER DEPTH:	**~7.8-ft bgs**
EASTING	**1293132.626**	SCREENED INTERVAL:	**0 to 20-ft bgs**

DEPTH	USCS	DESCRIPTION
0 – 4.5	SW	SAND with some small GRAVEL, fine to coarse-grained, some small ROOTS, dry to slightly moist, orange brown. At 3 ft bgs: Some ORGANIC fines, minor subround GRAVEL, slightly moist to moist.
4.5 – 5.3	SC	CLAYEY SAND, fine-grained, moist to wet, green to gray, no odors.
5.3 – 7.8	SP	SAND, very fine to fine-grained, sticky consistency, moist, tan to gray.
7.8 – 16	SP	SAND, fine to medium-grained, wet to saturated, dark gray to black.
16 – 20	SP	SILTY SAND, very fine to fine-grained, wet, dark brown, to dark brown. With pockets of WOODY debris and medium-grained SAND, medium soft and paste-like consistency.

SAMPLE ID	SAMPLE DEPTH (ft bgs)	PID (ppm) DPT
	0-3 ft	3.3
MW-8 4-5'	4-5 ft	4.8
	5-7 ft	4.9
	8-10 ft	4.9
	10-11 ft	5.1
MW-8 12-13'	12-13 ft	5.5
	14-15 ft	3.7
	16-17 ft	3.6
	18-19 ft	5.0

WELL CONSTRUCT. / WELL DESC.



NOTES: Southeast of ditch near southern property boundary.
Lithology logged from Macrocore samplers on 9/1/2022. Ecology tag # BNE-749

Project: Maralco Property	Project Desc. Remedial Investigation	Boring ID SB-UST-01	CRETE CONSULTING, INC.
Location: 7730 S. 202nd St., Kent, WA		Client: Bridge Industrial	Sheet 1 of 1
Logged By: Rusty Jones (CRETE)	Date — Started: 8/29/22 0815	Tooling: MacroCore MC5	Drilling Contractor: Holt Services
Drill Crew: Cody Henderson	Date — Completed: 8/29/22 0945		Borehole Diameter: ~~Geoprobe 7800~~ RJ 2-3"
	Date — Backfilled: Bentonite Chips		Drill Rig Type: Geoprobe 7800, truck-mounted
	Groundwater Depth (ft bgs): 6.9' in PVC		Total Depth of Boring (ft bgs): 20'

Depth (feet)	Sample Depth	PID (ppm)	Recovery (%)	Sample ID, Depth, Time
0-5'	~~0-5'~~ RJ 0.5-3'	1.0	75%	
5-10'	4-5'	1.0	—	SB-UST-01 5-6' @0910 (N)
	5-6'	2.7		
	7-8'	0.5		SB-UST-01 7-8' @0915 (N)
10-15'	9-10'	0.2	90%	
	11-12	0.2		
	13-14'	0.3		SB-UST-01 13-14' @0920 (N)
15-20'	15-16'	0.1	90%	
	17-18'	0.1		SB-UST-01 19-20' @0925 (N)
	19-20'	0.6		
				SB-UST-01 @0935 (S)

Lithology/Notes

ASPHALT 0-0.5' ish

0.5-5' SAND, fq-med, tan-browns, dry-sl. moist, loose-medium, no appreciable fines, trace organics

5-6.5' SAA, ~~med~~-dk brown, sl. moist-moist

6.5-8' SAND, fq-med, wet, dk brown

8-10' SAND, ~~fq-med~~ RJ wet-saturated, med-cq, light gray w/ WOOD debris @ 10'

10-13' SAA, med, minor weathered wood, wet-sat

13-15' SILTY sand, vfq-fq, gray brown, wet, ~~med-firm~~ RJ med firm. No wood or organics observed

~~15-20'~~ 15-18.5' SAA, soft to med firm consistency, gray brown, wet, bec. light gray w/depth.

18.5-20' Becomes ~~dry~~ moist, clumpy sandy ~~clay~~ RJ silty PEAT SAA but siltier, dk gray, ~~some~~ w/ wood/ decomposed SANDY PEAT layer

WQM Parameters:

		0928	0930	0932
temp	°C	16.9	16.8	16.7
DO	mg/L	2.00	1.62	1.51
SpC	uS/cm	1697	1643	1652
pH		6.17	6.18	6.19
ORP	mV	119.0	116.0	111.8
FLOW CELL turb	NTU	107-56	72000	~1700.
Hanna turb	NTU	167	185	157

Grab GW sample
3/4" PVC screened ~5-20', no filter pack
tubing @ ~19' bgs
Pre-purged 2-3 gallons w/ peri. pump

Project: Maralco Property	Project Desc. Remedial Investigation	Boring ID SB-UST-02	CRETE CONSULTING, INC. Sheet 1 of 1
Location: 7730 S. 202nd St., Kent, WA		Client: Bridge Industrial	
Logged By: Rusty Jones (CRETE)	Date Started: 8/29/22 0950	Tooling: Macrocore MCS	Drilling Contractor: Holt Services
Drill Crew: Cody Henderson	Date Completed: 8/29/22 1115		Borehole Diameter: 2-3"
	Backfilled: Bentonite Chips		Drill Rig Type: Geoprobe 7800, truck-mounted
	Groundwater Depth (ft bgs): ~7.9 in PVC		Total Depth of Boring (ft bgs): 20

Depth (feet)	Sample Depth	PID (ppm)	Recovery (%)	Sample ID, Depth, Time
0-5'	1-2.5'	3.0	65%	SB-UST-02 5-6' @ 1035
	4-5'	0.8		
5-10	5-6'	1.6	90+%	
	7-8'	0.6		SB-UST-02 15-16' @ 1040
	9-10'	0.3		
10-15'	11-12'	0.2	90-95%	
	13-14'	0.4		SB-UST-02 19-20' @ 1045
15-20'	15-16'	BHS 1.2	~90%	
	17-18'	0.6		
	19-20'	1.4		SB-UST-02 @1055

Lithology/Notes

0-<0.5' ASPHALT

(N) 0.5-1' FILL: Gravelly, clayey SAND, reddish brown, ang. rocks

1-5' SAND, fg-med, gray-black, sl. moist

5-7' SAA, fg-med, moist
@~7' wet

(N) 7-10' SILTY SAND, fg, wet, v. low psuedo-plasticity, tan-dk gray, minor w/decomposed wood (black)

10-15' SAND, fg-med, wet-sat. dk tan-dk gray, some w/decomposing wood (black), soft

15-18.5' SAA

(N) 18.5-20' SANDY PEAT, dk gray-black, moist-wet, abundant/mostly well-decomposed wood, soft/granular

WQM Parameters:

POOR RECHARGE LOW WATER → BUBBLES

		1046	1048	1050
temp	°C	19.9	20.3	20.8
DO	mg/L	1.96	3.36↑	5.38
SpC	µS/cm	1315	1436	1444
pH		6.49	6.53	6.58
ORP	mV	-25.4	-49.7	-51.6
FLOW CELL turb	NTU	229↓	283	323
HANNA turb.	NTU	755	628	711

(S) Grab GW sample (pre-purged 1.5-2.5 gal.)
Screen @ 5-~~20~~' bgs (3/4" PVC), no filter media
Slow to fill (poor recharge)

Project: Maralco Property	Project Desc. Remedial Investigation	Boring ID: SB-UST-03	**CRETE** CONSULTING, INC.
Location: 7730 S. 202nd St., Kent, WA		Client: Bridge Industrial	Sheet 1 of 1
Logged By: Rusty Jones (CRETE)	Date – Started: 8.29.22 1115	Tooling: Macrocore MC5	Drilling Contractor: Holt Services
Drill Crew: Cody Henderson	Date – Completed: 8.29.22 1245		Borehole Diameter: 2-3"
	Date – Backfilled: Bentonite Chips		Drill Rig Type: Geoprobe 7800, truck-mounted
	Groundwater Depth (ft bgs): 7.2' in PVC		Total Depth of Boring (ft bgs): 20

Depth (feet)	Sample Depth	PID (ppm)	Recovery (%)	Sample ID, Depth, Time
0-5'	0.5-1'	1.0	85%	
	1-2'	3.2		SB-UST-03 1-2' @1200 (2)
	4-5'	1.6	~~9?~~	
5-10'	5-6'	1.5	90-95%	SB-UST-03 7-8' @1205 (2)
	7-8'	1.6		
	9-10'	0.7		
10-15'	11-12'	1.6	70%	SB-UST-03 11-12' @1210 (2)
	13-14'	1.1		
15-20'	15-16'	0.8	95%	
	17-18'	1.0		
	19-20'	1.3		SB-UST-03 @1232 (5)

Lithology/Notes

0-<0.5' ASPHALT

<0.5-1' FILL: GRAVELLY (ang.) sand, poorly-sorted, reddish brown, dry - sl. moist, fg-cg

1-5' SAND - fg - med, sl. moist, dk brown - dk gray
trace w. wood (black)

5-5.8' SAA

5.8-10' SAND, wet, -saturated fg-med, dk brown

10-15' SAA, saturated, v. trace decomposing wood debris

15-15.5' SAA

15.5-18.3' SILTY SAND, wet-sat, vfg-med, dk tan - dk brown

18.3-18.8' PEAT layer, decomp. wood, moist, sat mycred
v. weathered (tearable), fibrous, dk brown to black

18.8-20' SAND, fq-med, ~~mo~~ wet-sat.
dk gray

WQM Parameter:

		1220	1222	1224	1226
temp	°C	15.5	15.3	15.2	15.4
DO	mg/L	2.49	2.15	1.71	1.54
SpC	uS/cm	3281	3378	3412	3328
pH		6.52	6.51	6.60	6.50
ORP	mV	-52.9	-77.6	-87.4	-93.4
FLOW CELL turb.	NTU	419	368	201	167
HANNA turb.	NTU	L.LO (error)	742	503	347

Grab sample (GW) from 3/4" PVC
turbid water, pre-purged 2-3 gal.

Project: Maralco Property	Project Desc. Remedial Investigation	Boring ID DPT-14	CRETE CONSULTING, INC.
Location: 7730 S. 202nd St., Kent, WA		Client: Bridge Industrial	Sheet 1 of 1
Logged By: Rusty Jones (CRETE)	Date — Started: 8/29/22 1255	Tooling: Macrocore MC5	Drilling Contractor: Holt Services
Drill Crew: Cody Henderson	Date — Completed: 8/29/22 1433		Borehole Diameter: 2-3"
	Date — Backfilled: Bentonite chips		Drill Rig Type: Geoprobe 7800, truck-mounted
	Groundwater Depth (ft bgs): 8.8' in PVC		Total Depth of Boring (ft bgs): 15

Depth (feet)	Sample Depth	PID (ppm)	Recovery (%)	Sample ID, Depth, Time
0-5'	0.5-1.5'	1.6	10%	
5-10'	5-7.5'	1.8	80%	~~DPT~~-14 5-7.5' @ 1400 (N)
	7.5-10'	2.1		
10-15'	10-11.5'	3.2	90%	DPT-14 10-11.5' @ 1405 (N)
	11.5-13'	1.2		
	13.5-15'	1.4		DPT-14 @ 1425 (G)

Lithology/Notes

0- <0.5' ASPHALT
POOR RECOVERY, hit rock, jammed sampler barrel
FILL: gravelly sand, dry, poorly-sorted, rd cobbles & gravell

5-10' upper 1.5' of core slough, → cobbles + FILL SAA
5-10' SAND, fg-med, sl. moist-moist, dk brown-black, well-drained

10-15' upper 1-1.5' slough → cobbly FILL (gravelly sand)
10-15' SAA SAND, moist to wet

WQM Parameters:

	1414	1416	1418	1420
temp °C	19.3	19.1	19.1	19.0
DO mg/L	1.67	1.40	1.34	1.31
SpC uS/cm	548	541	540	539
pH ~~6.85~~	6.55	6.47	6.46	6.45
ORP mV	~~-2.85~~ -5.4	-29.7	-40.9	-49.4
FLOW CELL turb (NTU)	42.9	57.0	74.9	56.9
HANNA turb. (NTU)	74.6	74.7	95.6	90.2

Grab GW sample from 3/4" PVC temp. well
* Screened 5-15' bgs, tubing @ ~14' bgs
Purge water relatively clear & Pre-Purged ~2 gal. water

Project: Maralco Property	Project Desc. Remedial Investigation	Boring ID DPT-15	CRETE CONSULTING, INC.
Location: 7730 S. 202nd St., Kent, WA		Client: Bridge Industrial	Sheet 1 of 1
Logged By: Rusty Jones (CRETE)	Date — Started: 8.29.22 1433	Tooling: MacroCore MC5	Drilling Contractor: Holt Services
Drill Crew: Cody Henderson	Date — Completed: 8.29.22 1555		Borehole Diameter: 2-3"
	Date — Backfilled: Bentonite chips		Drill Rig Type: Geoprobe 7800, truck-mounted
	Groundwater Depth (ft bgs): 9.3' in PVC		Total Depth of Boring (ft bgs): 15

Depth (feet)	Sample Depth	PID (ppm)	Recovery (%)	Sample ID, Depth, Time
0-5'	1-5'	2.1	30%	~~5-6.5 RS~~
	5-6.5'	2.4		
5-10'	6.5-8.5'	1.9	80%	DPT-15 5-6.5' @ 1515
	8.5-10'	2.4		
10-15'	10-11'	1.9	80%	DPT-15 ~~13.5-15' RS~~ 8.5-10' @ 1520
	12-13.5'	2.0		
	13.5-15'	1.9		
				DPT-15 @ 1538

Lithology/Notes

0-5' POOR RECOVERY
~0.5' ASPHALT
0.5-5' per recovery: Gravelly sand, rounded, dry, tan-browns, poorly-sorted

5-10' w/ ~1-1.5' slough (above FILL)
(N) 5-10' SAND, fg-med, dk brown - black, well-rd, moist, wet by ~9' bgs, some woody debris
@ ~8-10 abundant vfg sand & SILT

10-15', upper ~1' slough (FILL)
10-15' SAA, wet, w/ SILT + vfg, dk ~~gray~~ brown - dk gray, mostly vfg - fg, minor w. wood pieces

(2)

WQM Parameters:

		1527	1529	1531	1533
temp	°C	20.0	18.6	18.4	18.2
DO	mg/L	2.73	1.68	1.43	1.40
SpC	µS/cm	1297	1152	1181	1188
pH		6.46	6.43	6.40	6.39
ORP	mV	-23.9	-46.5	-62.9	-67.9
Flow cell turb	NTU	258	221	115	104
Hanna turb	NTU	605	540	204	193

(5) Grab GW sample from 3/4" PVC temp. well
Pre-purged ~1.5-2 gal. H_2O, somewhat ~~clear~~
Screened ~5-15' bgs
~~Pre-purged ~2 gal. temp. well water~~ RS

Project: Maralco Property	Project Desc. Remedial Investigation	Boring ID: DPT-16	**CRETE** CONSULTING, INC.
Location: 7730 S. 202nd St., Kent, WA		Client: Bridge Industrial	Sheet 1 of 1
Logged By: Rusty Jones (CRETE)	Date — Started: 8/30/22 0750	Tooling: Macrocore MC5	Drilling Contractor: Holt Services
Drill Crew: Cody Henderson	Date — Completed: 8/30/22 0920		Borehole Diameter: 2-3"
	Date — Backfilled: Bentonite Chips		Drill Rig Type: Geoprobe 7800, truck-mounted
	Groundwater Depth (ft bgs): 8.9 in PVC		Total Depth of Boring (ft bgs): 15

Depth (feet)	Sample Depth	PID (ppm)	Recovery (%)	Sample ID, Depth, Time
0-5'	0.5-2.5	1.3	55%	
	2.5-5'	0.8		DPT-16 6.5-8' @ 0845 (1)
5-10	5-6.5' 0.5		100%	
	6.5-8'	1.3		
10-15'	9-10'	1.1	100%	DPT16 10-11.5' @ 0850 (2)
	10-11.5'	4.1		
	12-13.5'	3.7		DPT-16 13.5-15 @ 0855 (2)
	13.5-15	3.9		
				DPT-16 @ 0905 (3)

Lithology/Notes

~0-0.5' ASPHALT

~0.5-1.5' FILL: GRAVELLY SAND, poorly-sorted, sub to rd fg-cg, tan, dry

~1.5-5' SAND, dk tan-med. brown, fg, well-sorted, sl. moist

5-10' ~~0-5 ft~~ upper 17" slough

5-10' SAND, fg, well-sorted, dk tan-reddish brown, (dk yellowish orange) trace small roots, medium firm, sl. moist-moist
@ 9' moist to wet

10-15' push → upper 14" slough

10-15' similar as above, but darker color

10-15' SAND, fg-med, wet-sat. well-sorted, subrd-rd dk brown-black, trace w. wood

WQM Measurements:

		0854	0856	0858	0900
temp	°C	15.0	14.9	14.8	14.8
DO	mg/L	2.92	2.29	2.15	2.17
SpC	uS/cm	971	953	956	950
ORP	mV	96.5	22.1	12.6	16.0
YSI turb.	NTU	56	110	112	104
Hanna turb	NTU	119	90.0	168	176
pH		6.23	6.21	6.21	6.21

Grab GW sample from 3/4" PVC temp. well
Screened 5-15' bgs, tubing near bottom due to recharge
No filter pack
Pre-purged ~2 gal.

Project: Maralco Property	Project Desc. Remedial Investigation	Boring ID DPT-17	CRETE CONSULTING, INC.
Location: 7730 S. 202nd St., Kent, WA		Client: Bridge Industrial	Sheet 1 of 1
Logged By: Rusty Jones (CRETE)	Date — Started: 8/30/22 1355	Tooling: MacroCore MC5	Drilling Contractor: Holt Services
Drill Crew: Cody Henderson	Date — Completed: 8/30/22 1555		Borehole Diameter: 3"
	Backfilled: Bentonite chips		Drill Rig Type: Geoprobe 7800, truck-mount
	Groundwater Depth (ft bgs):		Total Depth of Boring (ft bgs): 20

Depth (feet)	Sample Depth	PID (ppm)	Recovery (%)	Sample ID, Depth, Time
0-5'	1-2'	4.5	85-90%	DUP-RS DPT-17 5.5-8' @1455
	2-3'	5.0		
	4-5'	4.6		
5-10'	5.5-8'	2.9	70-75%	DPT-17 9-10' @1500
	9-10'	2.4		
10-15'	11-12'	3.9	90-95%	DPT-17 19-20' @1505
	13-14'	3.8		
15-20'	15-16'	2.5 (3.8)	95%	
	17-18'	2.5		
	19-20'	4.8		DPT-17 @1545

Lithology/Notes

0-0.5' ASPHALT 0.5-1' GRAVELLY SAND, dry, poorly-sorted, tan s
~~0.5-1.8'~~ 1-2.8' SILTY SAND, vfg-fg, brown, dry - sl. moist
2.8-5' SAND, fg-med, med-dk brown, sl. moist
reddish orange mottling

5-10' core → 8" slough
5-6' SAA
6-8' SILTY SAND, vfg-med trace clay content, sl. moist - moist, brown - reddish brown
8-9' ~~CLAYEY SAND~~ SANDY CLAY w/ SILT, vfg-fg dk gray, ~~wet~~ pasty consistency, v. low plasticity

9-10' SILTY SAND, vfg-fg, dk gray - dk brown, wet

10-15' SILTY SAND, vfg-med. (mostly fg), well-sorted, dk gray, saturated, variable vfg content & SILT content
12.5-14' abundant SILT + vfg sand
15-20' SAA, fg-med., dk gray - black

No HC odors observed
WQM parameters:

		1534	1536	1538	1540
temp	°C	18.4	18.4	18.3	18.1
DO	mg/L	2.77	2.16	2.09	1.99
SpC	µS/cm	1066	1057	1051	1051
pH		6.51	6.51	6.51	6.51
YSI turb	NTU	751	574	536	468
Hanna turb	NTU	ERROR →			
ORP	mV	4.5	2.3	-4.0	

Grab GW sample from 3/4" PVC well screened ~5-20' bgs
Pre-purged ~4 gal. (still turbid purge water)
(611 NTU Hanna) post-sampling

Project: Maralco Property	Project Desc. Remedial Investigation	Boring ID DPT-18	CRETE CONSULTING, INC.
Location: 7730 S. 202nd St., Kent, WA		Client: Bridge Industrial	Sheet 1 of 1
Logged By: Rusty Jones (CRETE)	Date Started: 8/31/22 0810	Tooling: MacroCore MC5	Drilling Contractor: Holt Services
Drill Crew: ~~Grady~~ R Green, Grady	Date Completed: 8/31/22 ~0945		Borehole Diameter: ~3"
	Backfilled: Bentonite Chips		Drill Rig Type: Geoprobe 7822DT, track-mounted
	Groundwater Depth (ft bgs): ~~8.6~~ 8.6 TRG in PVC ~~4~~8.0		Total Depth of Boring (ft bgs): 15

Depth (feet)	Sample Depth	PID (ppm)	Recovery (%)	Sample ID, Depth, Time	Lithology/Notes
0-5	0-2.5'	2.7	50%		GRASS + VEGETATION @ surface 0-5' SAND, fg-cg (mostly fg-med), poorly-sorted, dry, tan-light brown, subrd small (≤1 cm) gravel, trace-minor ROOTS
	2.5-5'	3.1		DPT-18 5-7.2' @ 0915 (N)	
5-10'	5-7.2'	2.8	50%		5-10' 5-7.2' SAA, dry-sl. moist or SLOUGH 7.2-10' moist-wet, fg-med SAND, dk brown, little to no gravel
	7.2-10	2.6		DPT-18 14-15' @ 0920 (N)	
10-15'	10-12'	3.3	25%		10-15' ~4-5" slough 10-15' SAND, fg-med, wet-sat, dk brown-black, trace wood pockets, no gravel, well-sorted
	12-14'	3.2		DPT-18 @ 0934 (b)	temp well 3/4" PVC, screened ~4.5-14.5' bgs, no filter media Grab GW sample (somewhat clear-ish) Pre-purged ~2-gal.
	14-15'	4.0			

WQM Parameters:

		0923	0925	0927	0929
temp	°C	14.5	14.3	14.3	14.1
DO	mg/L	1.86	1.67	1.58	1.53
SpC	µS/cm	298.9	298.1	296.8	296.3
pH		6.41	6.31	6.25	6.22
ORP	mV	-30.2	-28.2	-29.0	-30.8 ~~15.1~~
FLOW CELL turb.	NTU	165	133	107	100 ↓
Hanna turb.	NTU	426	297	212	212

After sampling → Hanna @ 84.1 NTU

Project: Maralco Property	Project Desc. Remedial Investigation	Boring ID DPT-19	CRETE CONSULTING, INC.
Location: 7730 S. 202nd St., Kent, WA		Client: Bridge Industrial	Sheet 1 of 1
Logged By: Rusty Jones (CRETE)	Date Started: 8/31/22 0945	Tooling: MacroCore MC5	Drilling Contractor: Holt Services
Drill Crew: ~~Graddy~~ Green Grady	Date Completed: 8/31/22 1251		Borehole Diameter: 3+"
	Date Backfilled: Bentonite Chips		Drill Rig Type: Geoprobe 7822DT, track
	Groundwater Depth (ft bgs): 13.4' in PVC, 9' in PVC (2nd attempt)		Total Depth of Boring (ft bgs): 15

Depth (feet)	Sample Depth	PID (ppm)	Recovery (%)	Sample ID, Depth, Time	Lithology/Notes
0-5'	0-2.5'	3.9	55%	DPT-19 6-8' @ 1020	GRASS + VEGETATION @ surface
	2.5-5'	1.5			② 0-5' SAND, vfg-cg (mostly fg-med), poorly-sorted, dry, tan-reddish brown, minor small GRAVEL, trace ROOTS
5-10'	6-8'	3.3	55-60%	DPT-19 12.5-15' @ 1025	5-10' core → upper 12" slough?
	8-10'	2.6			② 5-6' SAND or slough; 6-10' CLAYEY SILTY SAND, vfg-fg, moist to wet, reddish brown, soft, v. low plasticity by 8' (inc. CLAY fines w/ depth), gray-brown by 8'
10-15'	10-12.5'	3.9	40%		10-15' core → *poor recovery*; ~10-12.5' Mixed SLOUGH and below lithology
	12.5-15'	3.6			~12.5-15' SAND, fg-med, well-sorted, saturated, dk gray-black, no wood observed, trace SILTY ORGANIC FINES
				DPT-19 @ 1235	* ~~Grab GW sample from temp well~~ RJ 3/4" PVC no filter media, screened ~4.5-~~15~~ RJ 14.5' ~~Pre-purged~~ RJ
					⑤ UNABLE TO SAMPLE GW @ LOCATION → INSUFFICENT RECHARGE *very poor recharge, minimal WQM readings*

WQM Parameters:

		1st 1029	2nd 1224	1226	1228	1230
temp	°C	17.8	14.8	14.5	14.4	14.2
DO	mg/L	5.79 (Bubbling)	2.08	1.62	1.48	1.48
SpC	µS/cm	268.7	281.6	280.4	282.7	282.1
pH		6.25	6.27	6.25	6.26	6.26
ORP	mV	16.8	15.6	5.2	-5.8	-10.8
YSI turb.	NTU	234	1172	1382	882	789
Hanna turb.	NTU	DRY	ERROR			

Hardly a trickle
Flow cell ~3/4 full

Project: Maralco Property	Project Desc. Remedial Investigation	Boring ID DPT-20	CRETE CONSULTING, INC.
Location: 7730 S. 202nd St., Kent, WA		Client: Bridge Industrial	Sheet 1 of 1
Logged By: Rusty Jones (CRETE)	Date — Started: 8/31/22 1057	Tooling: MacroCore MCS	Drilling Contractor: Holt Services
Drill Crew: Grady Green	Date — Completed: 8/31/22 1246		Borehole Diameter: 3+"
	Date — Backfilled: Bentonite Chips		Drill Rig Type: Geoprobe 7822 DT track
	Groundwater Depth (ft bgs): 6.2' in PVC		Total Depth of Boring (ft bgs): 15

Depth (feet)	Sample Depth	PID (ppm)	Recovery (%)	Sample ID, Depth, Time
0-5'	0-2.5'	6.3	55%	
	2.5-5'	3.4		DPT-20 6.5-7.5 @ 1135 (2)
5-10'	6.5-7.5'	3.9	75%	
	7.5-9.3'	3.4		
10-15'	9.3-10'	3.7	80%	DPT-20 13.5-15' @ 1140 (2)
	10-11.5'	3.4		
	11.5-13.5	3.6		DPT-20 @ 1155 (5)
	13.5-15'	4.0		

Lithology/Notes

GRASS, VEGETATION @ surface
0-5' LESS THAN DESIRABLE RECOVERY
0-5' SAND - fg-med, minor cg, dry, some small ROOTS, tan
0-1' ~~trace~~ minor organics

~5-6.5' SAA, dry, possibly slough
6.5' SILTY SAND, moist, dk tan-brown, vfg-fg
7.5' CLAYEY SILTY SAND, moist-wet, dk tan-med brown, vfg-fg, low plasticity (CLAY) rusty orange mottling
9.3' SAND-fg-med, saturated, dk gray, well-sorted

10-15' SAA, saturated, dk gray-black
11.5' inc. vfg-fg, some SILTs
13.5 SILTY SAND, vfg-fg, dk gray, sat., well-drained well-sorted

Grab GW sample from temp well (pre-purged 1-1.5 gal. 3/4" PVC, Screened ~5-15' bgs, no filter media

WQM Parameters:

			1144	1146	1148	1150
	temp	°C	15.1	14.7	14.6	15.0
	SpC	uS/cm	311.62	315.8	320.2	320.8
	DO	mg/L	2.12	2.08	2.48	3.09
	pH		6.31	6.29	6.29	6.29
	ORP	mV	17.5	8.5	3.1	-0.7
YSI	turb.	NTU	68	450	395	505
Hanna	turb.	NTU	60	259	ERROR	704

Final water (not turbid, not clear) about like some tap water
@ sample 28.3 NTU Hanna

increasing turb

Bubbles surfacing

dec. purge rate

Project: Maralco Property	Project Desc. Remedial Investigation	Boring ID DPT-21	CRETE CONSULTING, INC.
Location: 7730 S. 202nd St., Kent, WA		Client: Bridge Industrial	Sheet 1 of 1
Logged By: Rusty Jones (CRETE)	Date — Started: 8/31/22 1256	Tooling: MacroCore MC5	Drilling Contractor: Holt Services
Drill Crew: Grady Green	Completed: 8/31/22 1413		Borehole Diameter: 3+"
	Backfilled: Bentonite chips		Drill Rig Type: Geoprobe 7822DT, track
	Groundwater Depth (ft bgs): 8.1 in PVC		Total Depth of Boring (ft bgs): 15

Depth (feet)	Sample Depth	PID (ppm)	Recovery (%)	Sample ID, Depth, Time
0-5'	0-2.5'	8.3	40-45%	DPT-21 6-10' @ 1330 (2)
	2.5-5'	6.3		
5-10'	~~5-7.5'~~ 6-10 ~~7.5 to~~	POOR REC (RJ)	40%	
				DPT-21 11.5-14' @ 1335 (2)
10-15'	10-11.5'	4.8	75%	DUPOL-220831 @ 0800 (2)
	11.5-14'	5.4		
	14-15'	5.8		DPT-21 @ 1350 (5)
				DUP02-220831 @ 0815 (GW) (5)

Lithology/Notes

GRASS & VEGETATION @ surface

0-5' core → poor recovery

SAND w/ small gravel, vfg-cg, minor vfg & cg, dry-sl. moist, tan-brown, minor ROOTS, poorly-sorted

5-10' core → poor recovery

5-10' SAND, ~~tan~~ RJ no ROOTS, sl. moist, fg-med, well-sorted

@ ~9-10' moist-wet

combined due to limited core volume

10-15' core → minor to 6" slough @ top

10-15' brown-dk brown SAND, fg-med, well-sorted, sat. minor-some organic fines

Grab GW samples (incl. duplicate) from temp well. 3/4" PVC, screened 5-15' bgs, no filter pack

Pre-purged ~1-2 gal. prior to sampling

WQM Parameters:

		1338	1540	1542	1544
temp	°C	15.1	15.1	14.9	14.8
DO	mg/L	2.10	1.78	1.60	1.55
SpC	µS/cm	350.1	348.3	350.9	350.3
pH		6.23 RJ	6.18	6.17	6.16
ORP	mV	~~15.3~~ 29.6	23.3	14.7	9.3
YSI turb.	NTU	221 ~~29.6~~ RJ	182	118	137
Hanna turb.	NTU	605	400	242	251

~~Post sampling turb (Hanna):~~ RJ

Project: Maralco Property	Project Desc. Remedial Investigation	Boring ID DPT-22	CRETE CONSULTING, INC. Sheet 1 of 1
Location: 7730 S. 202nd St., Kent, WA		Client: Bridge Industrial	
Logged By: Rusty Jones (CRETE)	Date — Started: 8/31/22 1414	Tooling: MacroCore MC5	Drilling Contractor: Holt Services
Drill Crew: Grady Green	Date — Completed: 8/31/22 1530		Borehole Diameter: 3+ "
	Date — Backfilled: Bentonite chips		Drill Rig Type: Geoprobe 7822DT
	Groundwater Depth (ft bgs): 6.8 in PVC		Total Depth of Boring (ft bgs): 15

Depth (feet)	Sample Depth	PID (ppm)	Recovery (%)	Sample ID, Depth, Time
0-5'	0-3.5'	3.2	50%	DPT-22 3.5-5' @ 1450
	3.5-5'	3.5		
5-10'	5-7'	5.5	70%	DPT-22 5-7' @ 1455
	7-8.5'	4.8		
	8.5-10'	4.7		
10-15'	10-11'	3.9	95%	DPT-22 11-13.2 @ 1500
	11-13.2'	4.4		
	14-15'	3.4		
				DPT-22 @ 1515

Lithology/Notes

GRASS + VEGETATION @ surface

0-3.5' SAND, fg-cg (mostly fg-med), dry, tans, some small gravel (<1.5cm), minor small ROOTS (N)

3.5-5 SAND, ~~fg-cg~~ fg-med, moist, brown-dk brown, trace small gravel

5-10' core ~12-13" SLOUGH @ top (N)
5-10' SAND, fg-med, dk brown-black, moist to wet
Some org. fines

10-13.2' SAA, med., saturated, dk brown black (N)

13.2-15' inc. SILT & vfg SAND, inc CLAYEY FINES
CLAYEY SAND, vfg-fg, dk brown-dk gray, wet
abundant ~~CLAY FINES~~ ORGANIC FINES, v. low plastic.

Grab GW sample from temp well
3/4" PVC, screened ~4.5-14.5' bgs, no filter media
Pre-purged ~1-2 gal. prior to sampling
Somewhat clear
~~Post RT~~ (S)

WQM Parameters:

	1503	1505	1507	1509
temp °C	16.4	16.5	16.2	16.1
DO mg/L	1.77	1.54	1.43	1.38
SpC uS/cm	247.7	249.6	249.5	251.9
pH	6.08	6.04	6.03	6.03
ORP mV	32.7	28.0	22.5	17.4
YSI turb. NTU	119	84.3	67	48
Hanna turb. NTU	196	152	90.8	65.3

1523 Post sampling Hanna turb. (NTU): 53.5

Appendix C

COI Screening Elevation Backup

Table C-1 PCUL Workbook - Soil Summary for Freshwater Sites

Sort Order	Chemical (all concentrations in mg/kg)	Shallow PCUL (uncovered, 0-6 ft bgs) SL #s 1,5-10	Deep PCUL (uncovered, >6 ft bgs) SL #s 1,5-7,10	Vadose Zone REL (covered) SL #s 1, 10	Saturated Zone REL (covered) SL #s 1,5-7,10	SL-1 Direct Contact SL-Det	SL-2 Protect Drinking Water Vadose Zone LeachFW	SL-3 Protect Surface Water via Ground Water Vadose Zone LeachFW	SL-4 Protect Sediment via Ground Water Vadose Zone LeachFW	SL-5 Protect Drinking Water Saturated Zone LeachFW	SL-6 Protect Surface Water via Ground Water Saturated Zone LeachFW	SL-7 Protect Sediment via Ground Water Saturated Zone LeachFW	SL-8 Sediment PCUL SMS Lower Tier Beach Play & Benthic SedFW	SL-9 Site-Specific TEE Unrest. Land Use SL-Det	SL-10 Natural Background Ecology (1994)
2	Total PCB Aroclors	0.00	0.00	1.00	0.00	1.0E+00	3.4E-01	1.1E-05	4.8E-02	1.7E-02	5.5E-07	2.4E-03	1.2E-02	6.5E-01	na
10	***Inorganics***														
11	Ammonia	na	na	na	na	na	na	na	na	na	na	na	na	na	na
12	Chloride	na	na	na	na	na	na	na	na	na	na	na	na	na	na
13	Cyanide, free	0.02	0.02	50.40	0.02	5.0E+01	1.0E+00	3.8E-01	8.3E+03	5.1E-02	1.9E-02	4.2E+02	4.2E+02	na	na
14	Fluoride	144.28	144.28	4800.00	144.28	4.8E+03	2.9E+03	na	8.0E+05	1.4E+02	na	4.0E+04	4.0E+04	na	na
15	Nitrate	128000.00	128000.00	128000.00	128000.00	1.3E+05	na	na	na	na	na	na	1.1E+06	na	na
19	***Metals***														
20	Aluminum	33000.00	33000.00	80000.00	33000.00	8.0E+04	4.8E+05	9.1E+03	1.3E+07	2.4E+04	4.5E+02	6.7E+05	6.7E+05	5.0E+01	3.3E+04
21	Antimony	5.20	5.20	32.00	5.20	3.2E+01	5.4E+00	5.1E+00	5.3E+03	2.7E-01	2.5E-01	2.7E+02	2.7E+02	2.7E-01	5.2E+00
22	Arsenic	7.30	7.30	7.30	7.30	6.7E-01	4.7E+00	4.7E+00	4.1E+01	2.3E-01	2.3E-01	2.1E+00	2.1E+00	1.0E+01	7.3E+00
23	Barium	250.00	250.00	16000.00	250.00	1.6E+04	1.6E+03	8.2E+02	2.7E+06	8.3E+01	4.1E+01	1.3E+05	1.3E+05	1.0E+02	2.5E+02
24	Beryllium	3.16	3.16	160.00	3.16	1.6E+02	6.3E+01	1.2E+03	2.7E+04	3.2E+00	6.0E+01	1.3E+03	1.3E+03	1.0E+01	6.1E-01
25	Cadmium	0.77	0.77	80.00	0.77	8.0E+01	6.9E-01	5.8E-02	1.5E+01	3.5E-02	2.9E-03	7.7E-01	7.7E-01	4.0E+00	7.7E-01
26	Chromium, total	48.00	72.00	na	72.00	na	2.0E+03	na	1.4E+03	1.0E+02	na	7.2E+01	7.2E+01	4.2E+01	4.8E+01
27	Chromium, trivalent	61.02	61.02	120000.00	61.02	1.2E+05	4.8E+05	1.2E+03	2.0E+07	2.4E+04	6.1E+01	1.0E+06	1.0E+06	na	na
28	Chromium, hexavalent	0.0069	0.0069	1.2000	0.0069	1.2E+00	1.8E-01	1.4E-01	1.4E+02	8.9E-03	6.9E-03	7.2E+00	7.2E+00	3.4E-01	na
29	Cobalt	11.00	11.00	24.00	11.00	2.4E+01	4.3E+00	na	4.0E+03	2.2E-01	na	2.0E+02	2.0E+02	2.0E+01	1.1E+01
30	Copper	36.00	36.00	3200.00	36.00	3.2E+03	2.8E+02	5.3E-01	8.0E+03	1.4E+01	2.7E-02	4.0E+02	4.0E+02	5.0E+01	3.6E+01
31	Iron	36000.00	36000.00	56000.00	36000.00	5.6E+04	1.5E+02	5.0E+02	9.3E+06	7.6E+00	2.5E+01	4.7E+05	4.7E+05	2.0E+02	3.6E+04
32	Lead	24.00	24.00	250.00	24.00	2.5E+02	3.0E+03	5.0E+02	4.2E+02	1.5E+02	2.5E+01	2.1E+01	2.1E+01	5.0E+01	2.4E+01
33	Manganese	1100.00	1100.00	3736.00	1100.00	3.7E+03	6.5E+01	6.5E+01	6.2E+05	3.3E+00	3.3E+00	3.1E+04	3.1E+04	1.0E+02	1.1E+03
34	Mercury, inorganic	0.07	0.07	na	0.07	na	2.1E+00	1.3E-02	1.4E+00	1.0E-01	6.3E-04	7.0E-02	7.0E-02	1.0E-01	7.0E-02
35	Methylmercury	0.40	8.00	8.00	8.00	8.0E+00	2.2E+02	na	1.3E+03	1.1E+01	na	6.7E+01	6.7E+01	4.0E-01	na
36	Molybdenum	1.62	1.62	400.00	1.62	4.0E+02	3.2E+01	na	6.6E+04	1.6E+00	na	3.3E+03	3.3E+03	2.0E+00	na
37	Nickel	48.00	48.00	1600.00	48.00	1.6E+03	4.2E+02	1.4E+01	5.2E+02	2.1E+01	7.2E-01	2.6E+01	2.6E+01	3.0E+01	4.8E+01
38	Selenium	0.78	0.78	400.00	0.78	4.0E+02	5.2E+00	3.2E-01	1.5E+01	2.6E-01	1.6E-02	7.8E-01	7.8E-01	3.0E-01	7.8E-01
39	Silver	0.61	0.61	400.00	0.61	4.0E+02	1.4E+01	2.9E-02	1.1E+01	6.9E-01	1.5E-03	5.7E-01	5.7E-01	2.0E+00	6.1E-01
40	Thallium	0.00441	0.00441	0.80000	0.00441	8.0E-01	2.3E-01	8.8E-02	1.3E+02	1.1E-02	4.4E-03	6.7E+00	6.7E+00	1.0E+00	na
41	Tin	50.00	2402.75	48000.00	2402.75	4.8E+04	4.8E+04	na	8.0E+06	2.4E+03	na	4.0E+05	4.0E+05	5.0E+01	na
42	Vanadium	45.00	80.02	400.00	80.02	4.0E+02	1.6E+03	na	6.7E+04	8.0E+01	na	3.3E+03	3.3E+03	2.0E+00	4.5E+01
43	Zinc	85.00	85.00	24000.00	85.00	2.4E+04	6.0E+03	3.0E+01	6.4E+04	3.0E+02	1.5E+00	3.2E+03	3.2E+03	8.6E+01	8.5E+01
49	***SVOCs - PAHs***														
50	Acenaphthene	0.155600	0.155600	4800.00	0.16	4.8E+03	4.9E+01	3.1E+00	2.2E+04	2.5E+00	1.6E-01	1.1E+03	5.4E+03	2.0E+01	na
51	Acenaphthylene	na	na	na	na	na	na	na	na	na	na	na	na	na	na
52	Anthracene	2.378667	2.378667	24000.00	2.38	2.4E+04	1.1E+03	4.7E+01	1.1E+05	5.7E+01	2.4E+00	5.4E+03	2.7E+04	na	na
53	Benzo(a)anthracene	0.000057	0.000057	na	0.00	na	na	1.1E-03	3.6E-02	na	5.7E-05	1.8E-03	9.0E-03	na	na
54	Benzo(b)fluoranthene	0.000096	0.000096	na	0.00	na	na	1.9E-03	3.6E-02	na	9.6E-05	1.8E-03	9.0E-03	na	na
55	Benzo(k)fluoranthene	0.000940	0.000940	na	0.00	na	na	1.9E-02	3.6E-02	na	9.4E-04	1.8E-03	9.0E-03	na	na
56	Total benzofluoranthenes	0.012000	na	na	na	na	na	na	na	na	na	na	1.2E-02	na	na
57	Benzo(g,h,i)perylene	0.005000	na	na	na	na	na	na	na	na	na	na	5.0E-03	na	na
58	Benzo(a)pyrene	0.000016	0.000016	0.19	0.00	1.9E-01	3.9E+00	3.1E-04	3.6E-02	1.9E-01	1.6E-05	1.8E-03	9.0E-03	1.1E+00	na
59	Chrysene	0.001802	0.001802	na	0.00	na	na	5.9E-02	3.6E-02	na	2.9E-03	1.8E-03	9.0E-03	na	na
60	Dibenz(a,h)anthracene	0.000029	0.000029	na	0.00	na	na	5.7E-04	3.6E-02	na	2.9E-05	1.8E-03	9.0E-03	na	na
61	Dibenzofuran	0.040995	0.040995	80.00	0.04	8.0E+01	1.5E+00	na	8.1E-01	7.6E-02	na	4.1E-02	2.0E-01	na	na
62	Fluoranthene	0.001005	0.001005	3200.00	0.00	3.2E+03	6.3E+02	5.9E+00	2.0E-02	3.2E+01	3.0E-01	1.0E-03	5.0E-03	1.1E+00	na
63	Fluorene	0.079967	0.079967	3200.00	0.08	3.2E+03	5.1E+01	1.6E+00	1.5E+04	2.6E+00	8.0E-02	7.4E+02	3.6E+03	na	na
64	Indeno(1,2,3-cd)pyrene	0.000312	0.000312	na	0.00	na	na	6.2E-03	3.6E-02	na	3.1E-04	1.8E-03	9.0E-03	na	na
65	Methyl isopropyl phenanthrene (retene)	na	na	na	na	na	na	na	na	na	na	na	na	na	na
66	1-Methylnaphthalene	0.002416	0.002416	19.61	0.00	2.0E+01	4.7E-02	na	8.6E+01	2.4E-03	na	4.4E+00	2.0E+01	na	na
67	2-Methylnaphthalene	0.088533	0.088533	320.00	0.09	3.2E+02	1.7E+00	na	1.5E+03	8.9E-02	na	7.8E+01	3.6E+02	na	na
68	Naphthalene	0.236267	0.236267	1600.00	0.24	1.6E+03	4.5E+00	3.8E+01	8.0E+03	2.4E-01	2.0E+00	4.2E+02	1.8E+03	1.0E+00	na
69	Phenanthrene	na	na	na	na	na	na	na	na	na	na	na	na	na	na
70	Pyrene	0.001003	0.001003	2400.00	0.00	2.4E+03	3.3E+02	1.1E+01	2.0E-02	1.6E+01	5.5E-01	1.0E-03	5.0E-03	1.1E+00	na
71	Total LPAHs	29.000000	na	na	na	na	na	na	na	na	na	na	na	2.9E+01	na
72	Total HPAHs	1.100000	na	na	na	na	na	na	na	na	na	na	na	1.1E+00	na
73	Total PAHs	17.000000	na	na	na	na	na	na	na	na	na	na	1.7E+01	na	na
74	Total cPAH TEQ	0.004201	0.004201	0.19	0.00	1.9E-01	3.9E+00	1.9E-01	8.4E-02	1.9E-01	9.4E-03	4.2E-03	2.1E-02	na	na
75	***Other SVOCs***														
79	Benzoic acid	2.88	2.88	320000.00	2.88	3.2E+05	2.6E+02	na	4.0E+01	1.8E+01	na	2.9E+00	2.9E+00	na	na
86	Bis(2-ethylhexyl) phthalate	0.00501	0.00501	71.43	0.01	7.1E+01	1.3E+01	1.0E-01	2.0E+00	6.7E-01	5.0E-03	1.0E-01	5.0E-01	na	na
96	Dibutyl phthalate	0.015	0.015	8000.00	0.01	8.0E+03	5.7E+01	2.8E-01	1.7E+00	3.0E+00	0.015	8.7E-02	3.8E-01	2.0E+02	na
114	Di-n-octyl phthalate	0.008	0.008	800.00	0.01	8.0E+02	4.5E+02	na	1.6E-01	2.3E+01	na	7.8E-03	3.9E-02	na	na
125	4-Methylphenol (p-cresol)	0.0854	0.0854	8000.00	0.09	8.0E+03	1.6E+01	na	1.5E+00	9.4E-01	na	8.5E-02	2.6E-01	na	na
136	Phenol	0.0465	0.0465	24000.00	0.05	2.4E+04	3.7E+01	3.1E+01	7.6E-01	2.3E+00	1.9E+00	4.7E-02	1.2E-01	3.0E+01	na
143	***Volatile Organic Compounds***														
149	Benzene	0.000153	0.0001534	18.18	0.00	1.8E+01	2.7E-02	2.4E-03	1.3E+03	1.7E-03	1.5E-04	8.3E+01	1.4E+02	na	na
189	Ethylbenzene	0.0059	0.0059	8000.00	0.01	8.0E+03	5.9E+00	1.0E-01	4.3E+05	3.4E-01	5.9E-03	2.5E+04	6.7E+04	na	na
211	Toluene	0.0226	0.0226	6400.00	0.02	6.4E+03	4.5E+00	3.7E-01	3.8E+05	2.7E-01	2.3E-02	2.3E+04	5.3E+04	2.0E+02	na
225	Total xylenes	0.0296	0.0296	16000.00	0.03	1.6E+04	1.4E+01	5.1E-01	8.2E+05	8.3E-01	3.0E-02	4.8E+04	1.3E+05	na	na
235	***Petroleum Hydrocarbons***														
236	Gasoline range hydrocarbons, fresh	30.0000	30.0000	1500.00	30.00	1.5E+03	3.0E+01	3.0E+01	na	3.0E+01	3.0E+01	na	na	1.2E+02	na
237	Gasoline range hydrocarbons, weathered	100.0000	100.0000	1501.00	100.00	1.5E+03	1.0E+02	1.0E+02	na	1.0E+02	1.0E+02	na	na	1.2E+02	na
238	Diesel range hydrocarbons, fresh	260.0000	2000.0000	na	2000.00	na	2.0E+03	2.0E+03	na	2.0E+03	2.0E+03	na	3.4E+02	2.6E+02	na
239	Diesel range hydrocarbons, weathered	260.00	2000.00	na	2000.00	na	2.0E+03	2.0E+03	na	2.0E+03	2.0E+03	na	3.4E+02	2.6E+02	na
240	Oil range hydrocarbons	260.00	2000.00	na	2000.00	na	2.0E+03	2.0E+03	na	2.0E+03	2.0E+03	na	3.6E+03	2.6E+02	na
241	Total diesel & oil range hydrocarbons	260.00	2000.00	na	2000.00	na	2.0E+03	2.0E+03	na	2.0E+03	2.0E+03	na	na	2.6E+02	na

Table C-2 PCUL Workbook - Groundwater Summary for Freshwater Sites

Sort Order	Chemical (all concentrations in ug/L)	Most Stringent PCUL Potable Water GW #s 1-5	Most Stringent PCUL Nonpotable Water GW #s 2-5	GW-1 Protect Drinking Water PW	GW-2 Protect Surface Water SW-FW	GW-3 Protect Sediment PartitFW	GW-4 Screening Level Protect Indoor Air VI	TCE Short-Term Action Level for Cardiac Birth Defects Unrestricted VI Guidance	GW-5 Natural Background
1	***PCBs***								
2	Total PCB Aroclors	0.00001	7.0E-06	2.2E-01	7.0E-06	3.1E-02	na	na	na
10	***Inorganics***								
11	Ammonia	na	na	na	na	na	na	na	na
12	Chloride	230000.00000	2.3E+05	2.5E+05	2.3E+05	na	na	na	na
13	Cyanide, free	1.90000	1.9E+00	5.0E+00	1.9E+00	4.1E+04	na	na	na
14	Fluoride	960.00000	2.7E+05	9.6E+02	na	2.7E+05	na	na	na
19	***Metals***								
20	Aluminum	302.00000	3.0E+02	1.6E+04	3.0E+02	4.5E+05	na	na	na
21	Antimony	5.60000	5.6E+00	6.0E+00	5.6E+00	5.9E+03	na	na	na
22	Arsenic	8.00000	8.0E+00	5.8E-01	1.8E-02	7.1E+01	na	na	8.0E+00
23	Barium	1000.00000	1.0E+03	2.0E+03	1.0E+03	3.2E+06	na	na	na
24	Beryllium	4.00000	7.6E+01	4.0E+00	7.6E+01	1.7E+03	na	na	na
25	Cadmium	0.42000	4.2E-01	5.0E+00	4.2E-01	1.1E+02	na	na	na
26	Chromium, total	71.97937	7.2E+01	1.0E+02	na	7.2E+01	na	na	na
27	Chromium, trivalent	61.00000	6.1E+01	2.4E+04	6.1E+01	1.0E+06	na	na	na
28	Chromium, hexavalent	0.36000	3.6E-01	4.6E-01	3.6E-01	3.7E+02	na	na	na
29	Cobalt	4.80000	4.4E+03	4.8E+00	na	4.4E+03	na	na	na
30	Copper	1.20000	1.2E+00	6.4E+02	1.2E+00	1.8E+04	na	na	na
31	Iron	300.00000	1.0E+03	3.0E+02	1.0E+03	1.8E+07	na	na	na
32	Lead	2.09994	2.1E+00	1.5E+01	2.5E+00	2.1E+00	na	na	na
33	Manganese	50.00000	5.0E+01	5.0E+01	5.0E+01	4.8E+05	na	na	na
34	Mercury, inorganic	0.01200	1.2E-02	2.0E+00	1.2E-02	1.3E+00	8.3E-01	na	na
35	Methylmercury	1.60000	9.5E+00	1.6E+00	na	9.5E+00	na	na	na
36	Molybdenum	80.00000	1.6E+05	8.0E+01	na	1.6E+05	na	na	na
37	Nickel	11.00000	1.1E+01	3.2E+02	1.1E+01	4.0E+02	na	na	na
38	Selenium	3.10000	3.1E+00	5.0E+01	3.1E+00	1.5E+02	na	na	na
39	Silver	0.17000	1.7E-01	8.0E+01	1.7E-01	6.6E+01	na	na	na
40	Thallium	0.06189	6.2E-02	1.6E-01	6.2E-02	9.4E+01	na	na	na
41	Tin	9600.00000	1.6E+06	9.6E+03	na	1.6E+06	na	na	na
42	Vanadium	80.00000	3.3E+03	8.0E+01	na	3.3E+03	na	na	na
43	Zinc	24.00000	2.4E+01	4.8E+03	2.4E+01	5.1E+04	na	na	na
49	***SVOCs - PAHs***								
50	Acenaphthene	30.00000	3.0E+01	4.8E+02	3.0E+01	2.2E+05	na	na	na
51	Acenaphthylene	na	na	na	na	na	na	na	na
52	Anthracene	100.00000	1.0E+02	2.4E+03	1.0E+02	2.3E+05	na	na	na
53	Benzo(a)anthracene	0.00016	1.6E-04	na	1.6E-04	5.0E-03	na	na	na
54	Benzo(b)fluoranthene	0.00016	1.6E-04	na	1.6E-04	3.0E-03	na	na	na
55	Benzo(k)fluoranthene	0.00160	1.6E-03	na	1.6E-03	3.1E-03	na	na	na
56	Total benzofluoranthenes	na	na	na	na	na	na	na	na
57	Benzo(g,h,i)perylene	na	na	na	na	na	na	na	na
58	Benzo(a)pyrene	0.00002	1.6E-05	2.0E-01	1.6E-05	1.9E-03	na	na	na
59	Chrysene	0.00983	9.8E-03	na	1.6E-02	9.8E-03	na	na	na
60	Dibenz(a,h)anthracene	0.00002	1.6E-05	na	1.6E-05	1.0E-03	na	na	na
61	Dibenzofuran	4.33965	4.3E+00	8.0E+00	na	4.3E+00	na	na	na
62	Fluoranthene	0.02034	2.0E-02	6.4E+02	6.0E+00	2.0E-02	na	na	na
63	Fluorene	10.00000	1.0E+01	3.2E+02	1.0E+01	9.2E+04	na	na	na
64	Indeno(1,2,3-cd)pyrene	0.00016	1.6E-04	na	1.6E-04	9.2E-04	na	na	na
65	Methyl isopropyl phenanthrene (retene)	na	na	na	na	na	na	na	na
66	1-Methylnaphthalene	0.16803	1.7E-01	8.6E-01	na	1.6E+03	1.7E-01	na	na
67	2-Methylnaphthalene	32.00000	2.8E+04	3.2E+01	na	2.8E+04	na	na	na
68	Naphthalene	8.83874	8.8E+00	1.6E+02	1.4E+03	2.9E+05	8.8E+00	na	na
69	Phenanthrene	na	na	na	na	na	na	na	na
70	Pyrene	0.01469	1.5E-02	2.4E+02	8.0E+00	1.5E-02	na	na	na
71	Total LPAHs	na	na	na	na	na	na	na	na
72	Total HPAHs	na	na	na	na	na	na	na	na
73	Total PAHs	na	na	na	na	na	na	na	na
74	Total cPAH TEQ	0.00433	4.3E-03	2.0E-01	9.7E-03	4.3E-03	na	na	na
75	***Other SVOCs***								
79	Benzoic acid	10011.50748	1.0E+04	6.4E+04	na	1.0E+04	na	na	na
86	Bis(2-ethylhexyl) phthalate	0.04500	4.5E-02	6.0E+00	4.5E-02	9.0E-01	na	na	na
93	2-Chloronaphthalene (beta-)	100.00000	1.0E+02	6.4E+02	1.0E+02	5.6E+05	na	na	na
96	Dibutyl phthalate	8.00000	8.0E+00	1.6E+03	8.0E+00	4.7E+01	na	na	na
125	4-Methylphenol (p-cresol)	145.52239	1.5E+02	1.6E+03	na	1.5E+02	na	na	na
136	Phenol	98.22647	9.8E+01	4.8E+03	4.0E+03	9.8E+01	na	na	na
143	***Volatile Organic Compounds***								
149	Benzene	0.44000	4.4E-01	5.0E+00	4.4E-01	2.4E+05	2.4E+00	na	na
189	Ethylbenzene	12.00000	1.2E+01	7.0E+02	1.2E+01	5.1E+07	2.8E+03	na	na
211	Toluene	53.00000	5.3E+01	6.4E+02	5.3E+01	5.4E+07	1.5E+04	na	na
225	Total xylenes	57.00000	5.7E+01	1.6E+03	5.7E+01	9.2E+07	3.2E+02	na	na
235	***Petroleum Hydrocarbons***								
236	Gasoline range hydrocarbons, fresh	800.00000	8.0E+02	8.0E+02	8.0E+02	na	na	na	na
237	Gasoline range hydrocarbons, weathered	1000.00000	1.0E+03	1.0E+03	1.0E+03	na	na	na	na
238	Diesel range hydrocarbons, fresh	150.00000	1.5E+02	5.0E+02	1.5E+02	na	na	na	na
239	Diesel range hydrocarbons, weathered	500.00000	5.0E+02	5.0E+02	5.0E+02	na	na	na	na
240	Oil range hydrocarbons	500.00000	5.0E+02	5.0E+02	5.0E+02	na	na	na	na
241	Total diesel & oil range hydrocarbons	500.00000	5.0E+02	5.0E+02	5.0E+02	na	na	na	na

Appendix C - Table C-3 COIs - Soil Data Summary (Metals)
Maralco Property - Kent, WA

Analyte			Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Copper	Lead	Manganese	Nickel	Thallium	Zinc	Mercury	Silver	Selenium	Iron	Cobalt
Ecology PCUL January 9 2025 - vadose (mg/kg)			33,000	5.2	7.3	250	3.16	0.77	48	36	24	1100	68	0.004	85	0.07	0.61	0.78	36,000	11
Ecology PCUL January 9 2025 - sat (mg/kg)			33,000	5.2	7.3	250	3.16	0.77	72	36	24	1100	48	0.004	85	0.07	0.61	0.78	36,000	11
Min Ecology PCUL value (mg/kg)			33,000	5.2	7.3	250	3.2	0.77	48	36	24	1,100	48	0.004	85	0.07	0.61	0.78	36,000	11
Min Detected Value (mg/kg)			1,400	0.10	1	12.3	ND	0.0759	1.2	6.73	1.08	62.2	4.3	ND	2	0.0163	0.5	0.34	841	2.32
Max Detected Value (mg/kg)			188,000	24.6	53.4	124	ND	7.51	232	6,050	184	1,520	87.5	ND	3,280	0.158	3.14	1.41	75,800	16.7
Lowest Dection Limit (for samples with all ND values)			--	--	--	--	2	--	--	--	--	--	--	0.20	--	--	--	--	--	--
Is Value above Ecology PCUL SL (lowest SL)			yes	yes	yes	no	no	yes	yes	yes	yes	yes	yes	ND	yes	yes	yes	yes	yes	yes
Sample ID	Depth (feet below ground surface)	Date	Results (mg/kg)																	
S1	Surface Composite	6/1/87	NA	0.5 U	2.8	NA	2 U	1 U	19.0	19.0	10 U	NA	23.0	0.4 U	55.0	0.99 U	2 U	0.2 U	NA	NA
S2	Surface Composite	6/1/87	NA	0.5 U	4.3	NA	2 U	1 U	21.0	29.0	26.0	NA	25.0	0.4 U	57.0	0.1 U	2 U	0.34	NA	NA
S3	Surface Composite	6/1/87	NA	0.5 U	12.0	NA	2 U	1 U	10.0	21.0	44.0	NA	14.0	0.4 U	56.0	0.1 U	2 U	0.2 U	NA	NA
S4	Surface Composite	6/1/87	NA	0.5 U	11.0	NA	2 U	1 U	13.0	21.0	27.0	NA	13.0	0.5 U	60.0	0.1 U	2 U	0.2 U	NA	NA
S5	Surface Composite	6/1/87	NA	0.5 U	9.2	NA	2 U	1 U	11.0	18.0	27.0	NA	14.0	0.4 U	66.0	0.1 U	2 U	0.2 U	NA	NA
HB-1	1.5-2	5/9/90	12,800	0.2	1	33	NA	0.2 U	12.4	24.1	1.7	141	9	0.2 U	27.9	0.04 U	0.3 U	0.5 U	NA	NA
HB-2	1.5-2	5/9/90	19,700	0.2	1.9	50.6	NA	0.2 U	26.3	91.8	6.2	209	12	0.2 U	67.8	0.05 U	0.2 U	0.6 U	NA	NA
HB-3	1.5-2	5/9/90	13,000	0.1	1.6	39.1	NA	0.2 U	12.4	35.2	2.3	151	9	0.2 U	34.3	0.04 U	0.3 U	0.6 U	NA	NA
HB-4	2-3	9/11/90	5,280	NA	NA	26.7	NA	NA	90.8	14.6	2 U	91	NA	NA	17.4	NA	NA	NA	NA	NA
HB-5	1-2	9/11/90	5,380	NA	NA	28.5	NA	NA	68.2	14.7	2.7	114	NA	NA	23.9	NA	NA	NA	NA	NA
HB-6	0-1	9/11/90	8,250	NA	NA	42.3	NA	NA	41.5	18	9.9	175	NA	NA	29.5	NA	NA	NA	NA	NA
HB-6	2-3	9/11/90	7,530	NA	NA	41.9	NA	NA	17.5	19.4	2	157	NA	NA	20.6	NA	NA	NA	NA	NA
HB-8	2.5-3	9/11/90	9,770	NA	NA	79.9	NA	NA	15	153	6.8	101	NA	NA	78.7	NA	NA	NA	NA	NA
HB-9	3-4	9/11/90	15,200	NA	NA	15.3	NA	NA	18.4	38.7	5.7	238	NA	NA	36.5	NA	NA	NA	NA	NA
HB-11	1.5-2.5	9/10/90	10,900	NA	NA	21	NA	NA	40.2	59	7.6	111	NA	NA	32.4	NA	NA	NA	NA	NA
HB-11	2.5-4	9/10/90	4,930	NA	NA	12.3	NA	NA	107	25.6	2 U	62.2	NA	NA	18	NA	NA	NA	NA	NA
HB-14	0-1	9/12/90	9,130	NA	NA	54.8	NA	NA	26.6	20.3	16	223	NA	NA	45.1	NA	NA	NA	NA	NA
HB-14	2-3.3	9/12/90	5,080	NA	NA	26.9	NA	NA	54.2	22.6	2.5	90.6	NA	NA	16.9	NA	NA	NA	NA	NA
HB-14 (Duplicate)	2-3	9/12/90	5,710	NA	NA	30.2	NA	NA	11.8	11.4	3.4	107	NA	NA	18.8	NA	NA	NA	NA	NA
HB-15	0-0.5	9/11/90	8,240	NA	NA	43.2	NA	NA	20.1	26.5	8.1	183	NA	NA	32.7	NA	NA	NA	NA	NA
HB-15	2-3	9/11/90	7,290	NA	NA	38	NA	NA	35.6	21.6	5.1	134	NA	NA	36.3	NA	NA	NA	NA	NA
HB-16	0-1	9/12/90	9,810	NA	NA	56.1	NA	NA	28.2	21	15.3	269	NA	NA	39.2	NA	NA	NA	NA	NA
HB-16	2-3	9/12/90	5,880	NA	NA	27	NA	NA	80.6	14.7	2 U	113	NA	NA	19.1	NA	NA	NA	NA	NA
MW-1	3.0-4.0	9/25/90	13,700	NA	NA	55.8	NA	NA	15.4	21.3	2.97	157	NA	NA	27.3	NA	NA	NA	NA	NA
MW-1	6.0-7.5	9/25/90	14,000	NA	NA	56.6	NA	NA	20.9	22.6	2.8	180	NA	NA	30	NA	NA	NA	NA	NA
MW-1	12.0-13.5	9/25/90	14,700	NA	NA	64.4	NA	NA	17.8	28.5	3.04	128	NA	NA	31.5	NA	NA	NA	NA	NA
MW-1	15.0-16.5	9/25/90	9,390	NA	NA	36.4	NA	NA	14	17.7	1.85	95.2	NA	NA	25.1	NA	NA	NA	NA	NA
MW-2	2.0-3.0	9/25/90	10,800	NA	NA	43.2	NA	NA	21.5	16.6	2.03	161	NA	NA	2	NA	NA	NA	NA	NA
MW-2	6.4-7.5	9/25/90	10,300	NA	NA	40	NA	NA	16.8	14.5	1.83	105	NA	NA	23.2	NA	NA	NA	NA	NA
MW-2	10.-12.0	9/25/90	8,590	NA	NA	37.3	NA	NA	17.9	15.3	1.94	135	NA	NA	23.7	NA	NA	NA	NA	NA
MW-2	15.5-16.5	9/25/90	22,900	NA	NA	88.2	NA	NA	24.3	54.1	4.26	396	NA	NA	38.5	NA	NA	NA	NA	NA
MW-3	3.0-4.5	9/24/90	13,500	NA	NA	45.7	NA	NA	38.4	18.3	2.03	148	NA	NA	22.9	NA	NA	NA	NA	NA
MW-3 (Duplicate)	3.0-4.5	9/24/90	13,400	NA	NA	51.9	NA	NA	27.7	21.4	2.29	172	NA	NA	25.4	NA	NA	NA	NA	NA
MW-3	6.5-7.5	9/24/90	31,800	NA	NA	124	NA	NA	29.4	38.6	5.88	222	NA	NA	53.8	NA	NA	NA	NA	NA
MW-3	12.5-13.5	9/24/90	17,100	NA	NA	65.3	NA	NA	30	20.3	2.47	177	NA	NA	31.4	NA	NA	NA	NA	NA
MW-3	15.0-16.5	9/24/90	15,300	NA	NA	70.2	NA	NA	24.3	25	3.09	204	NA	NA	34.3	NA	NA	NA	NA	NA
MW-4	1.5-3.0	9/24/90	17,100	NA	NA	40.7	NA	NA	26.6	22.6	2.67	122	NA	NA	29.3	NA	NA	NA	NA	NA
MW-4	4.5-6.0	9/24/90	18,200	NA	NA	62.7	NA	NA	27.9	20.6	2.48	131	NA	NA	32.6	NA	NA	NA	NA	NA
MW-4	9.0-10.5	9/24/90	21,800	NA	NA	86.1	NA	NA	34.3	34.5	3.92	250	NA	NA	40.7	NA	NA	NA	NA	NA
MW-4	12.0-13.5	9/24/90	9,770	NA	NA	25.8	NA	NA	55.5	10.7	1.23	106	NA	NA	22.4	NA	NA	NA	NA	NA
MW-5	5 ft bgs	1/22/03	NA	NA	NA	NA	NA	NA	NA	NA	18	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5	10 ft bgs	1/22/03	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5	15 ft bgs	1/22/03	NA	NA	NA	NA	NA	NA	NA	NA	13.9	NA	NA	NA	NA	NA	NA	NA	NA	NA
DP-2	3 ft bgs	2/4/03	1,400	NA	ND	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA
DP-3	3 ft bgs	2/4/03	2,000	NA	ND	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA
DP-4	3 ft bgs	2/4/03	2,300	NA	ND	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA
DP-5	1 ft bgs	2/4/03	NA	NA	ND	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA
DP-5	2.5 ft bgs	2/4/03	1,400	NA	ND	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA
MW-3A (5')	see sample ID	7/21/17	7,800	NA	1.1	5 U	NA	1 U	1.2	NA	1 U	NA	NA	NA	NA	0.5 U	NA	2 U	NA	NA
MW-4A (6.5')	see sample ID	7/21/17	5,600	NA	1 U	5 U	NA	1 U	1 U	NA	1 U	NA	NA	NA	NA	0.5 U	NA	2 U	NA	NA
MW-6 (6.5')	see sample ID	7/21/17	9,700	NA	1.6	5 U	NA	1 U	4	NA	1.6	NA	NA	NA	NA	0.5 U	NA	2 U	NA	NA
DPT-6 1.5-2'	see sample ID	5/24/21	14,500	2 U	10.9	NA	NA	1 U	10.6	43.6	14.5	NA	8.46	NA	353	NA	NA	NA	12,400	NA
DPT-6 2.6-3.1'	see sample ID	5/24/21	10,800	2 U	2.91	NA	NA	1 U	8.31	33.3	3.69	NA	6.25	NA	47	NA	NA	NA	11,200	NA
DPT-8 8.2-8.4'	see sample ID	5/24/21	17,400	2 U	11.3	NA	NA	1 U	17	56.5	8.28	NA	14	NA	56	NA	NA	NA	15,300	NA
DPT-9 14.5-15'	see sample ID	5/24/21	15,400	2 U	7.51	NA	NA	1 U	13.8	19.4	3.43	NA	9.51	NA	26.6	NA	NA	NA	21,700	NA
DPT-11 2.1-3.1'	see sample ID	5/24/21	17,100	2 U	5 U	NA	NA	1 U	25.7	58.1	5.17	NA	27.4	NA	60.7	NA	NA	NA	18,600	NA
DPT-11 4.5-5'	see sample ID	5/24/21	15,400	2 U	2.1	NA	NA	1 U	19.4	25	2.78	NA	22.5	NA	32	NA	NA	NA	16,500	NA
DPT-12 8.6-9.2'	see sample ID	5/24/21	16,500	2 U	5 U	NA	NA	1 U	18.4	26.7	5.72	NA	21.8	NA	50.8	NA	NA	NA	18,200	NA
DPT-13 7.2-8.2'	see sample ID	5/24/21	14,700	2 U	5 U	NA	NA	1 U	19.8	29.3	2.77	NA	20.6	NA	35	NA	NA	NA	16,400	NA
DPT-13 9.3-10'	see sample ID	5/24/21	11,800	2 U	3.15	NA	NA	1 U	9.81	12.2	10.1	NA	7.71	NA	29.9	NA	NA	NA	9,420	NA
DPT-14 5-7.5'	see sample ID	8/29/22	4,340	1 U	2.63	NA	NA	1 U	6.57	7.43	1.99	NA	5.05	NA	16.9	NA	1 U	NA	7,910	NA
DPT-14 10-11.5'	see sample ID	8/29/22	6,980	1 U	1 U	NA	NA	1 U	5.99	7.27	1.10	NA	4.36	NA	15.6	NA	1 U	NA	11,500	NA
DPT-15 5-6.5'	see sample ID	8/29/22	4,720	1 U	2.05	NA	NA	1 U	9.15	10.1	1.17	NA	5.25	NA	16.5	NA	1 U	NA	8,700	NA
DPT-15 8.5-10'	see sample ID	8/29/22	2,640	1 U	5.09	NA	NA	1 U	6.52	15.2	2.14	NA	8.96	NA	22.6	NA	1 U	NA	2,960	NA
DPT-16 6.5-8'	see sample ID	8/30/22	3,380	1 U	1.17	NA	NA	1 U	8.37	7.00	1.10	NA	4.91	NA	15.1	NA	1 U	NA	841	NA
DPT-16 10-11.5'	see sample ID	8/30/22	5,260	1 U	1.51	NA	NA	1 U	5.49	7.92	1.37	NA	5.12	NA	14.2	NA	1 U	NA	9,480	NA
DPT-18 5-7.2'	see sample ID	8/30/22	5,010	1 U	2.48	NA	NA	1 U	10.0	13.0	4.04	NA	9.26	NA	23.7	NA	1 U	NA	6,490	NA
DPT-18 14-15'	see sample ID	8/31/22	5,130	1 U	1.26	NA	NA	1 U	7.89	10.8	1.63	NA	5.85	NA	18.5	NA	1 U	NA	6,520	NA
DPT-19 6-8'	see sample ID	8/31/22	16,900	1 U	3.32	NA	NA	1 U	11.8	24.2	3.73	NA	11.1	NA	38.1	NA	1 U	NA	16,900	NA
DPT-19 12.5-15'	see sample ID	8/31/22	7,410	1 U	2.09	NA	NA	1 U	10.0	16.6	2.84	NA	8.24	NA	23.3	NA	1 U	NA	8,030	NA
DPT-20 6.5-7.5'	see sample ID	8/31/22	13,200	1 U	4.13	NA	NA	1 U	12.3	23.5	4.22	NA	11.2	NA	33.8	NA	1 U	NA	16,600	NA
DPT-20 13.5-15'	see sample ID	8/31/22	7,930	1 U	2.33	NA	NA	1 U	11.8	19.5	2.55	NA	12.8	NA	24.5	NA	1 U	NA	10,500	NA
DPT-21 6-10'	see sample ID	8/31/22	4,990	1 U	1.84	NA	NA	1 U	10.2	11.0	2.79	NA	6.01	NA	54.1	NA	1 U	NA	8,150	NA
DPT-21 11.5-14' DUP01-220831	see sample ID	8/31/22	5,390	1 U/1 U	1.14 U	NA	NA	1 U/1 U	8.51	11.7	1.56	NA	6.63	NA	20	NA	1 U/1 U	NA	8,220	NA
DPT-22 3.5-5'	see sample ID	8/31/22	10,400	1 U	6.91	NA	NA	1 U	12.9	22.3	21.7	NA	12.3	NA	37.0	NA	1 U	NA	15,000	NA
DPT-22 5-7'	see sample ID	8/31/22	9,160	1 U	1.64	NA	NA	1 U	10.3	20.0	2.54	NA	7.87	NA	23.6	NA	1 U	NA	8,310	NA
DPT-22 11-13.2'	see sample ID	8/31/22	4,390	1 U	3.23	NA	NA	1 U	8.39	8.74	1.19	NA	7.24	NA	17.3	NA	1 U	NA	9,290	NA
SB-UST-01 5-6'	see sample ID	8/29/22	6,720	1 U	2.05	NA	NA	1 U	9.82	12.0	1.80	NA	6.18	NA	17.2	NA	1 U	NA	8,660	NA
SB-UST-02 5-6'	see sample ID	8/29/22	7,250	1 U	2.18	NA	NA	1 U	10.7	13.6	2.16	NA	7.98	NA	20.8	NA	1 U	NA	9,870	NA
SB-UST-02 15-16'	see sample ID	8/29/22	6,690	1 U	2.83	NA	NA	1 U	9.27	19.7	2.66	NA	8.48	NA	25.7	NA	1 U	NA	8,940	NA
SB-UST-03 1-2'	see sample ID	8/29/22	5,370	1 U	7.81	NA	NA	1 U	8.57	16.7	13.5	NA	10.1	NA	28.2	NA	1 U	NA	7,800	NA
MW-5R 5.5-7'	see sample ID	8/30/22	5,000	1 U	1.52	NA	NA	1 U	6.98	7.60	1.09	NA	4.49	NA	14.2	NA	1 U	NA	13,700	NA
MW-5R 11-12'	see sample ID	8/30/22	7,760	1 U	1.93	NA	NA	1 U	8.50	14.1	1.96	NA	6.41	NA	20.4	NA	1 U	NA	7,260	NA
MW-7 5-7'	see sample ID	8/30/22	6,920	1 U	12.2	NA	NA	1 U	9.13	15.9	14.7	NA	8.80	NA	34.5	NA	1 U	NA	22,200	NA
MW-7 13.5-15'	see sample ID	8/30/22	8,820	1 U	5.27	NA	NA	1 U	8.01	23.2	2.62	NA	9.61	NA	31.6	NA	1 U	NA	27,400	NA
MW-8 4-5'	see sample ID	8/30/22	5,340	1 U	10.7	NA	NA	1 U	6.95	19.0	21.5	NA	5.77	NA	45.2	NA	1 U	NA	7,000	NA
MW-8 12-13'	see sample ID	8/30/22	8,160	1 U	2.99	NA	NA	1 U	8.61	16.5	2.07	NA	8.46	NA	22.8	NA	1 U	NA	9,090	NA
DPT-6 1.5-2'	0.5	5/24/21	14,500	2 U	10.9	NA	NA	1 U	10.6	43.6	14.5	140	8.46	NA	353	NA	NA	NA	12,400	5 U
DPT-6 2.6-3.1'	1.6	5/24/21	10,800	2 U	2.91	NA	NA	1 U	8.31	33.3	3.69	92.7	6.25	NA	47	NA	NA	NA	11,200	3.35
DPT-8 8.2-8.4'	0.5	5/24/21	17,400	2 U	11.3	NA	NA	1 U	17	56.5	8.28	194	14	NA	56	NA	NA	NA	15,300	6.65
DPT-9 14.5-15'	1.8	5/24/21	15,400	2 U	7.51	NA	NA	1 U	13.8	19.4	3.43	135	9.51	NA	26.6	NA	NA	NA	21,700	4.97
DPT-11 2.1-3.1'	0.5	5/24/21	17,100	2 U	5 U	NA	NA	1 U	25.7	58.1	5.17	242	27.4	NA	60.7	NA	NA	NA	18,600	6.3
DPT-11 4.5-5'	2.9	5/24/21	15,400	2 U	2.1	NA	NA	1 U	19.4	25 U	2.78	230	22.5	NA	32	NA	NA	NA	16,500	6.59
DPT-12 8.6-9.2'	0.5	5/24/21	16,500	2 U	5 U	NA	NA	1 U	18.4	26.7	5.72	229	21.8	NA	50.8	NA	NA	NA	18,200	6.21
DPT-13 7.2-8.2'	0.5	5/24/21	14,700	2 U	5 U	NA	NA	1 U	19.8	29.3	2.77	253	20.6	NA	35	NA	NA	NA	16,400	6.1
DPT-13 9.3-10'	2.6	5/24/21	11,800	2 U	3.15	NA	NA	1 U	9.81	12.2	10.1	85	7.71	NA	29.9	NA	NA	NA	9,420	4.59
B-4-7	7	10/27/16	9,370	NA	2.34	39.6	NA	0.115	13	NA	2.37	NA	NA	NA	NA	0.023	1.17 U	2.34 U	NA	NA
B-4-15	15	10/27/16	12,200	NA	2.73	55.7	NA	0.128	14.5	NA	3.26	NA	NA	NA	NA	0.0288	1.37 U	1.41	NA	NA
B-5-8	8	10/27/16	5,730	NA	3.46	19.1	NA	0.0759	8.32	NA	2.14	NA	NA	NA	NA	0.0211 U	1.05 U	2.11 U	NA	NA
B-5-15	15	10/27/16	8,840	NA	2.77 U	42.1	NA	0.692 U	11.4	NA	2.57	NA	NA	NA	NA	0.0281	1.38 U	2.77 U	NA	NA
B-6-7.5	7.5	10/27/16	16,600	NA	2.47	70.2	NA	0.153	18	NA	4.35	NA	NA	NA	NA	0.141	1.31 U	2.62 U	NA	NA
B-6-15	15	10/27/16	19,800	NA	2.88	52.2	NA	0.234	20.1	NA	6	NA	NA	NA	NA	0.0163	1.45 U	1.11	NA	NA
CS-01	Grid Cell CS-01	10/17/23	27,100	1.78	3.37	NA	NA	1 U	27.2	127	17.3	NA	20.8	NA	104	0.7 U	1 U	NA	15,900	4.97
CS-02	Grid Cell CS-02	10/17/23	38,000	3.14	2.44	NA	NA	1.16	47.2	244	20.9	NA	25.3	NA	151	0.7 U	1 U	NA	12,800	5.69
CS-03	Grid Cell CS-03	10/17/23	19,700	1.52	4.28	NA	NA	1 U	22.2	107	6.96	NA	16.6	NA	82.9	0.7 U	1 U	NA	17,900	5.85
CS-04	Grid Cell CS-04	10/17/23	13,600	1 U	1.61	NA	NA	1 U	17.9	21.9	3.67	NA	17.6	NA	35.0	0.7 U	1 U	NA	14,800	5.61
CS-05	Grid Cell CS-05	10/17/23	13,100	1 U	2.21	NA	NA	1 U	17.8	13.0	2.50	NA	17.7	NA	25.8	0.7 U	1 U	NA	16,600	5.99
CS-06	Grid Cell CS-06	11/14/23	13,900	1 U	2.05	NA	NA	1 U	19.5	16.8	2.12	NA	22.3	NA	29.8	0.7 U	1 U	NA	16,000	5.62
CS-07	Grid Cell CS-07	10/17/23	12,100	1 U	1.32	NA	NA	1 U	19.5	12.1	1.58	NA	20.6	NA	28.9	0.7 U	1 U	NA	13,200	5.62
CS-08	Grid Cell CS-08	10/17/23	14,900	1 U	2.73	NA	NA	1 U	21.5	42.6	4.93	NA	20.7	NA	51.0	0.7 U	1 U	NA	16,300	5.90
CS-09	Grid Cell CS-09	10/17/23	10,500	1 U	2.50	NA	NA	1 U	15.8	31.7	5.53	NA	13.0	NA	41.5	0.7 U	1 U	NA	11,900	3.97
CS-10	Grid Cell CS-10	11/10/23	17,500	1 U	2.08	NA	NA	1 U	20.7	13.7	2.73	NA	23.8	NA	27.0	0.7 U	1 U	NA	21,000	6.44
CS-11	Grid Cell CS-11	11/14/23	14,300	1 U	1.24	NA	NA	1 U	16.8	7.92	1.75	NA	20.3	NA	25	0.7 U	1 U	NA	16,300	5 U
CS-12	Grid Cell CS-12	10/17/23	11,400	1 U	1.54	NA	NA	1 U	19.4	11.8	2.18	NA	19.6	NA	23.9	0.7 U	1 U	NA	14,400	5.37
CS-13	Grid Cell CS-13	10/17/23	28,900	1 U	1.44	NA	NA	1 U	21.6	61.6	8.79	NA	20.4	NA	57.5	0.7 U	1 U	NA	13,900	5.58
CS-14C	Grid Cell CS-14	11/1/23	11,400	2.75	8.59	NA	NA	1 U	12.2	35.9	21.8	NA	8.98	NA	39.7	0.7 U	1 U	NA	15,000	4.23
CS-15	Grid Cell CS-15	11/10/23	11,500	1 U	1.81	NA	NA	1 U	7.30	12.2	1.61	NA	6.12	NA	17.7	0.7 U	1 U	NA	11,800	3.42
DUP-231110 (CS-15)	QA/QC	11/10/23	9,160	1 U	1.86	NA	NA	1 U	7.29	14.9	1.66	NA	5.67	NA	17.1	0.7 U	1 U	NA	10,000	3.34
CS-16	Grid Cell CS-16	10/17/23	14,100	1 U	2.00	NA	NA	1 U	17.7	35.7	3.80	NA	18.7	NA	29.1	0.7 U	1 U	NA	16,700	5.72

Appendix C - Table C-3 COIs - Soil Data Summary (Metals)
Maralco Property - Kent, WA

Analyte			**Aluminum**	**Antimony**	**Arsenic**	**Barium**	**Beryllium**	**Cadmium**	**Chromium**	**Copper**	**Lead**	**Manganese**	**Nickel**	**Thallium**	**Zinc**	**Mercury**	**Silver**	**Selenium**	**Iron**	**Cobalt**
Ecology PCUL January 9 2025 - vadose (mg/kg)			**33,000**	**5.2**	**7.3**	**250**	**3.16**	**0.77**	**48**	**36**	**24**	**1100**	**68**	**0.004**	**85**	**0.07**	**0.61**	**0.78**	**36,000**	**11**
Ecology PCUL January 9 2025 - sat (mg/kg)			**33,000**	**5.2**	**7.3**	**250**	**3.16**	**0.77**	**72**	**36**	**24**	**1100**	**48**	**0.004**	**85**	**0.07**	**0.61**	**0.78**	**36,000**	**11**
Min Ecology PCUL value (mg/kg)			**33,000**	**5.2**	**7.3**	**250**	**3.2**	**0.77**	**48**	**36**	**24**	**1,100**	**48**	**0.004**	**85**	**0.07**	**0.61**	**0.78**	**36,000**	**11**
CS-17	Grid Cell CS-17	10/17/23	**28,900**	1 U	**2.56**	NA	NA	1 U	**19.6**	**59.4**	**8.97**	NA	**14.8**	NA	**76.4**	0.7 U	1 U	NA	**15,000**	**4.78**
CS-18	Grid Cell CS-18	10/17/23	**42,400**	**1.67**	**2.79**	NA	NA	1 U	**26.4**	**165**	**17.9**	NA	**28.0**	NA	**128**	0.7 U	1 U	NA	**15,300**	**5.04**
CS-19C	Grid Cell CS-19	11/1/23	**10,200**	1 U	**7.60**	NA	NA	1 U	**11.0**	**22.0**	**6.98**	NA	**11.1**	NA	**31.9**	0.7 U	1 U	NA	**13,700**	**4.21**
CS-20	Grid Cell CS-20	11/1/23	**7,050**	1 U	**1.11**	NA	NA	1 U	**6.46**	**8.97**	**1.08**	NA	**5.43**	NA	**13.2**	0.7 U	1 U	NA	**9,220**	**2.59**
CS-21	Grid Cell CS-21	11/10/23	**14,400**	1 U	**3.09**	NA	NA	1 U	**9.45**	**15.1**	**2.19**	NA	**7.97**	NA	**21.5**	0.7 U	1 U	NA	**14,400**	**3.99**
CS-22	Grid Cell CS-22	10/30/23	**8,550**	1 U	**1.04**	NA	NA	1 U	**6.34**	**47.0**	**1.42**	NA	**4.88**	NA	**16.3**	0.7 U	1 U	NA	**10,400**	**2.44**
DUP-231030-2 (CS-22)	QA/QC	10/30/23	**7,490**	1 U	**1.21**	NA	NA	1 U	**7.44**	**57.6**	**1.87**	NA	**5.97**	NA	**19.5**	0.7 U	1 U	NA	**7,810**	**3.09**
CS-23	Grid Cell CS-23	10/17/23	**17,200**	**1.30**	**11.9**	NA	NA	1 U	**11.5**	**40.9**	**14.6**	NA	**7.69**	NA	**39.3**	0.7 U	1 U	NA	**30,100**	**3.84**
CS-24	Grid Cell CS-24	10/23/23	**8,660**	1 U	**2.42**	NA	NA	1 U	**6.64**	**10.5**	**2.06**	NA	**5.68**	NA	**15.6**	0.7 U	1 U	NA	**9,470**	**2.86**
CS-25	Grid Cell CS-25	10/23/23	**10,200**	1 U	**3.54**	NA	NA	1 U	**8.12**	**14.6**	**2.71**	NA	**7.07**	NA	**17.2**	0.7 U	1 U	NA	**11,400**	**3.65**
CS-26	Grid Cell CS-26	10/23/23	**12,500**	1 U	1 U	NA	NA	1 U	**8.51**	**43.0**	**1.75**	NA	**6.22**	NA	**18.9**	0.7 U	1 U	NA	**12,100**	**3.00**
DUP-231023 (CS-26)	QA/QC	10/23/23	**11,100**	1 U	**1.03**	NA	NA	1 U	**8.02**	**37.3**	**1.73**	NA	**6.08**	NA	**17.9**	0.7 U	1 U	NA	**11,200**	**2.89**
CS-27	Grid Cell CS-27	10/30/23	**7,650**	1 U	**1.78**	NA	NA	1 U	**7.32**	**11.5**	**1.49**	NA	**5.67**	NA	**30.1**	0.7 U	1 U	NA	**11,300**	**2.54**
CS-28	Grid Cell CS-28	11/1/23	**8,070**	1 U	**1.47**	NA	NA	1 U	**6.68**	**7.67**	**1.22**	NA	**5.97**	NA	**15.8**	0.7 U	1 U	NA	**9,750**	**2.78**
CS-29	Grid Cell CS-29	10/31/23	**11,900**	1 U	**1.35**	NA	NA	1 U	**6.99**	**14**	**2.52**	NA	**6.18**	NA	**17.8**	0.7 U	1 U	NA	**12,000**	**3.05**
CS-30B	Grid Cell CS-30B	10/31/23	**8,220**	1 U	**1.23**	NA	NA	1 U	**7.42**	**8.37**	**14.2**	NA	**5.04**	NA	**23.2**	0.7 U	1 U	NA	**10,100**	**2.37**
CS-32	Grid Cell CS-32	10/17/23	**13,200**	**1.20**	**5.02**	NA	NA	1 U	**9.83**	**19.6**	**3.77**	NA	**9.11**	NA	**27.7**	0.7 U	1 U	NA	**14,400**	**4.34**
CS-33	Grid Cell CS-33	10/23/23	**11,800**	1 U	**9.09**	NA	NA	1 U	**9.48**	**18.3**	**13.9**	NA	**7.83**	NA	**33.1**	0.7 U	1 U	NA	**11,300**	**4.8**
CS-34	Grid Cell CS-34	10/30/23	**6,900**	1 U	**1.08**	NA	NA	1 U	**9.19**	**12.5**	**1.62**	NA	**4.30**	NA	**13.8**	0.7 U	1 U	NA	**7,590**	**2.46**
CS-35	Grid Cell CS-35	10/30/23	**7,000**	1 U	**1.75**	NA	NA	1 U	**7.97**	**6.73**	1 U	NA	**5.61**	NA	**17.0**	0.7 U	1 U	NA	**9,790**	**2.62**
CS-36	Grid Cell CS-36	10/30/23	**11,100**	1 U	**2.88**	NA	NA	1 U	**7.92**	**7.20**	**1.12**	NA	**5.81**	NA	**16.0**	0.7 U	1 U	NA	**12,900**	**2.79**
CS-37	Grid Cell CS-37	10/30/23	**16,600**	1 U	**6.89**	NA	NA	1 U	**12.1**	**19.3**	**12.8**	NA	**13.9**	NA	**34.5**	0.7 U	1 U	NA	**18,000**	**6.02**
CS-38	Grid Cell CS-38	10/17/23	**20,100**	**1.04**	**3.9**	NA	NA	1 U	**20.1**	**101**	**21.5**	NA	**19.4**	NA	**97.7**	0.7 U	1 U	NA	**16,200**	**6.85**
CS-39	Grid Cell CS-39	10/17/23	**11,900**	1 U	**7.68**	NA	NA	1 U	**9.89**	**20.0**	**16.4**	NA	**9.03**	NA	**44.3**	0.7 U	1 U	NA	**12,800**	**5.32**
CS-40	Grid Cell CS-40	10/23/23	**7,980**	1 U	**2.56**	NA	NA	1 U	**6.36**	**7.99**	**1.97**	NA	**5.72**	NA	**19.1**	0.7 U	1 U	NA	**10,800**	**2.75**
CS-41	Grid Cell CS-41	10/30/23	**7,380**	**1.3**	**1.18**	NA	NA	1 U	**6.63**	**21.2**	**3.86**	NA	**6.86**	NA	**19.4**	0.7 U	1 U	NA	**10,100**	**4.39**
CS-42	Grid Cell CS-42	10/30/23	**11,100**	1 U	**2.82**	NA	NA	1 U	**8.49**	**14.5**	**2.50**	NA	**7.16**	NA	**23.1**	0.7 U	1 U	NA	**11,200**	**3.49**
CS-43	Grid Cell CS-43	10/30/23	**7,490**	1 U	**1.77**	NA	NA	1 U	**7.90**	**45.0**	**4.09**	NA	**5.33**	NA	**28.3**	0.7 U	1 U	NA	**7,810**	**2.66**
DUP-231030-1 (CS-43)	QA/QC	10/30/23	**8,040**	1 U	**1.73**	NA	NA	1 U	**6.57**	**23.8**	**3.67**	NA	**4.61**	NA	**22.7**	0.7 U	1 U	NA	**8,380**	**2.38**
CS-44	Grid Cell CS-44	10/17/23	**7,090**	1 U	**4.16**	NA	NA	1 U	**6.08**	**14.8**	**8.27**	NA	**4.86**	NA	**32.7**	0.7 U	1 U	NA	**9,400**	**2.32**
CS-45	Grid Cell CS-45	11/27/23	**17,400**	1 U	**3.87**	NA	NA	1 U	**19.6**	**78.6**	**6.24**	NA	**25.3**	NA	**104**	0.7 U	1 U	NA	**25,500**	**10.4**
CS-46	Grid Cell CS-46	11/27/23	**16,800**	1 U	**3.39**	NA	NA	1 U	**14.8**	**27.1**	**3.47**	NA	**18.3**	NA	**31.7**	0.7 U	1 U	NA	**19,600**	**7.37**
CS-47	Grid Cell CS-47	11/27/23	**16,500**	1 U	**1.16**	NA	NA	1 U	**22.9**	**117**	**6.92**	NA	**34.5**	NA	**81.7**	0.7 U	1 U	NA	**42,700**	**16.7**
CS-48	Grid Cell CS-48	11/27/23	**14,500**	1 U	**2.77**	NA	NA	1 U	**14.3**	**35.0**	**5.38**	NA	**17.4**	NA	**34.7**	0.7 U	1 U	NA	**17,400**	**5.03**
DUP-231127 (CS-48)	QA/QC	11/27/23	**17,000**	1 U	**2.70**	NA	NA	1 U	**14.6**	**48.7**	**6.70**	NA	**18.3**	NA	**41.1**	0.7 U	1 U	NA	**20,800**	**5.03**
CS-49	Grid Cell CS-49	11/17/23	**11,200**	1 U	**3.12**	NA	NA	1 U	**13.4**	**19.7**	**2.32**	NA	**13.6**	NA	**30.2**	0.7 U	1 U	NA	**15,800**	**5.95**
DUP-231117 (CS-49)	QA/QC	11/17/23	**12,700**	1 U	**3.56**	NA	NA	1 U	**14.5**	**20.2**	**2.63**	NA	**14.8**	NA	**32.3**	0.7 U	1 U	NA	**17,000**	**6.60**
CS-50	Grid Cell CS-50	11/17/23	**9,280**	1 U	**2.85**	NA	NA	1 U	**14.1**	**65.3**	**11.6**	NA	**20.0**	NA	**144**	0.7 U	1 U	NA	**21,200**	**9.61**
CS-51	Grid Cell CS-51	11/17/23	**11,200**	1 U	**2.19**	NA	NA	1 U	**22.2**	**21.8**	**2.76**	NA	**26.9**	NA	**29.1**	0.7 U	1 U	NA	**13,600**	**5.67**
CS-52	Grid Cell CS-52	11/17/23	**9,110**	**1.25**	**2.77**	NA	NA	1 U	**19.6**	**36.4**	**5.67**	NA	**23.5**	NA	**38.6**	0.7 U	1 U	NA	**10,600**	**6.12**
B-2	---	6/25/87	NA	**3.2**	**5.8**	NA	NA	**4.5**	**232**	**1500**	**144**	NA	**74**	NA	**1300**	0.2 U	3 U	0.3 U	NA	NA
B-3	---	6/25/87	NA	0.6 U	**4.4**	NA	NA	1.0 U	**14**	**16**	**14**	NA	**12**	NA	**58**	0.2 U	2 U	0.2 U	NA	NA
HB-8	0-1	9/11/90	**188,000**	NA	NA	NA	NA	NA	**154**	**6050**	**144**	**1520**	NA	NA	**3280**	NA	NA	NA	NA	NA
HB-8	2.5-3	9/11/90	**9,770**	NA	NA	NA	NA	NA	**15**	**153**	**6.8**	**101**	NA	NA	**78.7**	NA	NA	NA	NA	NA
HB-9	0-1	9/11/90	**17,700**	NA	NA	NA	NA	NA	**28**	**133**	**22.6**	**376**	NA	NA	**111**	NA	NA	NA	NA	NA
HB-9	3-4	9/11/90	**15,200**	NA	NA	NA	NA	NA	**18.4**	**38.7**	**5.7**	**238**	NA	NA	**36.5**	NA	NA	NA	NA	NA
SW-1	---	5/10/90	**39,400**	**4.1**	**3.1**	NA	NA	**1.4**	**54.7**	**562**	**61**	**285**	**22**	NA	**528**	**0.1**	**0.9**	1.2 U	**10,600**	**5.8**
SW-2	---	5/9/90	**9,970**	**0.2**	**2.2**	NA	NA	**1**	**15.7**	**59**	**22**	**201**	**13**	NA	**135**	**0.03**	0.3 U	0.6 U	**18,700**	**4.8**
SW-3	---	5/10/90	**25,600**	**0.83**	**3.9**	NA	NA	**0.9**	**27.7**	**231**	**24**	**286**	**15**	**NA**	**203**	0.1 U	0.3 U	0.7 U	**19,500**	**5.6**
SW-4	---	5/10/90	**17,200**	**4.09**	**53.4**	NA	NA	**6.9**	**58.5**	**183**	**89**	**396**	**31**	NA	**1200**	0.27 U	1.5 U	3.3 U	**43,300**	**11.2**
SW-6	---	5/10/90	**77,900**	**1.5**	**4.4**	NA	NA	**1**	**87.5**	**883**	**61**	**608**	**33**	NA	**678**	0.06 U	**0.5**	0.7 U	**17,700**	**5.6**
SS-1	---	10/28/16	**55,500**	NA	**6.78**	NA	NA	**0.619**	**36.3**	NA	**42**	NA	NA	NA	NA	**0.0564**	1.57 U	NA	NA	NA
SS-2	---	10/28/16	**22,200**	NA	**4.3**	NA	NA	**2.74**	**54.4**	NA	**53.7**	NA	NA	NA	NA	**0.116**	**0.776**	NA	NA	NA
SS-900 (SS-2 Dup)	---	10/28/16	**81,100**	NA	**9.47**	NA	NA	**5.56**	**112**	NA	**113**	NA	NA	NA	NA	**0.158**	**3.14**	NA	NA	NA
CS-14	---	10/17/23	**22,100**	**3.11**	**42.4**	NA	NA	1 U	**18.9**	**126**	**31.3**	NA	**13.1**	NA	**174**	1 U	1 U	NA	**75,800**	**5.08**
CS-19	---	10/17/23	**148,000**	**24.6**	**4.47**	NA	NA	**7.51**	**191**	**2,040**	**184**	NA	**87.5**	NA	**1,540**	1 U	**1.48**	NA	**12,300**	**6.64**
CS-30C	---	11/1/23	**13,400**	1 U	**17.7**	NA	NA	1 U	**10.6**	**19.5**	**3.74**	NA	**5.61**	NA	**33.9**	1 U	1 U	NA	**48,800**	**2.57**
CS-31B	---	10/31/23	**59,700**	**6.2**	**17.3**	NA	NA	**1.06**	**50.6**	**715**	**105**	NA	**27.6**	NA	**535**	1 U	1 U	NA	**18,400**	**4.80**
CS-31C	---	11/1/23	**11,600**	1 U	**15.5**	NA	NA	1 U	**8.93**	**72.9**	**12.4**	NA	**7.23**	NA	**62.1**	1 U	1 U	NA	**29,000**	**3.24**
DUP-231101 (CS-31C)	---	11/1/23	**10,500**	1 U	**14.4**	NA	NA	**1.46**	**10.0**	**40.5**	**12.1**	NA	**8.03**	NA	**93.7**	1 U	1 U	NA	**56,300**	**3.58**

Notes:
mg/kg - milligrams per kilogram
Bold - analyte detected
U - not detected at listed reporting limit
Lab qualifiers and data validation qualifiers have been removed except for "U" flags.
NA - not analyzed
ND - not detected (detection limits not reported)
Samples excluded from COI analysis (these are not shown on this table) include material that is dross or a mix of soil and dross or has been removed during previous site efforts

Appendix C - Table C-4 COIs - Soil Data Summary (Non-Metals)
Maralco Property - Kent, WA

Analyte				NWTPH-Gx	NWTPH-Dx	NWTPH-Oil	Chloride	Fluoride	Nitrate	Ammonia Nitrogen	Benzene	Toluene	Ethylbenzene	Xylenes, Total	Total cPAH	Benzo(G,H,I)Perylene	Anthracene	Acenaphthene	Acenaphthylene	Fluoranthene	Fluorene	Naphthalene	Phenanthrene	Pyrene	1-Methylnaphthalene	2-Methylnaphthalene	Di-n-Butylphthalate	bis(2-Ethylhexyl)phthalate	Di-n-octyl Phthalate	Phenol	4-Methylphenol	Benzoic Acid	Silanol, trimethyl
PCUL - Soil Protective of SW Vadose (fresh water, mg/kg)				30	260	260	NC	144.28	130000	NC	0.0002	0.0226	0.0059	0.0296	0.0042	na	2	0.155	na	0.001	0.079	0.24	na	0.001	0.002	0.089	0.015	0.005	0.008	0.047	0.085	2.9	NC
PCUL - Soil Protective of SW Saturated (fresh water, mg/kg)				30	2000	2000	NC	144.28	130000	NC	#REF!	0.023	#REF!	0.03	0.0042	na	2.3	0.16	na	0.001	0.08	0.24	na	0.001	0.0020	0.089	0.015	0.005	0.008	0.047	0.085	2.9	NC
Min of SL				30	260	260	NC	144.28	130000	NC	#REF!	0.023	#REF!	0.03	0.0042	na	2.3	0.16	na	0.001	0.08	0.24	na	0.001	0.002	0.089	0.015	0.01	0.01	0.047	0.085	2.9	NC
Min Detected Value				**ND**	**1,100**	**ND**	**10**	**0.544**	**0.954**	**4.26**	**0.00014**	**0.000476**	**ND**	**0.17**	**0.001**	**0.00184**	**ND**	**ND**	**ND**	**0.00111**	**1.1**	**0.00473**	**0.000954**	**0.00159**	**ND**	**0.00249**	**ND**	**0.51**	**3**	**ND**	**0.34**	**ND**	**0.36**
Max Detected Value				**ND**	**1,100**	**ND**	**29,900**	**579**	**13.8**	**399**	**0.00132**	**0.074**	**ND**	**0.17**	**0.069**	**0.00184**	**ND**	**ND**	**ND**	**1.9**	**1.1**	**0.52**	**3.1**	**3.3**	**ND**	**0.59**	**ND**	**11.00**	**3**	**ND**	**0.34**	**ND**	**0.36**
Lowest Dection Limit (for samples with only ND values)				**0.1**	--	**11**	--	--	--	--	--	--	**0.0005**	**0.0015**	--	--	**0.0066**	**0.0066**	**0.0066**	--	**0.0066**	--	--	--	0.022	--	**0.10**	**0.10**	**0.10**	**0.10**	**0.10**	**0.10**	**0.10**
Is Value above SL (lowest SL)				**no**	**yes**	**no**	**no**	**yes**	**no**	**no**	**#REF!**	**yes**	**no**	**yes**	**yes**	**no**	**no**	**no**	**no**	**yes**	**yes**	**yes**	**no**	**yes**	**no**	**yes**	**no**	**yes**	**yes**	**no**	**yes**	**no**	**no**
Sample ID	**Depth (feet below ground surface)**	**Vadoese or Saturated**	**Date**	**Results (mg/kg)**																													
B-1-5	5	vadose	10/27/16	NA	4.4 U	11 U	NA	NA	NA	NA	NA	NA	NA	NA	0.0066 U	0.0066 U	0.0066 U	0.0066 U	0.0066 U	0.0066 U	0.0066 U	0.022 U	0.0066 U	0.0066 U	0.022 U	0.022 U	NA	NA	NA	NA	NA	NA	NA
B-1-17	17	saturated	10/27/16	0.1 U	5.38 U	13.5 U	NA	NA	NA	NA	**0.000522**	0.005 U	0.0005 U	0.0015 U	0.00808 U	0.00808 U	0.00808 U	0.00808 U	0.00808 U	0.00808 U	0.00808 U	**0.00473**	**0.000954**	0.00808 U	0.0269 U	0.0269 U	NA	NA	NA	NA	NA	NA	NA
B-2-4	4	vadose	10/27/16	NA	4.61 U	11.5 U	NA	NA	NA	NA	NA	NA	NA	NA	0.00692 U	0.00692 U	0.00692 U	0.00692 U	0.00692 U	0.00692 U	0.00692 U	0.0231 U	**0.00132**	0.00692 U	0.0231 U	0.0231 U	NA	NA	NA	NA	NA	NA	NA
B-2-16.5	16.5	saturated	10/27/16	NA	5.04 U	12.6 U	NA	NA	NA	NA	NA	NA	NA	NA	0.00756 U	0.00756 U	0.00756 U	0.00756 U	0.00756 U	0.00756 U	0.00756 U	0.0252 U	0.00756 U	0.00756 U	0.0252 U	0.0252 U	NA	NA	NA	NA	NA	NA	NA
B-3-6	6	vadose	10/27/16	NA	45.1 U	113 U	NA	NA	NA	NA	NA	NA	NA	NA	**0.001**	**0.00184**	0.00676 U	0.00676 U	0.00676 U	**0.00111**	0.00676 U	0.0225 U	**0.00198**	**0.00159**	0.0225 U	**0.00249**	NA	NA	NA	NA	NA	NA	NA
B-3-16	16	saturated	10/27/16	0.1 U	5.5 U	13.8 U	NA	NA	NA	NA	**0.000205**	0.005 U	0.0005 U	0.0015 U	0.00826 U	0.00826 U	0.00826 U	0.00826 U	0.00826 U	0.00826 U	0.00826 U	0.0275 U	0.00826 U	0.00826 U	0.0275 U	0.0275 U	NA	NA	NA	NA	NA	NA	NA
B-4-7	7	vadose	10/27/16	NA	NA	NA	**44.4**	**5.03**	**2.25**	**15.2**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-4-9	9	saturated	10/27/16	0.1 U	NA	NA	NA	NA	NA	NA	**0.00132**	**0.000476**	0.0005 U	0.0015 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-4-15	15	saturated	10/27/16	NA	NA	NA	**309**	**2.75**	1.37 U	**5.92**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-5-8	8	saturated	10/27/16	NA	NA	NA	**41.4**	**31.8**	**0.954**	5.27U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-5-10	10	saturated	10/27/16	0.1 U	NA	NA	NA	NA	NA	NA	**0.000604**	**0.000557**	0.0005 U	0.0015 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-5-15	15	saturated	10/27/16	NA	NA	NA	**4,280**	**0.544**	1.38 U	**33.1**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-6-7.5	7.5	saturated	10/27/16	NA	NA	NA	**212**	**7.72**	1.31 U	**27.7**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-6-9.5	9.5	saturated	10/27/16	0.1 U	NA	NA	NA	NA	NA	NA	**0.00014**	0.005 U	0.0005 U	0.0015 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
B-6-15	15	saturated	10/27/16	NA	NA	NA	**183**	**35.9**	1.45 U	**9.72**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-14	5-7.5'	vadose	8/29/22	NA	NA	NA	10 U	5 U	NA	**162**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-14	10-11.5'	saturated	8/29/22	NA	NA	NA	10 U	5 U	NA	**82.0**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-15	5-6.5'	vadose	8/29/22	NA	NA	NA	10 U	5 U	NA	**135**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-15	8.5-10'	saturated	8/29/22	NA	NA	NA	**19**	5 U	NA	**123**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-16	6.5-8'	saturated	8/30/22	NA	NA	NA	**12**	5 U	NA	**156**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-16	10-11.5'	saturated	8/30/22	NA	NA	NA	10 U	5 U	NA	**74.6**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-18	5-7.2'	saturated	8/30/22	NA	NA	NA	10 U	5U	NA	**165**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-18	14-15'	saturated	8/31/22	NA	NA	NA	10 U	5 U	NA	**94.5**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-19	6-8'	saturated	8/31/22	NA	NA	NA	**12**	5 U	NA	**156**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-19	12.5-15'	saturated	8/31/22	NA	NA	NA	10 U	5 U	NA	**136**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-20	6.5-7.5'	saturated	8/31/22	NA	NA	NA	**12**	5 U	NA	**301**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-20	13.5-15'	saturated	8/31/22	NA	NA	NA	10 U	5 U	NA	**399**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-21	6-10'	saturated	8/31/22	NA	NA	NA	**13**	5 U	NA	**161**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-21/ DUP01-220831	11.5-14'	saturated	8/31/22	NA	NA	NA	10 U 10 U	5 U 5 U	NA	**94.1** **156**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-22	3.5-5'	vadose	8/31/22	NA	NA	NA	**12**	5 U	NA	**129**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-22	5-7'	saturated	8/31/22	NA	NA	NA	**12**	5 U	NA	**155**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-22	11-13.2'	saturated	8/31/22	NA	NA	NA	**10**	5 U	NA	**193**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5R	5.5-7'	vadose	8/30/22	NA	NA	NA	10 U	41	NA	**286**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5R	11-12'	saturated	8/30/22	NA	NA	NA	**22**	5 U	NA	**285**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-7	5-7'	vadose	8/30/22	NA	NA	NA	10 U	5 U	NA	**103**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-7	13.5-15'	saturated	8/30/22	NA	NA	NA	**950**	5 U	NA	**99.0**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-8	4-5'	saturated	8/30/22	NA	NA	NA	**80**	5 U	NA	**189**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-8	12-13'	saturated	8/30/22	NA	NA	NA	**1,600**	5 U	NA	**197**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-3A (5')	5'	vadose	7/21/17	2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-4A (6.5')	6.5'	vadose	7/21/17	2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-6 (6.5')	6.5'	vadose	7/21/17	2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-1 5-6’	5-6'	vadose	5/24/21	5 U	50 U	250 U	NA	NA	NA	NA	0.02 U	0.02 U	0.02 U	0.06 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-2 6-7.5’	6-7.5'	saturated	5/24/21	5 U	**1,100**	250 U	NA	NA	NA	NA	0.02 U	0.02 U	0.02 U	0.06 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-14 5-7.5'	5-7.5'	saturated	8/29/22	NA	NA	NA	10 U	5 U	NA	**162**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-14 10-11.5'	10-11.5'	saturated	8/29/22	NA	NA	NA	10 U	5 U	NA	**82.0**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-15 5-6.5'	5-6.5'	saturated	8/29/22	NA	NA	NA	10 U	5 U	NA	**135**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-15 8.5-10'	8.5-10'	saturated	8/29/22	NA	NA	NA	**19**	5 U	NA	**123**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-16 6.5-8'	6.5-8'	saturated	8/30/22	NA	NA	NA	**12**	5 U	NA	**156**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-19 12.5-15'	12.5-15'	saturated	8/31/22	NA	NA	NA	10 U	5 U	NA	**136**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-20 6.5-7.5'	6.5-7.5'	saturated	8/31/22	NA	NA	NA	**12**	5 U	NA	**301**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-20 13.5-15'	13.5-15'	saturated	8/31/22	NA	NA	NA	10 U	5 U	NA	**399**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-21 6-10'	6-10'	saturated	8/31/22	NA	NA	NA	**13**	5 U	NA	**161**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-21 11.5-14' DUP01-220831	11.5-14'	saturated	8/31/22	NA	NA	NA	10 U 10 U	5 U 5 U	NA	**94.1** **156**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-22 3.5-5'	3.5-5'	vadose	8/31/22	NA	NA	NA	**12**	5 U	NA	**129**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-22 5-7'	5-7'	saturated	8/31/22	NA	NA	NA	**12**	5 U	NA	**155**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DPT-22 11-13.2'	11-13.2'	saturated	8/31/22	NA	NA	NA	**10**	5 U	NA	**193**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-UST-01 5-6'	5-6'	vadose	8/29/22	NA	50 U	250 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-UST-02 5-6'	5-6'	vadose	8/29/22	NA	50 U	250 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-UST-02 15-16'	15-16'	saturated	8/29/22	NA	50 U	250 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SB-UST-03 1-2'	1-2'	vadose	8/29/22	NA	50 U	250 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5R 5.5-7'	5.5-7'	saturated	8/30/22	NA	50 U	250 U	10 U	41	NA	**286**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-5R 11-12'	11-12'	saturated	8/30/22	NA	50 U	250 U	**22**	5 U	NA	**285**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-7 5-7'	5-7'	saturated	8/30/22	NA	50 U	250 U	10 U	5 U	NA	**103**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-7 13.5-15'	13.5-15'	saturated	8/30/22	NA	50 U	250 U	**950**	5 U	NA	**99.0**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-8 4-5'	4-5'	vadose	8/30/22	NA	50 U	250 U	**80**	5 U	NA	**189**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-8 12-13'	12-13'	saturated	8/30/22	NA	50 U	250 U	**1,600**	5 U	NA	**197**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SW-1	---	no information	5/10/90	NA	NA	NA	NA	NA	NA	NA	NA	1.7 U	NA	1.7 U	0.17 U*	NA	NA	NA	NA	1.7 U	1.7 U	1.7 U	1.7 U	**0.21**	NA	1.7 U	1.7 U	**0.51**	1.7 U	1.7 U	1.7 U	8.2 U	**0.36**
SW-2	---	no information	5/9/90	NA	NA	NA	NA	NA	NA	NA	NA	0.007 U	NA	0.007 U	0.088 U*	NA	NA	NA	NA	**0.12**	0.88 U	0.88 U	0.88 U	**0.16**	NA	0.88 U	0.88 U	**0.51**	0.88 U	0.88 U	0.88 U	4.3 U	NA
SW-4	---	no information	5/10/90	NA	NA	NA	NA	NA	NA	NA	NA	**0.074**	NA	**0.17**	**0.069**	NA	NA	NA	NA	**1.9**	**1.1**	3.8 U	**3.1**	**3.3**	NA	3.8 U	3.8 U	14 U	**3**	3.8 U	3.8 U	19 U	NA
SW-8	---	no information	5/9/90	NA	NA	NA	NA	NA	NA	NA	NA	0.022 U	NA	0.022 U	0.28 U*	NA	NA	NA	NA	**1.1**	2.8 U	**0.52**	**0.89**	2.2 U	NA	**0.59**	2.8 U	**11**	2.8 U	2.8 U	**0.34**	14 U	NA
SS-1	---	no information	10/28/16	NA	NA	NA	**82.3**	**226**	**3.62**	**4.26**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-2	---	no information	10/28/16	NA	NA	NA	**26,800**	**383**	**13.8**	**6.65**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SS-900 (SS-2 Dup)	---	no information	10/28/16	NA	NA	NA	**29,900**	**579**	**8.21**	15.6 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SED-01	---	no information	6/3/21	NA	NA	NA	**49.4**	**45.1**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
All units in mg/kg. mg/kg - milligrams per kilogram
BOLD - constituent detected
NA - not analyzed
U* - Constituent not detected at associated reporting limit, benzo(a)pyrene reporting limit provided
cPAH = Carcinogenic Polycyclic aromatic hydrocarbons
Total cPAH is the sum of detected values based on the toxic equivalency factor (TEQ) per WAC 173-340-708(8)(e)

U - Constituent not detected at associated reporting level.
ft bgs - feet below ground surface
Lab qualifiers and data validation qualifiers have been removed except for "U" flags.
ND - not detected above laboratory reporting limits

Appendix C- Table C-5 COIs Soil Data Summary - Off-Property Ditches
Maralco Property - Kent, WA

	Sample ID	Sample depth (ft bgs)	Dated Collected	Aluminum	Iron	Antimony	Arsenic	Cadmium	Chromium	Cobalt	Copper	Lead	Nickel	Silver	Mercury	Zinc
PCUL - Soil Protective of SW Vadose (fresh water, mg/kg)				33,000	36,000	5.2	7.3	0.77	78	11	36	24	48	0.61	0.07	85
PCUL - Soil Protective of SW Saturated (fresh water, mg/kg)				33,000	36,000	5.2	7.3	0.77	72	11	36	24	48	0.61	0.07	85
	Max value detected			115,000	81,800	55.4	45.8	11.8	208	6.81	1,410	261	64.2	1.2	0.73	2,190
	COI? Is concentration > PCUL			**yes**	**yes**	**yes**	**yes**	**yes**	**yes**	**no**	**yes**	**yes**	**yes**	**yes**	**yes**	**yes**
General Location	Sample ID	Depth (feet below ground	Date	Results (mg/kg)												
Upstream	B-4	---	6/25/87	NA	NA	0.6 U	**5.2**	2.0 U	**14**	NA	**21**	**20**	**15**	3.0 U	0.1 U	**67**
S. 202nd ROW	B-1	---	6/25/87	NA	NA	**1.2**	**19**	2.0 U	**36**	NA	**262**	**64**	**31**	3.0 U	**0.26**	**365**
	SW-8	---	5/9/90	**93,700**	**40,600**	6.6	**6.8**	**7.4**	**127**	**5.4**	**1050**	**261**	**46**	**1.2**	**0.73**	**957**
	SED-02	0-0.5	6/9/21	**12,000**	**19,000**	2 U	**3.79**	1 U	**11.6**	**4.21**	**41.2**	**10.4**	**10.7**	NA	NA	**109**
	SED-02	0.5-1	6/9/21	**12,100**	**16,500**	2 U	**2.18**	1 U	**10.1**	**2.85**	**20.2**	**8.24**	**7.54**	NA	NA	**58.1**
	SED-03	0-0.5	6/9/21	**23,200**	**81,800**	8 U	**19.2**	2 U	**31.4**	10 U	**159**	**40.2**	**25.5**	NA	NA	**325**
	SED-03	0.5-1	6/9/21	**115,000**	**29,000**	**55.4**	**7.21**	**11.8**	**208**	10 U	**1,410**	**189**	**64.2**	NA	NA	**2,190**
	SED-04	0-0.5	7/11/23	NA	NA	NA	**16.3**	**1.04**	**14.9**	NA	**82.6**	NA	**8.12**	0.57 U	0.66 U	NA
	SED-04	0.5-1	7/11/23	NA	NA	NA	**6.86**	1 U	**11.7**	NA	**44.0**	NA	**9.74**	0.57 U	0.66 U	NA
	SED-05N	0-0.5	7/11/23	NA	NA	NA	**7.1**	1 U	**11.6**	NA	**18.6**	NA	**10.3**	0.57 U	0.66 U	NA
	SED-05	0-0.5	7/11/23	NA	NA	NA	**28.6**	**1.99**	**26.1**	NA	**149.0**	NA	**16.4**	0.57 U	0.66 U	NA
	SED-05	0.5-1	7/11/23	NA	NA	NA	**15.2**	1 U	**16**	NA	**68.0**	NA	**9.20**	0.57 U	0.66 U	NA
	SED-05	1-1.5	7/11/23	NA	NA	NA	**30.8**	**1.73**	**26.9**	NA	**207**	NA	**13.9**	0.5U	0.66 U	NA
	SED-05	1.5-2	7/11/23	NA	NA	NA	**16.0**	**1.01**	**23.1**	NA	**118**	NA	**12.3**	0.25U	0.33U	NA
	SED-05S1	0-0.5	7/11/23	NA	NA	NA	**45.8**	**1.15**	**10.3**	NA	**30.8**	NA	**6.58**	0.57 U	0.66 U	NA
	SED-05S1	0.5-1	7/11/23	NA	NA	NA	**40.7**	1 U	**2.35 J**	NA	5 UJ	NA	**1.31 J**	0.57 U	0.66 U	NA
	SED-05S1	1-1.5	7/11/23	NA	NA	NA	**7.50**	1U	**7.86**	NA	**11.5**	NA	**4.44**	0.25U	0.33U	NA
	SED-05S1	1.5-2	7/11/23	NA	NA	NA	**2.34**	1U	**6.44**	NA	**7.82**	NA	**3.93**	0.25U	0.33U	NA
	SED-05S2	0-0.5	7/11/23	NA	NA	NA	**2.64**	1 U	**9.40**	NA	**14.8**	NA	**6.95**	0.57 U	0.66 U	NA
	SED-05S3	0-0.5	7/11/23	NA	NA	NA	**2.89**	2 U	**8.18**	NA	**16.0**	NA	**7.25**	0.57 U	0.66 U	NA
	SED-06	0-0.5	7/11/23	NA	NA	NA	**25.9**	**1.92**	**12.3**	NA	**89.4**	NA	**6.96**	0.57 U	0.66 U	NA
	SED-06	0.5-1	7/11/23	NA	NA	NA	**9.63**	**2.51**	**26.3**	NA	**277**	NA	**13.0**	0.57 U	0.66 U	NA
	SED-06	1-1.5	7/11/23	NA	NA	NA	**11.4**	**4.65**	**23.1**	NA	**189**	NA	**14.7**	0.5U	0.66 U	NA
	SED-06	1.5-2	7/11/23	NA	NA	NA	**3.36**	1U	**8.35**	NA	**16.1**	NA	**5.15**	0.25U	0.33U	NA
	SED-07N	0.5-1	7/11/23	NA	NA	NA	**3.28**	1 U	**13.6**	NA	**24.9**	NA	**12.6**	0.57 U	0.66 U	NA
	SED-07	0-0.5	7/11/23	NA	NA	NA	**19.6**	**1.24**	**12.9**	NA	**120**	NA	**8.27**	0.57 U	0.66 U	NA
	SED-07	0.5-1	7/11/23	NA	NA	NA	**3.73**	**4.45**	**77.2**	NA	**495**	NA	**24.3**	0.57 U	0.66 U	NA
	SED-07	1-1.5	7/11/23	NA	NA	NA	**2.97**	1 U	**7.58**	NA	**34.7**	NA	**4.88**	0.57 U	0.66 U	NA
	SED-07S1	0-0.5	7/11/23	NA	NA	NA	**6.82**	1 U	**9.49**	NA	**23.9**	NA	**6.89**	0.57 U	0.66 U	NA
	SED-07S2	0-0.5	7/11/23	NA	NA	NA	**4.78**	1 U	**8.33**	NA	**14.3**	NA	**6.53**	0.57 U	0.66 U	NA
	SED-07S3	0-0.5	7/11/23	NA	NA	NA	**5.71**	1 U	**8.05**	NA	**16.0**	NA	**6.46**	0.57 U	0.66 U	NA
	SED-08	0-0.5	7/11/23	NA	NA	NA	**19.8**	**1.34**	**18.9**	NA	**137**	NA	**9.62**	0.57 U	0.66 U	NA
	SED-08	0.5-1	7/11/23	NA	NA	NA	**9.50**	**1.78**	**30.6**	NA	**196**	NA	**14.8**	0.57 U	0.66 U	NA
	SED-08	1-1.5	7/11/23	NA	NA	NA	**5.85**	1 U	**16.2**	NA	**95.6**	NA	**7.18**	0.57 U	0.66 U	NA
KCDD#1 Wetland	KCDD-S	0.5-1	8/24/21	**18,400**	NA	**2.89**	**18.9**	2 U	**38.7**	**6.81**	**64.6**	**60.6**	**20.8**	2 U	NA	NA
	KCDD-N	0.5-1	8/24/21	**23,600**	NA	**2.95**	**10.8**	**2.01**	**23.1**	**5.27**	**98.6**	**54.7**	**14.7**	1 U	NA	NA

NOTES:
Bold - analyte detected
mg/kg - milligrams per kilogram dry weight
U - Constituent not detected at associated reporting level.
Lab qualifiers and data validation qualifiers have been removed except for "U" flags.

NA - not analyzed or not available
ROW - right of way
ft bgs - feet below ground surface

Table C-6 - Stockpile Data Summary
Maralco Property - Kent, WA

	Sample ID:	Bags	Pile-A	Pile-B	Pile-C	Pile-D	Pile-E	Pile-F
	Date:	11/30/21	11/30/21	11/30/21	11/30/21	11/30/21	11/30/21	11/30/21
	Source Report:	CRETE 2021-2022						
	Material Pile:	Indoor Filter Bag Media	Indoor Washed Oxides	Indoor	Indoor	Indoor KBI Dross	Indoor Washed Oxides	Indoor
pH	S.U.	4.5	8.7	8.2	8	8	8.7	8.4
Total Sulfide	mg/kg	----	----	----	----	----	----	----
Fluoride	mg/kg	150	----	1,400	2,200	340	----	460
Potassium	mg/kg	1,240	----	47,100	8,330	29,200	----	8,640
Chloride	mg/kg	14,000	----	85,000	20,000	59,000	----	6,700
Ammonia	mg/kg	2,010	----	180	----	958	----	33.2
Kjeldahl Nitrogen	mg/kg	----	----	----	----	----	----	----
Cyanide	mg/kg	----	----	----	----	----	----	----
Calcium	mg/kg	----	116,100	----	----	----	11,100	----
Metals - Method SW6010/6020								
Aluminum	mg/kg	169,000	15,100	134,000	178,000	194,000	144,000	210,000
Boron	mg/kg	19.5	----	151	17.2	651	----	241
Iron	mg/kg	122,000	----	3,350	4,020	3,500	----	6,290
Magnesium	mg/kg	2.6 U	20,100	11,000	2,800	4,800	19,200	7,300
Sodium	mg/kg	1,320	----	49,100	58,800	25,100	----	9,020
Strontium	mg/kg	1.64	355	156	35.3	258	300	167
Titanium	mg/kg	89.2	2590	543	245	181	2560	377
Metals - Method SW6010/6020								
Antimony	mg/kg	23.9	21	18.4	17.8	5.49	18	7.9
Arsenic	mg/kg	3.23	8	3.93	1 U	1.15	7	3.65
Barium	mg/kg	----	115	----	----	----	112	----
Beryllium	mg/kg	----	3	----	----	----	3	----
Cadmium	mg/kg	5.46	4.4	4.35	1.93	9.23	4.3	4.55
Chromium	mg/kg	583	231	201	86.1	2,350	214	171
Cobalt	mg/kg	20 U	4	2.59	1.29	3.65	4	2.58
Copper	mg/kg	8,350	2,340	5,010	4,810	5,430	2,340	4,460
Iron	mg/kg	----	9,900	----	----	----	10,200	----
Lead	mg/kg	345	165	235	192	106	163	94.3
Manganese	mg/kg	1,340	1,340	1,160	403	3,240	1,280	1,640
Mercury	mg/kg	----	0.5 U	----	----	----	0.5 U	----
Nickel	mg/kg	318	67	111	59.2	61.2	69	66
Selenium	mg/kg	----	<3	----	----	----	<3	----
Silver	mg/kg	----	1	----	----	----	1	----
Thallium	mg/kg	----	0.5 U	----	----	----	0.5 U	----
Vanadium	mg/kg	----	199	----	----	----	197	----
Zinc	mg/kg	5,070	1,950	2,950	3,270	1,030	1,860	1,480
TCLP Metals - Method SW6020, 1311								
Aluminum	mg/L	----	----	----	----	----	----	----
Arsenic	mg/L	1 U	0.002 U	1 U	1 U	1 U	0.002 U	1 U
Barium	mg/L	1 U	0.09	1 U	1 U	1 U	0.09	1 U
Cadmium	mg/L	1 U	0.010	1 U	1 U	1 U	0.012	1 U
Chromium	mg/L	1 U	0.018	1 U	1 U	1 U	0.012	1 U
Cr(VI)	mg/L	----	----	----	----	----	----	----
Copper	mg/L	----	5.2	----	----	----	5	----
Lead	mg/L	2.1	0.05 U	1 U	1 U	1 U	0.05 U	1 U
Mercury	mg/L	0.1 U ht	0.001 U	0.1 U ht	0.1 U ht	0.1 U ht	0.001 U	0.1 U ht
Selenium	mg/L	1 U	0.003	1 U	1 U	1 U	0.002 U	1 U
Silver	mg/L	1 U	0.005 U	1 U	1 U	1 U	0.005 U	1 U
Zinc	mg/L	----	8.3	----	----	----	7.4	----

	Sample ID:	C1	C1 Duplicate	C2	G1	G2	C3	C4	BH-1	BH-2
	Date:	6/1/87	6/1/87	6/1/87	6/1/87	6/1/87	6/1/87	6/1/87	1/1/90	1/1/90
	Source Report:	*Site Assessment Report, E&E 1987*							*Draft Phase I Remedial Investigation Report, MKE 1991*	
	Material Pile:	Outdoor Dross	Outdoor Dross	Aluminum Oxide Outdoor Dross	Gray Substance	Yellow Dross Outdoor Dross	KBI Dross Indoor Dross	Baghouse Dust Indoor Dross	Baghouse Dust Indoor Dross	Baghouse Dust Indoor Dross
pH	S.U.	----	----	----	----	----	----	----	----	----
Total Sulfide	mg/kg	----	----	----	----	----	----	----	----	----
Fluoride	mg/kg	----	----	----	----	----	----	----	----	----
Potassium	mg/kg	----	----	----	----	----	----	----	190,000	86,600
Chloride	mg/kg	----	----	----	----	----	----	----	140,642	150,755
Ammonia	mg/kg	----	----	----	----	----	----	----	292	188
Kjeldahl Nitrogen	mg/kg	----	----	----	----	----	----	----	884	677
Cyanide	mg/kg	----	----	----	----	----	----	----	0.67	0.42
Calcium	mg/kg	----	----	----	----	----	----	----	2840	4200
Metals - Method SW6010/6020										
Aluminum	mg/kg	----	----	----	----	----	----	----	172,000	130,000
Boron	mg/kg	----	----	----	----	----	----	----	----	----
Iron	mg/kg	----	----	----	----	----	----	----	----	----
Magnesium	mg/kg	----	----	----	----	----	----	----	19,200	15,000
Sodium	mg/kg	----	----	----	----	----	----	----	93,100	65,000
Strontium	mg/kg	----	----	----	----	----	----	----	----	----
Titanium	mg/kg	----	----	----	----	----	----	----	----	----
Metals - Method SW6020										
Antimony	mg/kg	19	16	57	3.1	20	2.9	107	3.15 U	----
Arsenic	mg/kg	8.6	7.2	4.1	3.9	4.5	1.5	3.8	0.633 U	----
Barium	mg/kg	----		----	----	----	----	----	65.2	81.2
Beryllium	mg/kg	6	7.2	26	14	6	3.9	2.0 U	1.26	----
Cadmium	mg/kg	7.5	6.8	3.4	1.2	4.1	13	19	2.05	----
Chromium	mg/kg	588	637	442	233	186	975	21	153	189
Cobalt	mg/kg	----		----	----	----	----	----	4.1	----
Copper	mg/kg	13,300	27,800	2610	2190	2710	5120	198	1,200	1,420
Iron	mg/kg	----		----	----	----	----	----	3,630	----
Lead	mg/kg	861	241	226	146	176	307	587	110	108
Manganese	mg/kg	----		----	----	----	----	----	1510	1100
Mercury	mg/kg	0.2 U	0.2 U	0.2 U	0.1 U	0.27	0.44	0.49	0.26	----
Nickel	mg/kg	438	355	118	110	47	81	15	31.5	----
Selenium	mg/kg	0.3 U	0.3 U	0.3 U	0.3 U	0.48	0.2 U	1.5	0.633 U	----
Silver	mg/kg	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	0.2 U	6.9	1.57 U	----
Thallium	mg/kg	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.4 U	0.71	0.633 U	----
Vanadium	mg/kg	----		----	----	----	----	----	84.7	----
Zinc	mg/kg	7,600	6,960	1,760	1,140	1,130	3,020	16,500	773	871
TCLP Metals - Method SW6020										
Aluminum	mg/L	----		----	----	----	----	----	----	----
Arsenic	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	----	----
Barium	mg/L	0.82	0.82	0.01	0.29	0.66	0.60	0.30	----	----
Cadmium	mg/L	0.14	0.01	0.016	0.01	0.05	0.01	0.25	----	----
Chromium	mg/L	0.1	0.08	0.05	0.03	0.014	0.047	0.024	----	----
Cr(VI)	mg/L	----		----	----	----	----	----	----	----
Copper	mg/L	38	27.0	6.20	1.10	2.50	13.0	0.29	----	----
Lead	mg/L	1.6	1.30	0.11	0.05	0.05 U	0.20	0.12	----	----
Mercury	mg/L	0.002 U	0.002	0.001 U	0.001	0.001 U	0.001	0.002	----	----
Selenium	mg/L	0.002 U	0.002 U	0.002 U	0.002	0.002 U	0.002 U	0.004	----	----
Silver	mg/L	0.01 U	0.01 U	0.01 U	0.01	0.01 U	0.01 U	0.08	----	----
Zinc	mg/L	78	16	16	2.20	7.70	23	605	----	----

	Sample ID:	BD-5	BD-6	BD-8	BD-9	BD-10	BD-11	BD-12	BD-13	BD-14	BD-15	BD-16	BD-17
	Date:	1/1/90	1/1/90	1/1/90	1/1/90	1/1/90	1/1/90	1/1/90	1/1/90	1/1/90	1/1/90	1/1/90	1/1/90
	Source Report:	*Draft Phase I Remedial Investigation Report, MKE 1991*											
	Material Pile:	Outdoor Black Dross	Outdoor Black Dross	Outdoor Black Dross	Outdoor Black Dross	Outdoor Black Dross	Outdoor Black Dross	Outdoor Black Dross	Outdoor Black Dross	Outdoor Black Dross	Outdoor Black Dross	Outdoor Black Dross	Outdoor Black Dross
pH	S.U.	----	----	----	----	----	----	----	----	----	----	----	----
Total Sulfide	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----
Fluoride	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----
Potassium	mg/kg	17,300	43,400	115,000	70,700	27,900	57,000	29,000	22,400	33,600	17,500	42,000	22,000
Chloride	mg/kg	15,752	59,427	131,988	95,593	2,025	41,901	20,541	30,614	5,728	1,655	80	108
Ammonia	mg/kg	153	686	149	95	26	109	46	101	197	145	61	109
Kjeldahl Nitrogen	mg/kg	4,089	3,006	554	664	398	824	684	856	879	777	646	795
Cyanide	mg/kg	1.3	1.5	0.66	0.56	1.04	1.07	1.53	1.08	1.51	0.7	0.74	1.49
Calcium	mg/kg	6,800	4,340	5,120	5,000	23,000	7,600	12,500	4,700	6,700	7,350	13,900	10,100
Metals - Method SW6010/6020													
Aluminum	mg/kg	211,000	155,000	130,000	140,000	194,000	147,000	185,000	153,000	166,000	175,000	145,000	18,600
Boron	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----
Iron	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----
Magnesium	mg/kg	21,600	20,500	24,800	22,800	30,000	27,500	39,600	19,700	24,300	33,200	38,200	61,700
Sodium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----
Strontium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----
Titanium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----
Metals - Method SW6020													
Antimony	mg/kg	2.88 U	2.89 U	----	2.78 U	4.65	----	3.9	----	3	----	----	----
Arsenic	mg/kg	0.722	2.75	----	1.94	8.61	----	4.87	----	5.25	----	----	----
Barium	mg/kg	91.5	66.1	61.5	76.4	120	128	152	66.8	86.6	105	167	236
Beryllium	mg/kg	2.6	1.88	----	1.94	8.377	----	5.65	----	2.8	----	----	----
Cadmium	mg/kg	5.19	2.31	----	2.36	6.98	----	7.8	----	5.07	----	----	----
Chromium	mg/kg	196	119	412	120	349	140	1,860	1,200	324	146	322	207
Cobalt	mg/kg	7.36	3.47	----	11	6.28	----	8.38	----	----	7.52	----	----
Copper	mg/kg	2,860	1,660	1,200	746	4,600	2,100	2,180	1,600	5,400	1,290	2,100	1,300
Iron	mg/kg	8100	3040	----	6700	6500	----	6000	----	----	7200	----	----
Lead	mg/kg	144	115	93.1	97.2	116	129	214	103	81.1	70	172	176
Manganese	mg/kg	19,600	1,070	1,000	986	893	827	1,060	1,200	841	1,220	879	1,270
Mercury	mg/kg	0.351	0.064	----	0.059	0.238	----	0.155	----	----	0.076	----	----
Nickel	mg/kg	67.9	39.1	----	36.1	115	----	56.5	----	----	57.7	----	----
Selenium	mg/kg	0.577 U	0.578 U	----	0.555 U	0.931 U	----	0.780 U	----	----	0.700 U	----	----
Silver	mg/kg	1.44 U	1.45 U	----	1.39 U	2.33 U	----	1.95 U	----	----	1.75 U	----	----
Thallium	mg/kg	0.577 U	0.578 U	----	0.555 U	0.931 U	----	0.780 U	----	----	0.700 U	----	----
Vanadium	mg/kg	137	84.8	----	197	98.4	----	280	----	----	124	----	----
Zinc	mg/kg	2,000	1,060	952	634	6,100	1,730	2,000	780	2,820	1,320	1,870	960
TCLP Metals - Method SW6020													
Aluminum	mg/L	----	----	----	----	----	----	----	----	----	----	----	----
Arsenic	mg/L	----	----	----	----	----	----	----	----	----	----	----	----
Barium	mg/L	----	----	----	----	----	----	----	----	----	----	----	----
Cadmium	mg/L	----	----	----	----	----	----	----	----	----	----	----	----
Chromium	mg/L	----	----	----	----	----	----	----	----	----	----	----	----
Cr(VI)	mg/L	----	----	----	----	----	----	----	----	----	----	----	----
Copper	mg/L	----	----	----	----	----	----	----	----	----	----	----	----
Lead	mg/L	----	----	----	----	----	----	----	----	----	----	----	----
Mercury	mg/L	----	----	----	----	----	----	----	----	----	----	----	----
Selenium	mg/L	----	----	----	----	----	----	----	----	----	----	----	----
Silver	mg/L	----	----	----	----	----	----	----	----	----	----	----	----
Zinc	mg/L	----	----	----	----	----	----	----	----	----	----	----	----

Table C-6 - Stockpile Data Summary
Maralco Property - Kent, WA

	Sample ID:	BD-18	TC-1	TC-2	TC-3	TC-4	TC-5	HA-2-9.5	Composite 1	Composite 2	Composite 3	Composite 4	DP-1-1'	DP-2-3'	DP-3-3'	DP-4-3'
	Date:	1/1/90	9/11/90	9/11/90	9/11/90	9/11/90	9/11/90	7/6/90	7/6/00	7/6/00	7/6/00	7/6/00	2/4/03	2/4/03	2/4/03	2/4/03
	Source Report:							*Black Dross Pile Characterization, URS 2000*					*Draft RI/FS, EMR 2003*			
	Material Pile:	Outdoor Black Dross	Presumably Black Dross For TCLP only during Pilot Plant					Outdoor Black Dross					Outdoor Black Dross			Outdoor Washed Oxides
pH	S.U.	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Total Sulfide	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Fluoride	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Potassium	mg/kg	**21,700**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Chloride	mg/kg	**81**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Ammonia	mg/kg	**64**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Kjeldahl Nitrogen	mg/kg	**658**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cyanide	mg/kg	**1.43**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Calcium	mg/kg	**1,000**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Metals - Method SW6010/6020																
Aluminum	mg/kg	**181,000**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Boron	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Iron	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Magnesium	mg/kg	**45,000**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Sodium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Strontium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Titanium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Metals - Method SW6010/6020																
Antimony	mg/kg	----	----	----	----	----	----						----	----	----	----
Arsenic	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Barium	mg/kg	**289**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Beryllium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cadmium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Chromium	mg/kg	**172**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cobalt	mg/kg	----						----	----	----	----	----	----	----	----	----
Copper	mg/kg	**1,100**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Iron	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lead	mg/kg	**168**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Manganese	mg/kg	**1,100**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Mercury	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Nickel	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Selenium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Silver	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Thallium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Vanadium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Zinc	mg/kg	**864**	----	----	----	----	----	----	----	----	----	----	----	----	----	----
TCLP Metals - Method SW6020, 1311													Metals - Method 7030/7020/7061			
Aluminum	mg/L	----	----	----	----	----	----	----	----	----	----	----	**3,000**	**1,400**	**2,000**	**2,300**
Arsenic	mg/L	----	0.2 U	----	0.2 U	----	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	ND	ND	ND	ND
Barium	mg/L	----	1.0 U	----	1.0 U	----	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	----	----	----	----
Cadmium	mg/L	----	0.05 U	----	0.05 U	----	0.05 U	0.005 U	0.005 U	**0.000711**	**0.00651**	0.005 U	ND	ND	ND	ND
Chromium	mg/L	----	0.1 U	----	0.1 U	----	0.1 U	0.001 U	**0.012**	**0.0173**	**0.0196**	**0.0212**	----	----	----	----
Cr(VI)	mg/L	----	U	----	U	**0.087**	**0.092**	----	----	----	----	----	----	----	----	----
Copper	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lead	mg/L	----	**0.2**	----	0.1 U	----	0.1 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	----	----	----	----
Mercury	mg/L	----	0.001 U	----	0.001 U	----	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	----	----	----	----
Selenium	mg/L	----	0.05 U	----	0.05 U	----	0.05 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	----	----	----	----
Silver	mg/L	----	**0.07**	----	0.05 U	----	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	----	----	----	----
Zinc	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

	Sample ID:	B-1-S	B-1-S DUP	B-1-D	B-2-S	B-2-D	B-3-S	B-3-D	B-4-S	B-4-M	B-4-D	B-5-S	B-5-D	B-6-S	B-6-M	B-7-S	B-7-M	B-7-M DUP	B-7-D	B-8-S	B-8-M
	Date:	10/19/05	10/19/05	10/19/05	10/19/05	10/19/05	10/19/05	10/19/05	10/19/05	10/19/05	10/19/05	10/19/05	10/19/05	10/20/05	10/20/05	10/20/05	10/20/05	10/20/05	10/20/05	10/19/05	10/19/05
	Source Report:	*Dross Sampling and Waste Determination, URS 2006*																			
	Material Pile:	Outdoor Black Dross												Outdoor Black Dross							
pH	S.U.	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Total Sulfide	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Fluoride	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Potassium	mg/kg	**38,000**	**45,300**	**23,600**	**42,600**	**38,200**	**4,110**	**6,260**	**7,210**	**6,850**	**12,000**	**32,200**	**47,800**	**112,000**	**108,000**	**120,000**	**140,000**	**142,000**	**123,000**	**20,900**	**101,000**
Chloride	mg/kg	5.81 UJ	**209 J**	**14**	**523**	**32.9**	**21.4**	**106**	**11.6**	**39.7**	**16.4**	**6,550**	**104,000**	**283,000**	**213,000**	**169,000**	**276,000**	**261,000**	**258,000**	**781**	**176,000**
Ammonia	mg/kg	6.73 U	4.33 U	8.15 U	5.69 U	7.10 U	6.75 U	3.74 U	6.47 U	5.38 U	4.37 U	4.75 U	**15.3**	**88.3 J**	**280 J**	**261 J**	**449**	**336**	**276 J**	**4.87**	**113**
Kjeldahl Nitrogen	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cyanide	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Calcium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Metals - Method SW6010/6020																					
Aluminum	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Boron	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Iron	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Magnesium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Sodium	mg/kg	**23,600**	**24,700**	**20,900**	**27,200**	**26,200**	**4,590**	**4,500**	**7,200**	**7,240**	**8,550**	**18,800**	**41,500**	**119,000**	**81,300**	**74,900**	**101,000**	**108,000**	**116,000**	**12,100**	**67,500**
Strontium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Titanium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Metals - Method SW6010/6020																					
Antimony	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Arsenic	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Barium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Beryllium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cadmium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Chromium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cobalt	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Copper	mg/kg	**2,180 J**	**1,870 J**	**1,000**	**4,760**	**2,740**	**1,090**	**2,480**	**2,320**	**5,730**	**1,770**	**1,520**	**2,470**	**797**	**1,160**	**864**	**1,320 J**	**2,460 J**	**535**	**1,470**	**1,220**
Iron	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lead	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Manganese	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Mercury	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Nickel	mg/kg	**48.2 J**	**60.6 J**	**35.2**	**142**	**67.2**	**34.8**	**100**	**72.8**	**110**	**45.5**	**39**	**74.6**	**37.8**	**32.5**	**26.7**	**27.1**	**24.7**	**16.8**	**51.5**	**35.3**
Selenium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Silver	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Thallium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Vanadium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Zinc	mg/kg	**3,520 J**	**1,500 J**	**767**	**4,250**	**1,780**	**529**	**1,670**	**1,360**	**2,210**	**846**	**700**	**1,180**	**865**	**780**	**609**	**696 J**	**1,000 J**	**524**	**882**	**1830**
TCLP Metals - Method SW6020, 1311																					
Aluminum	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Arsenic	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Barium	mg/L	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U
Cadmium	mg/L	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Chromium	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Cr(VI)	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Copper	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lead	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Mercury	mg/L	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U
Selenium	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U
Silver	mg/L	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U
Zinc	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Table C-6 - Stockpile Data Summary
Maralco Property - Kent, WA

	Sample ID:	B-8-D	B-9-S	B-9-M	B-10-S	B-10-M	B-11-S	B-11-M	B-12-S	B-12-M	B-12-D	B-13-S	B-13-D	B-14-S	B-14-D	B-15-S	B-15-D	B-15-D DUP	B-16-S	B-16-M	B-16-D	B-17-S	B-17-M	B-17-D	B-18-S	COMP-1	COMP-2	COMP-3	COMP-4	COMP-5	COMP-6	COMP-7
	Date:	10/19/05	10/20/05	10/20/05	10/20/05	10/20/05	10/20/05	10/20/05	10/21/05	10/21/05	10/21/05	10/21/05	10/21/05	10/21/05	10/21/05	10/21/05	10/21/05	10/21/05	10/21/05	10/21/05	10/21/05	10/21/05	10/21/05	10/21/05	10/21/05	10/19/05	10/19/05	10/20/05	10/20/05	10/20/05	10/21/05	10/21/05
	Source Report:		*Dross Sampling and Waste Determination, URS 2006*																							*Dross Sampling and Waste Determination, URS 2006*						
	Material Pile:						Outdoor Black Dross												Outdoor Black Dross							Outdoor Black Dross						
																										B-1, B-2, B-3	B-4, B-5	B-6, B-7	B-8, B-10	B-9, B-11	B-12, B-13, B-14	B-15, B16, B17
pH	S.U.	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	**9.31 J**	**8.81 J**	**8.73**	**9.00**	**8.68**	**9.25 J**	**9.08 J**
Total Sulfide	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	56.1 U	58.5 U	23.2 U	28.1	24.8 U	27.2 U	**28.0**
Fluoride	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Potassium	mg/kg	**159,000**	**67,500**	**125,000**	**117,000**	**110,000**	**23,700**	**86,900**	**29,600**	**31,600**	**128,000**	**31,400**	**114,000**	**27,100**	**83,500**	**90,400**	**138,000**	**119,000**	**145,000**	**130,000**	**90,500**	**102,000**	**122,000**	**84,200**	**13,700**	----	----	----	----	----	----	----
Chloride	mg/kg	**186,000**	**152,000**	**209,000**	**243,000**	**221,000**	**149**	**124,000**	**211**	**3,860**	**101,000**	**36,900**	**106,000**	**157,000**	**107,000**	**139,000**	**167,000**	**206,000**	**196,000**	**259,000**	**163,000**	**167,000**	**213,000**	**136,000**	**86.8**	----	----	----	----	----	----	----
Ammonia	mg/kg	**214**	**223 J**	**300 J**	**104 J**	**107 J**	7.04 UJ	**54.3 J**	6.44 UJ	**138 J**	**243 J**	**142 J**	**309 J**	**129 J**	**325 J**	**216 J**	**334**	**322**	**84.4**	**174**	**252**	**242**	**288**	**339**	6.28 U	----	----	----	----	----	----	----
Kjeldahl Nitrogen	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cyanide	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	**1.16**	**0.74**	0.580 U	0.574 U	0.624 U	0.657 U	0.604 U
Calcium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Metals - Method SW6010/6020																																
Aluminum	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Boron	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Iron	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Magnesium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Sodium	mg/kg	**44,000**	**75,000**	**108,000**	**86,700**	**97,000**	**16,400**	**62,900**	**17,100**	**15,100**	**38,400**	**19,200**	**42,000**	**15,000**	**43,100**	**35,100**	**59,200**	**72,200**	**49,200**	**107,000**	**75,400**	**70,200**	**84,900**	**53,100**	**6,950**	----	----	----	----	----	----	----
Strontium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Titanium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Metals - Method SW6010/6020																																
Antimony	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Arsenic	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Barium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Beryllium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cadmium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Chromium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Cobalt	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Copper	mg/kg	**1,470**	**1,200**	**876**	**1,270**	**428**	**3,030**	**1,270**	**3,210**	**1,930**	**2,950**	**1,360**	**1,340**	**1,490**	**1,670**	**1,660**	**1,400**	**1,620**	**918**	**1,240**	**1,090**	**1,030**	**766**	**9,610**	**2,010**	----	----	----	----	----	----	----
Iron	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lead	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Manganese	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Mercury	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Nickel	mg/kg	**44.4**	**37.8**	**33.3**	**47.5**	**22.4**	**98.1**	**36.1**	**80.2**	**57.9**	**145**	**40.9**	**64**	**55.9**	**52.8**	**40.6**	**49.6**	**38.3**	**27.9**	**28**	**45.7**	**35.8**	**27**	**109**	**56.6**	----	----	----	----	----	----	----
Selenium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Silver	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Thallium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Vanadium	mg/kg	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Zinc	mg/kg	**885**	**761**	**589**	**931**	**356**	**3,040**	**1,200**	**3,470**	**1,650**	**2,150**	**934**	**1,400**	**1,000**	**1,400**	**1,270**	**1,200 J**	**1,850 J**	**739**	**584**	**858**	**735**	**661**	**6,730**	**1,580**	----	----	----	----	----	----	----
TCLP Metals - Method SW6020, 1311																																
Aluminum	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Arsenic	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	----	----	----	----	----	----	----
Barium	mg/L	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	1.00 U	----	----	----	----	----	----	----
Cadmium	mg/L	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	----	----	----	----	----	----	----
Chromium	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	----	----	----	----	----	----	----
Cr(VI)	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Copper	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Lead	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	----	----	----	----	----	----	----
Mercury	mg/L	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	0.00250 U	----	----	----	----	----	----	----
Selenium	mg/L	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	0.100 U	----	----	----	----	----	----	----
Silver	mg/L	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	0.0500 U	----	----	----	----	----	----	----
Zinc	mg/L	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

NOTES:
Bold - analyte detected
---- not analyzed/no data
U - not detected at listed reporting limit
NA - not available or not applicable; insufficient results to calculate
ND - not detected (reporting limit not available)
J - laboratory estimated value
ht - Laboratory analysis performed outside the method holding time.

Table C-7 - Washed Oxide Stockpile Testing Results
Maralco Property - Kent, WA

Parameter	Units	PILE-A	PILE-E	PILE-OUTDOOR-WASHED
Date		11/30/2021	11/30/2021	11/30/2021
Physical Tests (Soil)				
Moisture	%	22.4	8.7	50.2
Metals (Soil)				
Aluminum (Al)	mg/kg	151,000	144,000	110,000
Antimony (Sb)	mg/kg	21	18	47
Arsenic (As)	mg/kg	8	7	7
Barium (Ba)	mg/kg	115	112	217
Beryllium (Be)	mg/kg	3	3	10
Bismuth (Bi)	mg/kg	10	11	17
Cadmium (Cd)	mg/kg	4.4	4.3	5.5
Calcium (Ca)	mg/kg	11,600	11,100	13,800
Chromium (Cr)	mg/kg	231	214	296
Cobalt (Co)	mg/kg	4	4	5
Copper (Cu)	mg/kg	2,340	2,340	2,030
Iron (Fe)	mg/kg	9,900	10,200	6,600
Lead (Pb)	mg/kg	165	163	169
Lithium (Li)	mg/kg	52	47	196
Magnesium (Mg)	mg/kg	20,100	19,200	31,700
Manganese (Mn)	mg/kg	1,340	1,280	840
Mercury (Hg)	mg/kg	<0.5	<0.5	<0.5
Molybdenum (Mo)	mg/kg	<9.9	<9.6	<9.8
Nickel (Ni)	mg/kg	67	69	85
Phosphorus (P)	mg/kg	290	240	250
Selenium (Se)	mg/kg	<3	<3	<3
Silver (Ag)	mg/kg	1	1	2
Strontium (Sr)	mg/kg	355	300	499
Sulfur (S)	mg/kg	400	400	400
Tellurium (Te)	mg/kg	7.55	6.14	7.24
Thallium (Tl)	mg/kg	<0.5	<0.5	<0.5
Tin (Sn)	mg/kg	43.8	44.2	47.8
Titanium (Ti)	mg/kg	2,590	2,560	3,550
Tungsten (W)	mg/kg	<5	<5	5
Uranium (U)	mg/kg	<5	<5	<5
Vanadium (V)	mg/kg	199	197	158
Zinc (Zn)	mg/kg	1,950	1,860	1,670
Hg + Cd + Tl	mg/kg	5.4	5.3	6.5
As+Ni+Co+Mn+Zn+Pb+Sb+V+Be	mg/kg	3757	3601	2991

NOTES:

% = percent

mg/kg - milligrams per kilogram

For < values, used numerical value regardless for summation purposes.

Appendix C - Table C-8 COI - Groundwater Data Summary
Maralco Property - Kent, WA

Analyte (ug/L)	Screening Level	Max Value	Detection above SL	Is this a COI	MW-1 10/2/90	MW-1 9/14/22	MW-2 10/1/90	MW-2 1/24/03	DUP OF MW-2 1/24/03	MW-2 1/24/03	MW-2 9/14/22	MW-3 10/1/90	MW-3 1/24/03	MW-3A 7/26/17	MW-3A 6/3/21	MW-3A 9/13/22	MW-4 10/1/90	MW-4 1/24/03	MW-4 9/13/22	MW-4A 7/26/17	MW4A 6/3/21	DUP OF MW4A 6/3/21	MW-5 1/24/03	MW5A 7/26/17	MW5A 6/3/21	MW-5R 9/13/22	MW6 7/26/17	MW6 6/3/21	MW-6 9/13/22
Aluminum, total	302	363,000	yes	yes	**17,800**	**33.0**	**2,350**	**600**	**860**	**174**	**65.0**	**3,850**	**820**	**5,800**	**2,160**	**993**	**27,500**	**3,600**	**159**	**61**	100 U	100 U	**28,000**	**93,000**	**32,200**	**1,500**	**130**	**273**	**308**
Aluminum, dissolved	302	606	yes	yes	NA	**5.84**	NA	NA	NA	NA	1 U	NA	NA	NA	NA	**493**	NA	NA	**8.50**	NA	NA	NA	NA	NA	NA	**72.3**	NA	NA	**61**
Antimony, total	5.6	4	no	no	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2 U	NA	NA	NA	NA	NA	2 U	2 U	NA	NA	4 U	NA	NA	2 U	NA
Arsenic, total	8.0	73	yes	yes	**7.96**	1 U	**5.3**	ND	ND	10 U	**1.69**	**5.38**	**40**	5 U	1 U	**1.03** U	**17.1**	**19**	**12.9**	5 U	**9.45**	**9.37**	**11**	**6**	**73.2**	**12.6**	5 U	**18.3**	**35.3**
Arsenic, dissolved	8.0	34	yes	yes	NA	1 U	NA	NA	NA	NA	5 U	NA	NA	NA	NA	5 U	NA	NA	**11.0**	NA	NA	NA	NA	NA	NA	**12.6**	NA	NA	**33.8**
Barium	1,000	3,850	yes	yes	**109**	NA	**33**	ND	ND	**5.65**	NA	**3,530**	**2,500**	50 U	NA	NA	**605**	**77**	NA	50 U	NA	NA	**170**	50 U	NA	NA	50 U	NA	NA
Cadmium, total	0.42	10	yes	yes	ND	1 U	ND	ND	ND	2 U	1 U	ND	ND	5 U	1 U	1 U	ND	ND	10 U	5 U	1 U	1 U	ND	5 U	**4.60**	1 U	5 U	1 U	10 U
Cadmium, dissolved	0.42	10	yes	yes	NA	1 U	NA	NA	NA	NA	1 U	NA	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	NA	NA	NA	NA	1 U	NA	NA	1 U
Chromium, total	72	124	yes	yes	**16**	1 U	ND	ND	ND	10 U	1 U	ND	**14**	10 U	1 U	**2.99**	**25**	**22**	**2.99**	10 U	1 U	**1.01**	**38**	**10**	**98.6**	**3.18**	10 U	**2.13**	**2.84**
Chromium, dissolved	72	10	no	no	NA	1 U	NA	NA	NA	NA	1 U	NA	NA	NA	NA	**1.90**	NA	NA	**3.66**	NA	NA	NA	NA	NA	NA	**3.06**	NA	NA	**3.44**
Cobalt, total	4.8	35	yes	yes	NA	**1.15**	NA	NA	NA	NA	**2.51**	NA	NA	NA	1 U	1 U	NA	NA	1 U	NA	1 U	1 U	NA	NA	**34.6**	**2.74**	NA	**2.77**	**2.03**
Cobalt, dissolved	4.8	18	yes	yes	NA	**1.12**	NA	NA	NA	NA	**2.70**	NA	NA	NA	NA	1 U	NA	NA	1 U	NA	NA	NA	NA	NA	NA	**2.84**	NA	NA	**2.58**
Copper, total	1.2	589	yes	yes	NA	5 U	NA	NA	NA	NA	5 U	NA	NA	NA	**6.73**	**12.4**	NA	NA	**5.11**	NA	**8.56**	**9.51**	NA	NA	**589**	5 U	NA	**19.0**	5 U
Copper, dissolved	1.2	50	yes	yes	NA	5 U	NA	NA	NA	NA	5 U	NA	NA	NA	NA	5 U	NA	NA	5 U	NA	NA	NA	NA	NA	NA	5 U	NA	NA	5 U
Iron, total	300	157,000	yes	yes	NA	**93.6**	NA	NA	NA	NA	**9,430**	NA	NA	NA	**304**	**1,150**	NA	NA	**48,600**	NA	**62,900**	**64,500**	NA	NA	**157,000**	**2,190**	NA	**47,700**	**54,200**
Iron, dissolved	300	74,300	yes	yes	NA	5 U	NA	NA	NA	NA	**9,410**	NA	NA	NA	NA	**695**	NA	NA	**48,000**	NA	NA	NA	NA	NA	NA	**1,980**	NA	NA	**49,900**
Lead, dissolved	2.1	50	yes	yes	NA	50 U	NA	NA	NA	NA	1 U	NA	NA	NA	NA	1 U	NA	NA	5 U	NA	NA	NA	NA	NA	NA	1 U	NA	NA	5 U
Lead, total	2.1	54	yes	yes	**5.32**	1 U	**2.0**	**1.2**	**1.4**	**2.59**	1 U	**1.0**	**2.7**	2 U	1 U	1 U	**9.51**	**9.0**	**1.24** U	2 U	1 U	1 U	**8.0**	**2**	**53.7**	1 U	2 U	1 U	1 U
Manganese, total	50	2,750	yes	yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**37.5**	NA	NA	NA	NA	NA	**2,660**	**2,750**	NA	NA	**2,510**	NA	NA	**1,590**	NA
Mercury	0.012	1	yes	yes	**0.12**	NA	ND	ND	ND	0.2 U	NA	**0.11**	ND	0.5 U	NA	NA	**0.077**	ND	NA	0.5 U	NA	NA	ND	0.5 U	NA	NA	0.5 U	NA	NA
Nickel, total	11	77	yes	yes	NA	**2.97**	NA	NA	NA	NA	**4.97**	NA	NA	NA	1 U	**1.66**	NA	NA	1 U	NA	**1.06**	**1.06**	NA	NA	**76.7**	**5.26**	NA	**2.71**	**1.26**
Nickel, dissolved	11	19	yes	yes	NA	1 U	NA	NA	NA	NA	**5.02**	NA	NA	NA	NA	**1.13**	NA	NA	1 U	NA	NA	NA	NA	NA	NA	**4.81**	NA	NA	**1.32**
Silver	0.17	10	yes	yes	ND	NA	ND	ND	ND	5 U	NA	ND	ND	10 U	NA	NA	ND	ND	NA	10 U	NA	NA	ND	10 U	NA	NA	10 U	NA	NA
Selenium	3.1	50	yes	yes	ND	NA	ND	ND	ND	10 U	NA	ND	**43**	50 U	NA	NA	ND	ND	NA	50 U	NA	NA	ND	50 U	NA	NA	50 U	NA	NA
Zinc, total	24	431	yes	yes	NA	5 U	NA	NA	NA	NA	5 U	NA	NA	NA	5 U	5 U	NA	NA	5 U	NA	5 U	5 U	NA	NA	**431**	5 U	NA	5 U	5 U
Zinc, dissolved	24	155	yes	yes	NA	**2.79**	NA	NA	NA	NA	5 U	NA	NA	NA	NA	5 U	NA	NA	5 U	NA	NA	NA	NA	NA	NA	5 U	NA	NA	5 U
Chloride (mg/L)	230	9,100	yes	yes	NA	**20.3**	NA	**9.64**	**8.89**	**3.89**	**12.9**	NA	**9100**	**78**	**14.2**	**17.2**	NA	**92.0**	**350**	**290**	**275**	**280**	**442**	**150**	**81.3**	**145**	**270**	**207**	**156**
Fluoride (mg/L)	0.96	53	yes	yes	NA	0.5 U	NA	ND	ND	**0.0807**	0.5 U	NA	ND	**27**	**19.8**	**14.4**	NA	**6.89**	**1.39**	0.200 U	0.800 U	0.800 U	**2.10**	**0.230**	**1.92**	**0.53**	**4.1**	**16.0**	**22.2**
Nitrate-Nitrogen (mg/L)	10	2	no	no	NA	NA	NA	ND	ND	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	**1.50**	NA	NA	NA	NA	NA	NA
Ammonia-Nitrogen (mg/L)	---	2,120	no	no	**0.175**	**0.076**	**0.124**	**1.26**	**0.433**	NA	**0.208**	**14.638**	**33.7**	NA	NA	**493**	**6.683**	**1.71**	**3.99**	NA	NA	NA	**1.52**	NA	NA	**5.01**	NA	NA	**5.91**
TPH-Gasoline	1000	100	no	no	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	100 U	100 U	NA	NA	NA	NA	NA	100 U	NA
Diesel Range Oil - SGC	500	12,000	yes	yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	50 U	50 U	NA	NA	NA	NA	NA	50 U	NA
Residual Range Oil - SGC	500	1,700	yes	yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	250 U	250 U	NA	NA	NA	NA	NA	250 U	NA
Diesel Range Oil	500	4,500	yes	yes	NA	NA	NA	NA	NA	82.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	20 U	**200** x	**210** x	NA	NA	NA	NA	NA	50 U	NA
Residual Range Oil	500	430	no	no	NA	NA	NA	NA	NA	165 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	50 U	250 U	250 U	NA	NA	NA	NA	NA	250 U	NA
Benzene	0.44	ND	yes	yes	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	12	1.00	no	no	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	53	1.00	no	no	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Xylenes	57	3.00	no	no	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	100	0.10	no	no	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	30	0.46	no	no	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NC	0.10	no	no	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	0.02	0.10	yes	yes	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	10	0.48	no	no	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	8.8	0.61	no	no	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NC	0.10	no	no	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	0.015	0.10	yes	yes	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	0.168	2.38	yes	yes	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	32	0.50	no	no	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	100	0.50	no	no	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total cPAH (ND = 0)	0.004	0.08	yes	yes	ND	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(A)Anthracene	0.00016	0.10	yes	yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(A)Pyrene	0.00002	0.10	yes	yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(B)Fluoranthene	0.00016	0.10	yes	yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(G,H,I)Perylene	na	0.10	no	no	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(K)Fluoranthene	0.0016	0.10	yes	yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.0098	0.10	yes	yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(A,H)Anthracene	0.00002	0.10	yes	yes	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Bold - analyte detected
ug/L - micrograms per liter
NC - no criterion
NA - Not analyzed
J - Reported value is an estimate.
U - Compound is not detected at or above reporting limit
ND - not detected (reporting limit not readily available)
x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

Appendix C - Table C-8 COI - Groundwater Data Summary
Maralco Property - Kent, WA

Analyte (ug/L)	Screening Level	MW-7 9/13/22	MW-8 9/14/22	B-1-GW 10/27/16	B-2-GW 11/2/16	B-3-GW 11/2/16	B-4-GW 11/2/16	B-6-GW 11/2/16	B-5-GW 11/2/16	DPT-1-0521 5/24/21	DPT-2-0521 5/24/21	DPT-14 8/29/22	DPT-15 8/29/22	DPT-16 8/30/22	DPT-17 8/30/22	DPT-18 8/31/22	DPT-19 8/31/22	DPT-20 8/31/22	DPT-21/ DUP02 8/31/22	DPT-22 8/31/22	SB-UST-01 8/29/22	SB-UST-02 8/29/22	SB-UST-03 8/29/22
Aluminum, total	302	**1,270**	**13.4**	**151,000**	**159,000**	**11,000**	**363,000** J	**43,500**	**7,880**	**405**	**1,160**	0.3 U	**1,660**	**348**	NA	**553**	**3,720**	**84.5**	1800 / 632	**634**	**9,350**	**3,120**	**1,100**
Aluminum, dissolved	302	**43**	1 U	NA	NA	NA	NA	NA	NA	NA	NA	1 U	**1.10**	**2.37**	NA	**2.14**	**3.74**	**1.67**	**1.67** / 1 U	1 U	**606**	**15.5**	**7.64**
Antimony, total	5.6	NA	NA	NA	NA	NA	NA	NA	NA	2 U	2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic, total	8.0	**5.84**	10 U	**68.6**	**45.2**	**33.8**	**65.9**	**64**	**43.9**	**13.3**	**13.6**	**8.31**	**22.1**	**3.23**	NA	**5.12**	**17.4**	**6.97**	**3.46 / 3.45**	**1.16**	**3.12**	**35.3**	**20.3**
Arsenic, dissolved	8.0	**6.17**	10 U	NA	NA	NA	NA	NA	NA	NA	NA	**7.90**	**18.0**	**1.55**	NA	**3.82**	**8.93**	**6.64**	**2.83 / 2.95**	1 U	5 U	**32.2**	**19.7**
Barium	1,000	NA	NA	**608**	**590**	**164**	**676**	**325**	**3,850**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium, total	0.42	1 / 1 U	10 U	**1.13** J	**1.5** J	2 U	**1.56** J	2 U	2 U	1 U	1 U	1 U	10 U	1 U	NA	1 U	5 U	1 U	1 U / 1 U	1 U	1 U	1 U	10 U
Cadmium, dissolved	0.42	1 / 1 U	10 U	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	NA	1 U	1 U	1 U	1 U / 1 U	1 U	1 U	1 U	1 U
Chromium, total	72	**2.68**	10 U	**86.6**	**124**	**15.4**	**108**	**44.3**	**18.7**	**2.41**	**1.74**	**1.19**	**7.44**	**1.65**	NA	**2.68**	**26.7**	**1.11**	**2.19 / 2.00**	**1.66**	**6.73**	**7.97**	**3.53**
Chromium, dissolved	72	**2.13**	10 U	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	NA	2 U	2 U	2 U	1 U / 1 U	1 U	**4.72**	**1.32**	**1.51** U
Cobalt, total	4.8	**1.78**	**14.9**	NA	NA	NA	NA	NA	NA	**4.29**	1 U	1 U	**5.78**	**1.67**	NA	**1.60**	**21.7**	**1.18**	**1.51 / 1.46**	**1.17**	**1.51**	**4.38**	**1.71**
Cobalt, dissolved	4.8	**1.89**	**17.5**	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	NA	2 U	2 U	2 U	1 U / 1 U	1 U	1 U	1 U	1 U
Copper, total	1.2	5 / 5 U	50 U	NA	NA	NA	NA	NA	NA	**11.1**	**9.63**	5 U	**22.4**	**6.20**	NA	**9.32**	**57.3**	5 U	5 U/ 5 U	5 U	**13.0**	**21.1**	**11.2**
Copper, dissolved	1.2	5 / 5 U	50 U	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	NA	10 U	10 U	10 U	5 U / 5 U	5 U	5 U	5 U	5 U
Iron, total	300	**11,100**	**75,400**	NA	NA	NA	NA	NA	NA	**32,200**	**10,300**	**33,900**	**84,700**	**33,800**	NA	**29,800**	**91,000**	**34,100**	**33,200 / 35,300**	**20,000**	**13,500**	**45,500**	**64,900**
Iron, dissolved	300	**11,100**	**74,300**	NA	NA	NA	NA	NA	NA	NA	NA	**32,500**	**50,400**	**27,400**	NA	**24,000**	**29,800**	**32,700**	**27900 / 29,400**	**17,600**	**8,760**	**30,000**	**57,900**
Lead, dissolved	2.1	1 / 1 U	10 U	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	1 U	NA	1 U	1 U	1 U	1 U / 1 U	1 U	1 U	1 U	1 U
Lead, total	2.1	1 / 1 U	10 U	**41.9**	**49.3**	**6.73**	**28.5**	**40.3**	**9.4**	1 U	1	1 U	**3.47**	1 U	NA	**1.66**	**7.51**	1 U	1 U / 1 U	1 U	**1.94**	**3.09**	**1.62**
Manganese, total	50	NA	NA	NA	NA	NA	NA	NA	NA	**2,720**	**379**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	0.012	NA	NA	**0.0726** J	**0.234**	0.2 U	**0.0681** J	**0.338**	**0.0502** J	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel, total	11	**2.46**	**20.0**	NA	NA	NA	NA	NA	NA	**8.14**	**1.02**	**1.52**	**7.10**	**2.34**	NA	**3.10**	**26.6**	**1.63**	**3.10 / 2.93**	**2.46**	**3.59**	**7.26**	**2.79**
Nickel, dissolved	11	**2.03**	**19.2**	NA	NA	NA	NA	NA	NA	NA	NA	**1.30**	1 U	**1.67**	NA	2 U	2 U	2 U	**1.09 / 1.17**	**1.60**	**1.62**	1 U	**1.20**
Silver	0.17	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	3.1	NA	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc, total	24	5 / 5 U	**130**	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	**20.4**	5 U	NA	**7.15**	**91.3**	5 U	**6.14 / 5.83**	5 U	**6.65**	**18.3**	**6.30**
Zinc, dissolved	24	5 / 5 U	**155**	NA	NA	NA	NA	NA	NA	NA	NA	5 U	5 U	5 U	NA	10 U	10 U	10 U	5 U / 5 U	5 U	5 U	5 U	5 U
Chloride (mg/L)	230	**482**	**3,960**	**265**	**177**	**341**	**109**	**111**	**8,970**	**224**	**51.6**	**20.1**	**183**	**139**	NA	**5.33**	**3.42**	**2.47**	**6.02 / 6.08**	**4.81**	**265**	**271**	**693**
Fluoride (mg/L)	0.96	**8.0**	**0.5** U	**0.428**	**0.850**	**0.496**	**5.09**	**52.9**	**7.74**	0.800 U	**1.38**	**1.36**	**0.14**	**0.17**	NA	0.05 U	**0.06**	0.05 U	**0.05 / 0.05**	**0.12**	**16.3**	**0.78**	**0.27**
Nitrate-Nitrogen (mg/L)	10	NA	NA	**0.488**	**0.177**	**0.0556** J	**0.363**	0.100 U	0.100 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ammonia-Nitrogen (mg/L)	---	**4.9**	**35.4**	**4.070**	**4.570**	**7.030**	**4.150**	**0.516**	**39.8**	NA	NA	**2.72**	**3.31**	**2120**	NA	**0.182**	**0.286**	**0.072**	**0.077 / 0.086**	**0.088**	**0.304**	**5.21**	**5.40**
TPH-Gasoline	1000	NA	NA	NA	NA	NA	NA	NA	NA	100 U	100 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Diesel Range Oil - SGC	500	NA	NA	**160** J	250 U	**235** J	250 U	250 U	250 U	**850** x	**12,000**	NA	NA	NA	NA	NA	NA	NA	NA	NA	**91 x**	**880 x**	**290 x**
Residual Range Oil - SGC	500	NA	NA	500 U	500 U	500	500 U	500 U	500 U	**370** x	**1,700**	NA	NA	NA	NA	NA	NA	NA	NA	NA	250 U	250 U	250 U
Diesel Range Oil	500	NA	NA	NA	NA	NA	NA	NA	NA	**140** x	**4,500**	NA	NA	NA	NA	NA	NA	NA	NA	NA	50 U	50 U	50 U
Residual Range Oil	500	NA	NA	NA	NA	NA	NA	NA	NA	250 U	**430** x	NA	NA	NA	NA	NA	NA	NA	NA	NA	250 U	250 U	250 U
Benzene	0.44	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene	12	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	53	NA	NA	NA	NA	NA	NA	NA	NA	1 U	1 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Xylenes	57	NA	NA	NA	NA	NA	NA	NA	NA	3 U	3 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	100	NA	NA	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	30	NA	NA	**0.112**	0.05 U	**0.459**	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	**0.056**	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	NC	NA	NA	**0.0136** J	0.05 U	**0.0735** J	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	0.02	NA	NA	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	10	NA	NA	**0.0431** J	0.05 U	**0.483**	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	**0.034**	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	8.8	NA	NA	**0.167** J	**0.0429** J	**0.614**	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NC	NA	NA	**0.0124** J	0.05 U	**0.0249** J	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	0.015	NA	NA	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
1-Methylnaphthalene	0.168	NA	NA	**0.147** J	**0.0167** J	**2.38**	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	32	NA	NA	**0.0585** J	**0.0165** J	**0.226** J	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA	NA
2-Chloronaphthalene	100	NA	NA	0.25 U	0.25 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total cPAH (ND = 0)	0.004	NA	NA	**0.0812**	0.05 U	0.05 U	0.05 U	0.05 U	0.1 U	NA	NA	NA	NA	NA	0.2 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(A)Anthracene	0.00016	NA	NA	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(A)Pyrene	0.00002	NA	NA	**0.0812**	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(B)Fluoranthene	0.00016	NA	NA	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(G,H,I)Perylene	na	NA	NA	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.04 U	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(K)Fluoranthene	0.0016	NA	NA	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	0.0098	NA	NA	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.02 U	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(A,H)Anthracene	0.00002	NA	NA	0.05 U	0.05 U	0.1 U	0.1 U	0.1 U	0.1 U	NA	NA	NA	NA	NA	0.04 U	NA	NA	NA	NA	NA	NA	NA	NA

Bold - analyte detected
ug/L - micrograms per liter
NC - no criterion
NA - Not analyzed
J - Reported value is an estimate.
U - Compound is not detected at or above reporting lir
ND - not detected (reporting limit not readily available
x - The sample chromatographic pattern does not rese

Appendix C - Table C-9 COI - Surface water Data Summary
Maralco Property - Kent, WA

Location	Sample ID	Date Collected	Analyte:	Metals																		
				Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Nickel	Selenium	Silver	Thallium	Tin
			Screening Level:	302 *	5.6	8	1000	4	0.42	71	4.8	11	300	2.1	NC	50	0.01	11	3.1	0.17	0.062	9600
			Max Value	216000	5.80	107.00	3590	4.30	38.60	18.00	70	2150	78000	1410	176000	24200	1.40	121	0.00	7.40	304	104
			Is this a COI?	yes	yes	yes	yes	no	yes	no	yes	yes	yes	yes	no	yes	yes	yes	no	yes	yes	no
On-Property Ditches	A2	6/25/87	Total	NA	2 U	1 U	NA	10 U	5 U	10 U	NA	**190**	**NA**	50 U	NA	NA	0.2 U	50 U	1 U	10 U	2U	NA
	SW-3	5/10/90	Total	**24000**	100 U	100 U	**3590**	2 U	**28.9**	5 U	1500 U	**2090**	**78000**	**134**	**176000**	**24200**	0.02 U	40 U	200 U	**7.4**	200 U	5000 U
	SW-3	5/10/90	Dissolved	**25600**	200 U	**107**	**3480**	2 U	**38.0**	5 U	**70**	**2150**	**77000**	**1270**	**192**	**24.9**	**0.21**	**44**	200 U	3 U	**304**	NA
	SW-3R	1/29/91	Total	**2750**	NA	NA	**1150**	NA	NA	5 U	NA	**74**	NA	1 U	**60**	**6090**	NA	NA	NA	NA	NA	NA
	SW-3R	1/29/91	Dissolved	**803**	NA	NA	**947**	NA	NA	10 U	NA	**93**	NA	**1410**	**63800**	**5780**	NA	NA	NA	NA	NA	NA
	SW-4	5/10/90	Total	**315**	1 U	**2**	**48.7**	2 U	**0.3**	5 U	15 U	**11**	**16.6**	**4**	**5850**	**1040**	0.02 U	40 U	2 U	3 U	2.5 U	**104**
	SW-4	5/10/90	Dissolved	**55**	NA	1.5 U	**33.3**	2 U	0.1 U	5 U	15 U	2 U	**3130**	**2**	**6**	**583**	0.02 U	40 U	NA	3 U	2.5 U	40 U
	SW-4R	1/29/91	Total	**254**	NA	NA	**47.9**	NA	NA	5 U	NA	**13**	NA	**1**	**4**	**446**	NA	NA	NA	NA	NA	NA
	SW-4R	1/29/91	Dissolved	200 U	NA	NA	**75**	NA	NA	10 U	NA	25 U	NA	5 U	**4190**	**379**	NA	NA	NA	NA	NA	NA
	SW-6	5/10/90	Total	**662**	200 U	100 U	**1200**	2 U	**33.7**	5 U	1500 U	**268**	**796**	180 U	**159000**	**5260**	**1.4**	40 U	200 U	**5.1**	250U	5000 U
	SW-6	5/10/90	Dissolved	**420**	200 U	100 U	**1140**	2 U	**38.6**	5 U	15 U	**364**	**15**	60 U	**171**	**5350.0**	0.02 U	40 U	200 U	3 U	250 U	4000 U
	SW-6R	1/29/91	Total	**4200**	NA	NA	**1250**	NA	NA	5 U	NA	**146**	NA	2 U	**64**	**5050**	NA	NA	NA	NA	NA	NA
	SW-6R	1/29/91	Dissolved	**1310**	NA	NA	**1040**	NA	NA	10 U	NA	**80**	NA	**440**	**72200**	**5100**	NA	NA	NA	NA	NA	NA
	SW-10	10/28/16	Total	**730**	NA	10 U	**481**	NA	**2.13**	**1.91**	NA	NA	NA	5 U	NA	NA	0.2 U	NA	10 U	5 U	NA	NA
	SW-11	10/28/16	Total	**618**	NA	10 U	**15.5**	NA	2 U	**1.41**	NA	NA	NA	**2**	NA	NA	0.2 U	NA	10 U	5 U	NA	NA
	SW-900 (Dup of SW-11)	10/28/16	Total	**373**	NA	10 U	**14.4**	NA	2 U	10 U	NA	NA	NA	5 U	NA	NA	0.2 U	NA	10 U	5 U	NA	NA
Storm-water Pond	SW-7	5/10/90	Total	**216000**	**1.2**	**83**	**33.9**	**2.2**	**11.1**	**18**	**51**	**268**	**3230**	**14**	**31700**	**3170**	**0.06**	**121**	2 U	3 U	2.5 U	50 U
	SW-7	5/10/90	Dissolved	**207000**	1 U	1.5 U	**32**	**4.3**	**10.9**	9 U	**46**	**308**	**716**	**16**	**32**	**3195**	0.02 U	**121**	2 U	3 U	2.5 U	50 U
	SW-7R	1/29/91	Total	**1930**	NA	NA	**27.7**	NA	NA	5 U	NA	**27**	NA	**3**	**18**	**208**	NA	NA	NA	NA	NA	NA
	SW-7R	1/29/91	Dissolved	**279**	NA	NA	**70**	NA	NA	10 U	NA	25 U	NA	5 U	**19900**	**211**	NA	NA	NA	NA	NA	NA
S. 202nd ROW Ditch	A1	6/25/87		NA	**5.8**	**3.8**	NA	10 U	5 U	10 U	NA	**180**	NA	**87**	NA	NA	0.2 U	50 U	1 U	10 U	2U	NA
	SW-8	5/10/90	Total	**5620**	1 U	1.5 U	**22.7**	2 U	**0.59**	**5**	15 U	**35.6**	**23200**	**8**	**6230**	**747**	0.02 U	40 U	2 U	3 U	2.5 U	50 U
	SW-8	5/10/90	Dissolved	**85**	1 U	1.5 U	**9.1**	2 U	**0.1**	5 U	15 U	**6**	**2530**	**1**	**5.71**	**41.5**	0.02 U	40 U	2 U	3 U	2.5 U	50 U
	SW-8R	1/29/91	Total	**754**	NA	NA	**39.8**	NA	NA	5 U	NA	**18**	NA	**3**	**4.56**	**485**	NA	NA	NA	NA	NA	NA

Notes:

Bold - analyte detected

ug/L - micrograms per liter

NC - no criterion

NA - Not analyzed

U - Compound is not detected at or above reporting limit

Appendix C - Table C-9 COI - Surface water Data Summary
Maralco Property - Kent, WA

Location	Sample ID	Date Collected	Analyte:	Vanadium	Zinc	Chloride	Fluoride	Nitrate	Ammonia Nitrogen	Total Kjedahl Nitrogen	Cyanide	VOCs	SVOCs
				Geochemical Parameters (µg/L)									
			Screening Level:	80	24	230,000	960	10,000	NC	NC	1.9	Varies	Varies
			Max Value	7.00	2680	24900000	6630	10200	188200	162890	108		
			Is this a COI?	no	yes	yes	yes	no	no	no	yes	no	no
On-Property Ditches	A2	6/25/87	Total	NA	**160**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-3	5/10/90	Total	4 U	**2610**	NA	NA	NA	**188200**	**162890**	**20**	NA	NA
	SW-3	5/10/90	Dissolved	4 U	**2680**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-3R	1/29/91	Total	NA	**285**	**17,600,000**	NA	NA	**64500**	NA	**65**	NA	NA
	SW-3R	1/29/91	Dissolved	NA	**256**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-4	5/10/90	Total	4 U	**56.1**	NA	NA	NA	500 U	**2060**	4 U	NA	NA
	SW-4	5/10/90	Dissolved	4 U	**19.1**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-4R	1/29/91	Total	NA	**96.3**	**643,000**	NA	NA	**2130**	NA	10 U	NA	NA
	SW-4R	1/29/91	Dissolved	NA	**68**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-6	5/10/90	Total	4 U	**65.4**	NA	NA	NA	**108400**	**93830**	**13**	NA	NA
	SW-6	5/10/90	Dissolved	4 U	**52**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-6R	1/29/91	Total	NA	**198**	**24,900,000**	NA	NA	**83500**	NA	**108**	NA	NA
	SW-6R	1/29/91	Dissolved	NA	**219**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-10	10/28/16	Total	NA	NA	**8,940,000**	**6,630**	**10,200**	**2,680**	NA	NA	NA	NA
	SW-11	10/28/16	Total	NA	NA	**379,000**	**4,170**	**288**	**62**	NA	NA	NA	NA
	SW-900 (Dup of SW-11)	10/28/16	Total	NA	NA	**367,000**	**4,210**	**288**	**60**	NA	NA	NA	NA
Storm-water Pond	SW-7	5/10/90	Total	**7**	**1740**	NA	NA	NA	**600**	**880**	4 U	ND	ND
	SW-7	5/10/90	Dissolved	4 U	**1810**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-7R	1/29/91	Total	NA	**50.2**	**1,130,000**	NA	NA	**680**	NA	10 U	NA	NA
	SW-7R	1/29/91	Dissolved	NA	20 U	NA	NA	NA	NA	NA	NA	NA	NA
S. 202nd ROW Ditch	A1	6/25/87		NA	**150**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-8	5/10/90	Total	**4.6**	**95.6**	NA	NA	NA	500 U	**1600**	4 U	ND	ND
	SW-8	5/10/90	Dissolved	4 U	**12.2**	NA	NA	NA	NA	NA	NA	NA	NA
	SW-8R	1/29/91	Total	NA	**94.1**	**440,000**	NA	NA	**1230**	NA	10 U	NA	NA

Notes:
Bold - analyte detected
ug/L - micrograms per liter
NC - no criterion
NA - Not analyzed
U - Compound is not detected at or above reporting limit

Appendix D

Quality Assurance Project Plan

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

APPENDIX D: QUALITY ASSURANCE PROJECT PLAN

Maralco Site
7730 South 202nd Street, Kent WA

Agreed Order No. DE 22343
Facility Site Identification No. 2067
Cleanup Site Identification No. 5055

January 27, 2025

Prepared for:

SUPPLEMENTAL REMEDIAL INVESTIGATION WORK PLAN

APPENDIX D: QUALITY ASSURANCE PROJECT PLAN

Maralco Site
7730 South 202nd Street, Kent WA

January 27, 2025

Prepared by:

CRETE
CONSULTING, INC.

Title Page with Approvals/Distribution List

Supplemental Remedial Investigation Work Plan
Appendix D: Quality Assurance project plan
7730 202nd Street, LLC (Bridge)
Maralco Site – 7730 South 202nd Street, Kent WA
January 27, 2025

Project Manager ______________________________ 1/27/2025

Grant Hainsworth, CRETE   Date

Quality Assurance Officer ______________________________ 1/27/2025

Jamie C. Stevens, CRETE   Date

Ecology Project Manager ______________________________ 2/3/2025

Tena Seeds, Ecology   Date

Bridge Project Manager ______________________________ 1/27/2025

Nick Siegel, 7730 202nd Street, LLC   Date

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Acronyms and Abbreviations

COI	constituent of interest
CLP	Contract Laboratory Program
cPAH	carcinogenic polyaromatic hydrocarbon
DQO	data quality objective
DRO	Diesel Range Organic Hydrocarbon
EDD	electronic data deliverable
EPA	United States Environmental Protection Agency
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
MDL	method detection limit
MRL	method reporting limit
MS/MSD	matrix spike/matrix spike duplicate
ORO	Organic Range Organic Hydrocarbon
PARCC	precision, accuracy, representativeness, comparability, and completeness
PDF	portable document format
PQL	practical quantitation limit
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RPD	relative percent difference
Site	Maralco Site
SRIWP	Supplemental Remedial Investigation Work Plan
SVOC	semi-volatile organic compound
TPH	total petroleum hydrocarbons
VOC	volatile organic compound
WAC	Washington Administrative Code

1 Introduction

1.1 Background

This Quality Assurance Project Plan (QAPP) accompanies the Supplemental Remedial Investigation Work Plan (SRIWP) for the Maralco Site (Site) located at 7730 South 202nd Street in Kent, Washington (King County Parcel Number 6315000300).

This QAPP describes quality assurance/quality control (QA/QC) procedures associated with collecting, analyzing, validating, and using data identified in the SRIWP. This QAPP uses Ecology's Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies, December 2016, Publication No. 04-03-030 (Ecology 2016b).

The history, constituents of interest (COIs), screening levels, and other background information for the Site are described in the SRIWP (CRETE 2024).

1.2 Project Description

This QAPP pertains to the following investigation tasks described in the SRIWP (where the goals and objectives of this work are defined):

- Fieldwork
- Laboratory analyses
- Data validation and management
- Data analysis and report preparation.

<u>Fieldwork- Soil, Groundwater and Surface Water Sampling</u>

Soil, groundwater and surface water testing will include collection of soil and water samples for analysis of COIs. Groundwater field measurements will be taken for pH, specific conductance, temperature, oxidation-reduction potential, and dissolved oxygen during well purging and as an indicator that samples are collected under stable conditions. Groundwater samples for COIs will be collected from temporary well screens installed in direct push locations and from permanent monitoring wells.

Soil, groundwater and surface water samples will be analyzed for the analytes in Tables 2 and 3. These tables also include reporting limits and analysis methods.

<u>Laboratory Analyses</u>

Analyses will be completed using the laboratory methods listed in Tables 2 and 3.

Level 2B laboratory data reports will be provided in portable document format (PDF), and electronic data deliverables (EDDs) will be provided in a text or Microsoft Excel file format suitable for import into the Ecology Environmental Information Management System (EIM) for all samples.

Data Verification and Management
Data verification will be completed by the Quality Assurance Officer for data generated in the field and laboratory prior to database import.

The accuracy and completeness of the final database will be verified by the Quality Assurance Officer. Following verification, data collected during the remedial investigation will be uploaded to Ecology's EIM database.

Data Analysis and Report Preparation
The data collected during the remedial investigation will be evaluated for compliance with the proposed screening levels identified in the SRIWP. The results will be documented in the RI report.

1.3 Roles and Schedule

1.3.1 Roles and Responsibilities

Roles and responsibilities are defined in Table 1.

Friedman & Bruya will perform the chemical analyses of the all samples collected by CRETE Consulting, Inc. Select groundwater samples may be sent to Brooks Applied Labs (Seattle Washington) for additional metals analysis due to possible interference from salts (chloride) measured at the site. Results of chloride in groundwater will inform if samples are sent to Brooks Applied Labs. These methods are included on Table 3.

1.3.2 Schedule

This SRIWP expected to be implemented in the winter of 2024. The schedule will be based on approval of the SRIWP by Ecology.

Samples will be delivered to the laboratory within applicable holding times and within 24 hours of collection time, when possible. Samples will be delivered to the laboratory by field personnel or arranged for pickup by laboratory couriers. Chain-of-custody procedures will be maintained during transit to the laboratory. Sample turnaround times will be determined at the time of sampling and may vary between 24 hours and 2 weeks depending on construction sequencing and schedule.

Data verification and validation will be completed prior to entry into the project database.

Data will be uploaded to the Ecology EIM database when the draft RI Report is submitted to Ecology.

2 Quality Objectives

The overall data quality objective for this project is the collection of representative data of known and acceptable quality. The QA procedures and measurements that will be used for this project are based on EPA guidance (EPA 2020). Parameters related to precision, accuracy or bias, representativeness, completeness, and comparability (PARCC) will be used to assess the quality of the data (Table 4).

2.1 Precision

Precision is a measure of how closely one result matches another result expected to have the same value. Field precision will be assessed by collecting one duplicate sample for every ten field samples. Field precision is determined by the relative percent difference (RPD) between a sample and its duplicate. However, results from the analysis of a duplicate sample also test laboratory precision. Therefore, the RPD between the sample and the field replicate provides an indication of both the field and laboratory precision. The tolerance limit for percent differences between field duplicates will be ± 50 percent for soil and water samples. If the RPDs exceed these limits, a replicate sample may be run to verify laboratory precision. If any RPD exceedance is linked to field sampling, the Field Manager will recheck field sampling procedures and identify the problem. Resampling and analysis may be required.

Laboratory precision can be measured through the evaluation of laboratory control samples/duplicates (LCS/ LCSD). The laboratory will perform the analysis of one set of LCS/LCSD samples for every 20 samples. Laboratory precision will be evaluated by the RPD for each analyte between LCS/LCSD samples.

$$RPD = \frac{ABS(R1-R2)}{(R1+R2)/2} \times 100$$

Where:
ABS = absolute value
R1 = Sample result
R2 = Duplicate sample result.

The tolerance limit for percent differences between laboratory duplicates will be ± 25 percent for soil and water samples. If the precision values are outside this limit, the laboratory will recheck the calculations and/or identify the problem. Reanalysis may be required.

2.2 Accuracy

Accuracy is an expression of the degree to which a measured or computed value represents the true value. Accuracy may be expressed as a percentage of the true or reference value for reference material or as spike recovery from matrix spike/matrix spike duplicate (MS/MSD) samples. The RPD between the MS and MSD is used to evaluate laboratory precision. The following equations are used to express accuracy:

- For reference materials:
  - Percent of true value = (measured value/true value) x 100
- For spiked samples:
  - Percent recovery = ([SQ – NQ]/S) x 100

    SQ = quantity of spike or surrogate found in sample
    NQ = quantity found in native (unspiked) sample
    S = quantity of spike or surrogate added to native sample

The performance of the method will be monitored using surrogate compounds or elements. Surrogate standards are added to all samples, method blanks, matrix spikes, and calibration standards. Acceptance criteria for method blanks and matrix spikes are +/- 25% and for laboratory control samples +/- 20%.

2.3 Sensitivity

Laboratory method reporting limits (MRL) are listed in Tables 2 and 3. All MRLs are below screening levels; otherwise, screening levels derived in the SRIWP were set to the practical quantitation limit, which is identical to the MRL for this project.

2.4 Representativeness

Representativeness is the degree to which data from the project accurately represent a particular characteristic of the environmental matrix which is being tested. Representativeness of samples is achieved by adherence to standard field sampling protocols and standard laboratory protocols. Representativeness is achieved through following of the sampling plan design, sampling techniques, and sample handling protocols.

2.5 Comparability

Comparability is the qualitative similarity of one dataset to another (i.e., the extent to which different datasets can be combined for use). Comparability will be addressed through the use of field and laboratory methods that are consistent with methods and procedures recommended by Ecology and that are commonly used for soil and water studies.

2.6 Completeness

Completeness is a measure of the amount of data that is determined to be valid in proportion to the amount of data collected. Completeness will be calculated as follows:

$$\text{Completeness} = (\text{number of valid measurements}/\ \text{total number of data points planned}) \times 100$$

The data quality objective (DQO) for completeness for all analytes is 100%. Data that have been qualified as estimated (J qualified) will be considered valid for the purpose of assessing completeness. Data that have been qualified as rejected will not be considered valid for the purpose of assessing completeness. Results will be considered valid if all the precision and accuracy targets are met.

3 Sampling Process Design and Sampling Procedures

The sampling program addressed in this QAPP is to:

- Collect soil samples (3.1)
- Collect water samples from temporary well points/Geoprobe borings (3.2)
- Install and develop permanent monitoring wells, and collect groundwater and soil samples(3.3)
- Surface Water Sampling (3.4)

Standard operating procedures (SOPs) are included in Attachment 1.

3.1 Soil Sample Collection

For subsurface soil sample collection, a Washington-licensed driller will complete Geoprobe borings using a push probe to advance a 2-inch diameter sampler. Water and soil samples will be collected at the intervals prescribed in the SRIWP. The probe will be decontaminated before each use. Drill cuttings and decontamination water will be drummed for appropriate disposal.

Soil will be removed from the subsurface in 5-ft sleeves. Each sleeve will be cut open on a table and positioned with the upper end at the same side of the table each time. A photograph of the open sleeve placed next to a tape measure will be taken of each 5-foot sleeve. Percent recovery for the sleeve as a whole, and for any specific portions of the sleeve that differ from the general recovery will be recorded on a field form/boring log. As soon as feasible after the core sleeve is opened, the photo-ionization detector will be scanned over the soil for a qualitative indication of soil quality. Any areas with measurement spikes will be evaluated more closely.

The soil will be visually classified, and the following information will be recorded:

- Depth of visual observations and sample collection, with sample ID
- Physical soil description (soil type and color, stratification per ASTM 2488)
- Other distinguishing characteristics or features, such as debris or concrete
- If odors are noted, a photo-ionization detector reading will be recorded by placing soil in a plastic bag, shaking it, and inserting the probe into the bag; indigo-blue dye test kits may also be used for soils exhibiting diesel-like odors.
- Qualitative moisture content (dry, damp, moist, wet, saturated).

Sample containers for all analyses except VOCs will be filled directly from the Geoprobe sleeve using a gloved hand and clean stainless steel spoon, if appropriate. Disposable soil sampler will be used to obtain soil for VOC analyses. Gloves will be changed between samples. Stainless steel spoons will be decontaminated prior to each use (and between samples). Sample containers will be clearly labeled with sample ID, collection date and time, and project name, and then placed in an iced cooler for delivery to the laboratory within 24 hours of sample collection. Chain of custody will be maintained. The sample ID is the boring name (including initials for the subarea) and the depth below ground surface.

The container and preservative requirements are listed in Tables 2 and 3.

3.2 Groundwater Sampling from Geoprobe Locations

Groundwater samples collected from Geoprobe borings will be collected with a temporary screen, placed to intercept the water table, and peristaltic pump as follows:

- Lower the new, clean polyethylene tubing into the well until the tubing intake is in the middle of the screened interval, or slightly above the middle of the screened interval. Secure the tubing to the top of the well and leave approximately 5 feet of tubing outside the well. Ensure that the bottom of the tubing is at a minimum 2 feet above the bottom of the screen interval. Attach a 1-foot length of silicon tubing that is appropriate for a peristaltic pump to the polyethylene tubing.
- Attach the silicon tubing to the peristaltic pump. Purge (remove with pump) water from the well into a calibrated 5-gallon pail or similar and monitor flow rate.
- Purge at approximately 100-300 milliliters (0.03-0.09 gallons) per minute until turbidity has visually decreased. The goal is to create minimal screen velocities during purging such that fines, which may bias sampling results, are not captured. This goal may be difficult to achieve under some circumstances and may require adjustment based on site-specific conditions and professional judgment.
- Collect samples of water for laboratory analysis in a manner that minimizes volatilization of potential contaminants from the water into the air. Hands and clothing will be clean when handling sampling equipment and during sampling.
- Clean, disposable, latex, nitrile, or equivalent–material gloves will be worn when filling bottles for analyses. Gloves will be changed when dirty and between samples.
- All water samples will be collected from the pump discharge lines directly into the appropriate sample containers following the procedures described for filling sampling containers from monitoring wells.

3.3 Monitoring Well Installation and Sampling

3.3.1 Monitoring Well Installation

Monitoring well construction and installation will involve drilling a borehole using either a sonic or a hollow-stem auger drill rig, installing a 2-inch diameter 0.010-inch slot Schedule 40 PVC well, filling the annular space with 10-20 (sieve size) Colorado silica sand below bentonite, and developing the well prior to sampling.

All wells will be installed in accordance with Washington Administrative Code (WAC) 173-160. As the soil cuttings are removed, field staff will log visual observations, similar to those for soil sampling, on a well log/well construction diagram.

Upon reaching the target depth below ground (approximately 15-ft), the 10-ft long well screen and riser pipe are inserted into the borehole. The full length of the slotted portion of the well screen as well as the unslotted portion of the bottom of the screen should be measured with the measuring tape, and these measurements should be recorded on the well construction diagram. The well screen will be placed such that it intercepts the water table. The water table depth below ground is determined after the borehole depth has been achieved by placing a water level meter inside the borehole. Moisture observations are also made on the soil cuttings removed from the borehole.

After the static water level measurement has been taken, the drilling subcontractor will begin assembling the well in conformance with any modifications to the well design made by the geologist based on field conditions. As the assembled well is lowered, extra attention will be given to centering it in the hole if centralizers are not used. The well should be temporarily capped before filter sand and other annular materials are installed. The drilling subcontractor should fill the annular space surrounding the screened section of the monitoring well to at least one foot above the top of the screen with 10-20 (sieve size) Colorado silica sand. In general, the filter pack should not extend more than three feet above the top of the screen to limit the thickness of the monitoring zone. A minimum 2-foot thick layer of bentonite pellets or slurry seal will be installed by the drilling subcontractor immediately above the well screen filter pack in all monitoring wells.

The borehole annulus will be grouted with seal materials to within three feet of the ground surface. Drill cuttings, even those known not to be contaminated, will not be used as backfill material. The grout seal should consist of a bentonite/cement mix with a ratio of bentonite to cement of between 1:5 and 1:20. The drilling subcontractor will cut the top of the well casing to a height that will allow installation of a locking cap with the monument closed.
All newly installed monitoring wells will be surveyed to the nearest 0.01-ft vertical at the top of casing and less than 1-ft horizontal accuracy. All other sampling locations will be located to 1-ft horizontal and vertical accuracy. Vertical and horizontal datums will be NAVD88 and NAD83, respectively, unless otherwise noted by the surveyors.

Following well installation, the well will be developed by surging and bailing or pumping until turbidity has visually decreased and stabilized. At least three casing volumes should be purged during development. Field measurements (turbidity, temperature, pH) collected during well development and the volume of water removed will be recorded on a field form. The well will be allowed to sit for a minimum of seven days prior to sampling to allow bentonite seals to set.

3.3.2 Groundwater Sampling From Monitoring Wells

Groundwater sampling will include measurement of field parameters to evaluate stability of groundwater collected from wells. Field water quality instruments will be calibrated at the beginning (prior to sampling) and middle of each day. Calibration data will be recorded on a field form or log book. All groundwater sampling activities will follow EPA's Low-Flow Groundwater Sampling Procedure (EPA, 2017). New, disposable, polyethylene tubing will be used to draw water from each monitoring well. The bottom of the tubing shall be placed at the midway point between the top of the water column and the bottom of the well, ensuring that the tubing is within the well screen and a minimum of 2 feet from the well bottom. The following tasks will be performed at each well:

- Measure and record static water level (distance from top of casing).

- A peristaltic pump will be used to collect groundwater samples.
- Insert new, disposable polyethylene tubing into the well at the mid-point of the water column but at least 2 feet above the bottom of the well.
- Use the EPA Low-Flow Groundwater Sampling Procedure (EPA, 2017), these procedure includes several steps and can be summarized as follows: First, purge groundwater at a low rate (~100-200 mL/min). Second, monitor the discharge water for turbidity, dissolved oxygen, specific conductance, temperature, pH, oxidation/reduction potential, and water drawn down at least three times during the purging period. Third, measure the purge volume using a calibrated bucket. Fourth, record purge water volume, time, and field parameter values in the field notes.
- Sampling may begin after three consecutive field parameter measurements are stable. Continue purging water until three consecutive stable measurements are recorded. Stability is defined on the groundwater monitoring forms included in the SOP and include:
    - Turbidity (10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized),
    - Dissolved Oxygen (10% for values greater than 0.5 mg/L, if three Dissolved Oxygen values are less than 0.5 mg/L, consider the values as stabilized),
    - Specific Conductance (3%),
    - Temperature (3%), pH (± 0.1 unit),
    - Oxidation/Reduction Potential (±10 millivolts).
- Collect samples of water for laboratory analysis in a manner that minimizes volatilization of constituents. Hands and clothing will be clean when handling sampling equipment and during sampling. Clean, disposable, latex gloves will be worn when filling bottles for analyses. Gloves will be changed when dirty and between samples.

- All water samples will be collected from the pump discharge lines directly into the appropriate sample containers. Samples submitted for dissolved metals analyses only will be filtered in the field prior to filling the sample container. Dissolved metals samples will be field filtered using a single-use 0.45 micron filter. All samples for metals analysis (dissolved and total) will be placed in 500 milliliter poly bottles pre-preserved with nitric acid. All sample preparations for DRO and ORO analysis will include with and without silica gel cleanup.

Collect samples in the following manner:

- VOCs (Benzene, toluene, ethylbenzene, and total xylene compounds): For each sample, fill three 40-ml vials preserved with hydrochloric acid. Slowly fill each vial until all air is removed and sample water bulges slightly over the top of the vial. Wet cap with sample water and screw onto top of vial. Invert vial and tap with finger. The properly filled vial has NO visible air bubbles.
- Metals: Samples for dissolved metals will be collected directly into lab-supplied bottles with acid preservative after passing through an in-line, disposable, 0.45-micron filter such as the Sample Filter Plus or equivalent installed in the discharge line of the pump. Samples for total metals analysis will be unfiltered and collected directly into lab-supplied bottles with acid preservative. A new filter will be used for each sample. Sample bottles will be filled almost to the top but not overfilled.
- TPH and SVOCs: There are no headspace or filtering concerns related to the other water quality parameters. Fill the laboratory prepared sample bottles almost to the top, taking care not to overfill.
- Record sample identification data on each sample container, in the field notes, and on the chain-of-custody. Sample identification will be the same as the well name/number and the sample collection date.

The container and preservative requirements are listed in Table 3.

3.4 Surface Water Sampling

Surface water samples may be collected directly from the manholes, culverts, or the drainage swale where the staff gauge is located at the upgradient end of the culvert that discharge from the Property to the South 202nd Street ditch. Sampling will follow EPA Surface Water Sampling procedures outlined in EPA document ID LSASDPROC-201-R6, dated April 22, 2023. In general, samples will be collected directly into the sample container when the surface water source is accessible by wading or other means using a dipper device. The sampler will face upstream if there is a current and collect the sample without disturbing the bottom sediment.

Dissolved metals samples will be field filtered after initial collection of surface water. The container and preservative requirements are listed in Table 3. Dissolved metals samples will be field filtered using a single-use 0.45 micron filter. All samples for metals analysis (dissolved and total) will be placed in 500 milliliter poly bottles pre-preserved with nitric acid.

3.5 Waste Management

Any investigation-derived waste (IDW), including waste/wastewater generated during decontamination of equipment, will be collected and managed in appropriate waste containers such as 55-gallon steel drums. Soil waste is expected to be generated, as not all soil removed from each soil boring will be containerized as sample media. Monitoring well installation will generate soil cuttings that will be captured and transferred to drums during the drilling and monitoring well installation process. Well development and well sampling activities will generate well purge water will be containerized in drums. All sampling efforts may generate decontamination fluids from cleaning hand tools and field sampling equipment.

All waste will be appropriately characterized in accordance with applicable regulations based on the laboratory analytical results and historical knowledge. IDW stored in drums, which will be clearly labeled and will remain at the site until the completion of the investigation, all IDW will be disposed of a off-site waste disposal facility in accordance with applicable regulations.

3.6 Sampling Equipment

Field equipment and supplies include sampling equipment (e.g., bowls, tape measures), utensils (e.g., spoons), decontamination supplies, sample containers, coolers, log books and forms, personal protection equipment, and personal gear. Protective wear (e.g., hard hats, gloves) are described in the Health and Safety Plan. Sample containers, coolers, and packaging material will be supplied by the analytical laboratory.

3.7 Decontamination

If used, stainless-steel sampling bowls and reusable handheld tools/equipment will be washed with Liquinox™ detergent and rinsed with distilled water prior to use and between sampling stations. The following decontamination steps will be performed on stainless-steel bowls and spoons and other handheld monitoring equipment and sample collection tools prior to use at each station:

- Wash with Liquinox™
- Double rinse with distilled/deionized water
- Final rinse with distilled/deionized water.

If a residual material remains on the sampling equipment or is difficult to remove using the standard decontaminations procedures above, a hexane rinse may be added, followed by a final rinse with distilled/deionized water. Sample equipment will be kept wrapped in aluminum foil until time for use. To minimize sample cross-contamination, disposable gloves will be replaced between samples. If any equipment decontamination occurs, an equipment blank will be collected by pouring distilled water over the equipment and collecting in a set of the same sample containers as those used for the environmental samples the equipment is used to collect.

Gloves will be changed between each sample.

Rinse water will be disposed of with soil cuttings/purge water.

3.8 Sample Nomenclature

All samples will be assigned a unique sample identification name based on the sampling location designation. Sample names may include the sampling date, depth to sampling and type of sample. Typical type of samples identification include the following examples:

- MW = monitoring well
- SB = soil boring or DPT = Direct Push Technology; water and soil samples collected from soil borings will have the same sample ID. Soil sample collection depths will be included in soil samples. Example: A soil sample collected from DPT-34 at 8-10 feet bgs will be identified as “DPT-34-8-10”. Water samples will just include the boring ID. Example: A groundwater sample collected from DPT-34 on April 28, 2025 will be identified as “DPT-34”.
- SW = surface water – surface water samples collected on different dates will include the surface water sample ID and the date. Example: A surface water sample collected from SW-South on April 28, 2025 will be identified as “SW-South-0425”.
- Groundwater samples collected from the monitoring wells will include the well ID in the sample ID. Example: A groundwater sample collected from MW-7 on April 28, 2025 will be identified as “MW-7-0425”.
- Duplicates shall not include information linking the parent sample to the duplicate. Example: Dup-01-0624.
- Equipment Rinsate Blanks are not anticipated because dedicated sampling equipment will be used, but if other blanks are collected, they shall include an identification acronym followed by the date. Example: Blank-01-0624 or MSD-01-0624.

All sample identification names will be clearly labeled on sample jars and recorded on the associated field forms and tracking sheets (such as chain-of-custodies).

3.9 Sampling Containers

Requirements for sample containers and storage conditions are provided in Tables 2 and 3. All sample containers will have screw-type lids so that they are adequately sealed. Lids of the glass containers will have Teflon™ inserts to prevent sample reaction with the plastic lid and to improve the quality of the seal. Commercially available, pre-cleaned jars will be used, and the laboratory will maintain a record of certification from the suppliers. The container shipment documentation will record batch numbers for the bottles. With this documentation, containers can be traced to the supplier, and bottle rinse blank results can be reviewed.

Sampling containers will be filled to minimize head space, and will be appropriately labeled and stored prior to shipment or delivery to the laboratory. Samples must be packed to prevent damage to the sample containers and labeled to allow sample identification. All samples must be packaged so that they do not leak, break, vaporize or cause cross-contamination of other samples. Each individual sample must be properly labeled and identified. When refrigeration is required for sample preservation, samples must be kept cool, by means of ice packs or double-bagged ice in coolers, during the time between collection and final packaging.

3.10 Field Logs

All field activities and observations will be noted on weatherproof paper at the time they occur. The field logs will be compiled in a binder (or a bound notebook) in the chronological order they were completed. A blank field log (also called a daily report) is included Attachment 1. Information will include personnel, date, time, station designation, sampler, types and number of samples collected, photographs taken, weather conditions, health and safety meetings conducted (tailgate meeting), and general observations. Any changes that occur at the site (e.g., personnel, responsibilities, deviations from the SRIWP) and the reasons for these changes will be documented in the field log. It will also identify onsite visitors observing the sampling. The Field Manager is responsible for ensuring that the field logs are correct.

All field activities and observations will be noted during fieldwork. The descriptions will be clearly written with enough detail so that participants can reconstruct events later, if necessary. Requirements for entries include:

- Field logs will be compiled in chronological order in a 3-ring binder, with the date and observer clearly marked on all field forms and note sheets.
- Entries will be made legibly with black (or dark) waterproof ink or pencil.
- Unbiased, accurate language will be used.
- Entries will be made while activities are in progress or as soon afterward as possible (the date and time that the notation is made should be noted, as well as the time of the observation itself).

- Each consecutive day's first entry will be made on a new, blank page.
- The date and time, based on a 24-hour (military) clock (e.g., 0900 for 9 a.m. and 2100 for 9 p.m.), will appear on each page.
- When the field activity is complete, the field binder will be physically entered into the project file and the pages will be scanned to a PDF file and saved in the electronic project library. Scanning of sheets may also occur after each day's field activities.
- The person recording the information must initial and date each sheet. If more than one individual makes entries on the same sheet, each recorder must initial and date each entry. The bottom of the page must be signed and dated by the individual who makes the last entry.
- The Field Manager, after reading the day's entries, also must sign and date the last page of each daily entry.
- Corrections will be made by drawing a single line through the original entry allowing the original entry to be read. The corrected entry will be written alongside the original. Corrections will be initialed, dated, and explained.

3.11 Chain-of-Custody Procedures

All samples must be clearly identified immediately upon collection. Each sample container label will list:

- Client and project name
- A unique sample description/sample ID
- Sample collection date and time.

Additionally, the container's label may include:

- Sampler's name or initials
- Preservative, if applicable
- Analyses to be performed.

Chain-of-custody procedures will be used to document sample possession from the time of collection, through analysis, to disposal. Chain-of-custody forms (typically provided by the laboratory, a blank one is included in Attachment 1) will document transfers of sample custody. A sample is considered to be under custody if it is in one's possession, view, or in a designated secure area. One set of chain-of-custody forms will be used per laboratory shipment. The chain-of-custody record will include, at a minimum, the following information:

- Client and project name
- Sample collector's name
- Sampler's company mailing address and telephone number
- Designated recipient of data (name, email, and telephone number)
- Analytical laboratory's name and city

- Description of each sample (i.e., unique identifier and matrix)
- Date and time of collection
- Quantity of each sample or number of containers
- Type of analysis required
- Any unique features of analysis, such as lower reporting limits
- Any requests to hold/archive samples
- Addition of preservative, if applicable
- Requested turn-around times
- Date and method of shipment.

When transferring custody, both the staff relinquishing custody of samples and the staff receiving custody of samples will sign, date, and note the time on the form. Samples to be analyzed by Friedman & Bruya Laboratory will not be shipped, but will be delivered by project personnel or a laboratory courier at the end of each sampling day. If samples are to be analyzed by other laboratories, they will either be delivered or shipped, depending on the location. All samples will be stored appropriately by the laboratory.

4 Quality Control

4.1 Laboratory Quality Control

Only laboratories accredited in accordance with WAC 173-50, Accreditation of Environmental Laboratories will be used for this project. EPA Contract Laboratory Program (CLP) QA/QC procedures or similar efforts will be used for the analyses. Internal quality control procedures are used to produce consistently high-quality data. A routine QC protocol is an essential part of the analytical process. The minimum requirements for each analytical run are described here. Additional description of laboratory QA/QC procedures can be found in the laboratory's QA manual. A project narrative detailing analytical results must accompany all data packages submitted by the laboratory.

Preparation batches have a maximum of 20 field samples of the same matrix. QA/QC samples processed with each batch are:

- **One method blank**. The method blank is used to assess the preparation batch for possible contamination during the preparation and processing steps. It is processed along with and under the same conditions as the environmental samples. Concentrations of compounds detected in the blank will be compared to the samples. Any concentration of common laboratory contaminants (i.e., phthalates, acetone, methylene chloride, or 2-butanone) in a sample lower than 10 times that found in the blank will be considered a laboratory contaminant and will be so qualified. For other contaminants, any compounds detected at concentrations lower than five times that found in the blank will be considered laboratory contamination (EPA 2020). Values reported for the method blanks are expected to be below the method detection limits (MDLs) for all analytes, except the common laboratory contaminants. Deviations from this must be explained in the laboratory project narrative(s).
- **One LCS**. The LCS is used to evaluate the performance of the total analytical system, including all preparation and analysis steps.
- **One MS**. Matrix specific QA/QC samples indicate the effect of the sample matrix on the precision and accuracy of the results generated using the selected method. The information from these controls is sample/matrix specific and is not normally used to determine the validity of the entire batch.
- **At least one duplicate**. Duplicates are replicate aliquots of the same sample taken through the entire analytical procedure. The results from this analysis indicate the precision of the results for the specific sample using the selected method. One duplicate sample is analyzed with each preparation batch. If sufficient sample is provided, a MS and MSD will be analyzed. If sufficient volume is not available, a LCSD will be analyzed. Sample jar size has been selected to provide sufficient volume to complete MS/MSDs; however, volume may be lost if additional analysis is completed by the laboratory (such as re-analysis).
- **Initial and continuing calibration:** A calibration standard will be analyzed each time an instrument is calibrated. The instruments used to perform the analyses

will be calibrated, and the calibrations will be verified as required by EPA methodologies. For example, a standard five-point initial calibration will be utilized to determine the linearity of response with the gas chromatograph/electron capture detection. Once calibrated, the system must be verified every 12 hours. All relative response factors, as specified by the analytical method, must be greater than or equal to 0.05. All relative standard deviations, as specified by the analytical method, must be less than or equal to 30 percent for the initial calibration and less than or equal to 25 percent for the continuing calibration.

- **Surrogate evaluations:** Surrogates are compounds added to every sample at the initiation of preparation to monitor the success of the sample preparation on an individual sample basis (accuracy). Although some methods have established surrogate recovery acceptance criteria that are part of the method or contract compliance, for the most part, acceptable surrogate recoveries need to be determined by the laboratory. Recoveries of surrogates will be calculated for all samples, blanks, and QC samples. Acceptance limits will be listed for each surrogate and sample type and will be compared against the actual result by the data validator.
- **Laboratory management review:** The Laboratory Project Manager will review all analytical results prior to final external distribution (preliminary results will be reported before this review). If the QA Officer finds that the data meet project quality requirements, the data will be released as “final” information. Data which are not acceptable will be held until the problems are resolved, or the data will be flagged appropriately.

4.2 Additional Laboratory Quality Control Procedures

Additional laboratory quality control procedures will be evaluated to provide supplementary information regarding overall quality of the data, performance of instruments and measurement systems, and sample-specific matrix effects.

QC samples and procedures are specified in each method protocol. All QC requirements will be completed by the laboratory as described in the protocols, including the following (as applicable to each analysis):

- Instrument tuning
- Initial calibration
- Initial calibration verification
- Continuing calibration
- Calibration or instrument blanks
- Method blanks
- LCS/LCSD
- Internal standards
- Surrogate spikes

- Serial dilutions
- MS/MSD.

4.3 Field Quality Control

QA/QC samples will be collected during all sampling activities. Field duplicate and matrix spike/matrix spike duplicate samples will be collected as follows:

- Field duplicate samples will use the same naming system as the environmental samples so that they are submitted “blind” to the laboratory. Field duplicates are useful in identifying problems with sample collection or sample processing. One duplicate sample will be collected for every 10 field samples of the same matrix. Each field duplicate will be analyzed for the same parameters as the samples to evaluate heterogeneity attributable to sample handling.
- One matrix spike/matrix spike duplicate sample (MS/MSD) will be collected for every 20 field samples. Extra sample containers (the same as those for the environmental sample) collected for MS/MSD analyses will be noted in field notes and on chain-of-custody forms submitted to the analytical laboratory. Extra sample bottles for MS/MSD will be labeled with a “-MS/MSD” suffix for clarity in sample processing.

Rinsate and equipment blanks will not be collected because samples will be collected using disposable supplies, with new sampling supplies used for each soil sample collected. All monitoring well samples will be collected with new and disposable supplies (including tubing and filters) for each sample.

4.4 Additional Field Quality Control

Field quality control samples will be collected during the remedial investigation. The field quality control samples consist of decontamination field blanks (one per day that sampling equipment is reused), and field duplicates (one for every ten samples, blind duplicates).

The goal is to have no detectable contaminants in decontamination blanks. If contamination is detected, the nature of the interference and the effect on the analysis of each sample in the batch will be evaluated. Data from affected samples may require qualification as “estimated” or “rejected.”

4.5 Instrument and Equipment Testing, Inspection, and Maintenance

The primary objective of an instrument/equipment testing, inspection, and maintenance program is to aid in the timely and effective completion of a measurement effort by minimizing the downtime due to component failure.

Testing, inspection, and maintenance will be carried out on all field and laboratory equipment in accordance with manufacturer's recommendations and professional judgment.

Analytical laboratory equipment preventative testing, inspection, and maintenance will be addressed in the laboratory QA manual, which will be kept on file at the contracted laboratory.

As appropriate, schedules and records of calibration and maintenance of field equipment will be maintained in the field notebook. Equipment that is out of calibration or is malfunctioning will be removed from operation until it is recalibrated or repaired.

4.6 Instrument and Equipment Calibration and Frequency

Field equipment and laboratory instrumentation used for monitoring and sample analysis will be subject to the following calibration requirements:

- **Identification**. Either the manufacturer's serial number or the calibration system identification number will be used to uniquely identify equipment. This identification, along with a label indicating when the next calibration is due, will be attached to the equipment. If this is not possible, records traceable to the equipment will be readily available for reference.
- **Standards**. Equipment will be calibrated, whenever possible, against reference standards having known valid relationships to nationally recognized standards (e.g., National Institute of Standards and Technology) or accepted values of natural physical constraints. If national standards do not exist, the basis for calibration will be described and documented.
- **Frequency.** Equipment will be calibrated at prescribed intervals and/or prior to use. Frequency will be based on the type of equipment, inherent stability, manufacturers' recommendations, intended use, and observation of equipment readings over the course of the field work. All sensitive equipment to be used in the field or laboratory will be calibrated or checked prior to use.
- **Records**. Calibration records (certifications, logs, etc.) will be maintained for all measuring and test equipment used.

If field or laboratory equipment is found to be out of calibration, the validity of previous measurements will be investigated, and/or corrective action will be implemented. The Field Manager or the Laboratory Project Manager, respectively, will lead the evaluation process, which will be documented in the field forms or laboratory log book, respectively.

All laboratory calibration requirements must be met before sample analysis may begin. The laboratory will follow the calibration procedures dictated by the analytical methods to be performed. If calibration non-conformances are noted, samples will be reanalyzed under compliant calibration conditions within method-specified hold times.

4.7 Inspection and Acceptance of Supplies and Consumables

The Field Manager will be responsible for material procurement and control. The Field Manager will verify upon receipt that materials meet the required specifications and that, as applicable, material or standard certification documents are provided, maintained, and properly stored with the project files. The Field Manager will also verify that material storage is properly maintained and that contamination of materials is not allowed.

The laboratory must document and follow procedures related to:

- Checking purity standards, reagent grade water, and other chemicals relative to intended use
- Preparing and storing chemicals
- Handling disposable glassware (including appropriate grade).

The Field Manager will be responsible for procuring and transporting the appropriate sample containers, equipment, and consumables (e.g., soap) to the Site. The containers will be pre-cleaned and certified by lot. If needed, reagents provided will be of the appropriate grade for the analysis. Records of these certifications and grades of material will be maintained on file at the laboratory.

5 Corrective Actions

Upon receipt of data, the QA Officer will evaluate field and laboratory precision by the RPDs between the field duplicate and sample data. Non-conforming items and activities are those which do not meet the project requirements or approved work procedures. Non-conformance may be identified by any of the following groups:

- **Field staff/Manager**: during the performance of field activities, supervision of subcontractors, performance of audits
- **Laboratory staff**: during the preparation for and performance of laboratory testing, calibration of equipment, and QC activities
- **QA Staff**: during the performance of audits and during data validation, through the use of data to make decisions (i.e., do the data make sense?).

If possible, the Field Manager will identify any action that can be taken in the field to correct any non-conformance observed during field activities. If necessary and appropriate, corrective action may consist of a modification of methods or a re-collection of samples. If implementation of corrective action in the field is not possible, the non-conformance and its potential impact on data quality will be discussed in the data quality section of the report.

Corrective action to be taken as a result of non-conformance during field activities will be situation-dependent. The laboratory will be contacted regarding any deviations from the QAPP, will be asked to provide written justification for such deviations, and in some instances, will be asked to reanalyze the sample(s) in question. All corrective actions must be documented. The person identifying the nonconformance will be responsible for its documentation.

Documentation will include the following information:

- Name(s) of the individual(s) identifying or originating the nonconformance
- Description of the nonconformance
- Any required approval signatures
- Method(s) for correcting the nonconformance or description of the variance granted.

Documentation will be made available to project, laboratory, and/or QA management. Appropriate personnel will be notified by management of any significant nonconformance detected by the project, laboratory, or QA staff. Implementation of corrective actions will be the responsibility of the Field Manager or the QA Officer. Any significant recurring nonconformance will be evaluated by project or laboratory personnel to determine its cause. Appropriate changes will then be instituted in project requirements and procedures to prevent future recurrence. When such an evaluation is performed, the results will be documented. If there are unavoidable deviations from this QAPP, the Project Manager will document the alteration and track the change in the subsequent deliverables.

6 Data Management Procedures

The project database will only have one result per constituent in a given sample. Where duplicate analyses of the same constituent are present in the data for the same sample due to reanalysis or inclusion in multiple analytical methods, only one value will be preserved in the primary database tables; this does not apply to duplicate samples which are maintained as separate samples in the database. The preserved value will be selected as follows: for non-detects, the result with the lower reporting limit; values without QA flags are preserved over flagged values; detections are selected over non-detects; where all other conditions are equal, the result with the higher concentration is preserved in the database.

For accepted data, concentrations will be averaged between the parent and field duplicate, using one-half the reporting limit if any values are undetected. The database will store both the parent and field duplicate data.

All hard copies of field forms or log book pages will be filed in the project library as scanned PDFs.

7 Audits and Reports

Field investigators will maintain field notes in a bound notebook or on field forms, and all documents, records, and data collected will be kept in a case file in a secure records filing area. All laboratory deliverables with verifiable supporting documentation shall be submitted by the laboratory to the QA Officer. The following documents will be archived at the laboratory: 1) signed hard copies of sampling and chain-of-custody records; and 2) electronic files of analytical data including extraction and sample preparation bench sheets, raw data, and reduced analytical data.

PDFs of all analytical reports will be retained in the laboratory files, and at the discretion of laboratory management, the data will be stored electronically for a minimum of 1 year. After 1 year, or whenever the data become inactive, the files will be transferred to archives in accordance with standard laboratory procedure. Data may be retrieved from archives upon request.

No audits, other than the identified data verification and validation, will be conducted.

8 Data Verification and Validation

Analytes detected at concentrations between the MRL and the MDL will be reported with a J qualifier to indicate that the value is an estimate (i.e., the analyte concentration is below the calibration range). J-qualified data are considered valid when completeness is calculated. Undetected data will be reported at the MRL. The MRL will be adjusted by the laboratory as necessary to reflect sample dilution or matrix interference.

Verification of completeness and method compliance, as well as raw data entry and calculations by analysts will be reviewed by the Laboratory Project Manager. The Laboratory Project Manager will be responsible for checking each group or test data package for precision, accuracy, method compliance, compliance to special client requirements, and completeness. The Laboratory Project Manager will also be responsible certifying that data in PDFs and EDDs are identical prior to release from the laboratory.

Data validation will be completed by a third-party data validator. Data validation will be completed within two weeks after receipt of the complete laboratory data package.

The laboratory will generate Level 2 data package for all analytes. Validation of the analytical data will comply with criteria set forth in the CLP National Functional Guidelines for Superfund Inorganic Methods Data Review (EPA 2020).

9 Data Quality (Usability) Assessment

The QA Officer will review the field notebooks, laboratory reports, and the data validation report to determine if the data quality objectives have been met. Instances where the data quality objectives were not met will be documented. The usability of the data will depend on the magnitude of the data quality objective exceedance. Data that has been rejected will be flagged as "R" and will not be included in the database. The QA Officer will determine if rejected data trigger additional sample collection.

10 References

CRETE 2024. Draft Supplemental Remedial Investigation Work Plan. CRETE Consulting, Inc. October 18, 2024.

Ecology 2016a. Guidance for Remediation of Petroleum Contaminated Sites. Washington State Department of Ecology. Publication No. 10-09-057. November 2010, revised June 2016.

Ecology 2016b. Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies. Publication No. 04-03-030. July 2004, revised December 2016.

EPA 2017. Low Stress (Low Flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells. EQASOP-GW4, Revised September 19, 2017. https://www.epa.gov/sites/default/files/2017-10/documents/eqasop-gw4.pdf

EPA 2020. Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review. OSWER 9240.1-51. EPA 542-R-20-006. November 2020.

Tables

Table 1 Project Roles and Responsibilities

Role	Person	Responsibilities
Ecology Project Manager	Tena Seeds (425-457-3143)	• Direct other Ecology staff and their consultants to review and comment on materials • Grant final approval on this QAPP/SRIWP, on data use, and on further data collection.
The Property Representative	Kyle Siekawitch Nick Siegel (425-749-4325)	• Represents the Owner (7730 202nd, LLC [Bridge]) • Monitor all aspects of the project to verify that work follows Owner's goals and decisions
Consultant Team Project Manager	Grant Hainsworth (253-797-6323)	• Primary point of contact with Bridge. • Review all technical documents associated with the project for technical accuracy and feasibility, as well as adherence to budget and schedule.
Quality Assurance Officer	Jamie Stevens (206-799-2744)	• Monitor all aspects of the project to verify that work follows project plans • Review laboratory analytical data • Serve as liaison between the laboratory and Field Manager • Maintain a complete set of laboratory data • Review compliance with field methods and procedures.
Field Manager	Rusty Jones (832-330-1359)	• Collect or direct collection of samples • Maintain a log (field log book) for all sampling-related activities • Coordinate the sampling operations to verify that the this QAPP is followed • Identify any deviations from this QAPP • Prepare the field data and information for RI/FS • Maintain the integrity of samples throughout sample collection and transport to the laboratory.
Laboratory Project Manager	Eric Young Friedman and Bruya Lab (206-285-8282) Amy Goodall Brooks Applied Labs 206-632-6206)	• Conduct analysis of soil and water samples • Practice quality assurance methods per internal laboratory standard operating procedures and this QAPP, and document such practices • Verify quality of samples (e.g., cooler temperature) as they're received at the laboratory • Verify accuracy and completeness of laboratory reports and EDDs.
Data Manager	Cari Saylor Saylor Data Solutions, Inc. (425-820-7504)	• Evaluate conformance of the analyses with the specifications of this QAPP • Verify the reported results with the raw data • Check that EDDs match the analytical reports

Table 2 Soil Sample Analytes

Analyte	Preparation Method /Analytical Method	Method Reporting Limit (mg/kg)	Lowest Initial Screening Level (mg/kg)	Holding Time	Sample Container/ Preservation/ Storage
Aluminum	3050/3050B EPA 6020/6020B	166	33000	6 months	4-ounce glass/ Dark, 0-6°C .
Antimony		1	5.2		
Arsenic		1	7.3		
Barium		1	250		
Cadmium		1	0.77		
Chromium		1	48		
Cobalt		1	11		
Copper		5	36		
Iron		1,600	36,000		
Lead		1	24		
Manganese		1	1100		
Nickel		1	48		
Thallium		0.004	0.004		
Selenium		0.27	0.78		
Silver		0.6	0.61		
Vanadium		10	45		
Zinc		5	85		
Mercury	3050B EPA 6020/7471	0.02 (PQL)	0.07	28 days	4-ounce glass/ Dark, 0-6°C .
Diesel and Oil Range Organics	3550 NWTPH-Dx with EPH/VPH	5	2,000	14 days to extract; 40 days to analysis	4-ounce glass/0- 6°C
Benzene	5035 EPA 8021B	0.02	0.00015	14 days (if preserved)	2 EnCore Samples/0- 6°C
Toluene		0.02	0.02		
Ethylbenzene		0.02	NC		
Total Xylenes		0.02	0.03		
Cyanide	E9012 / E9016 / SM4500CN	0.02	0.02	14 days	8-ounce glass Dark/ 0-6°C.

cPAHs	3550/EPA 8270E-SIM	0.0005	Total cPAH TEQ= 0.0042	14 days to extract; 40 days to analysis	4-ounce glass/0- 6°C
Bis(2-ethylhexyl)phthalate		0.085 (MDL)	0.005		
Di-n-octyl phthalate		0.09 (MDL)	0.008		
Di-n-butylphthalate		0.0025	0.015		
Fluorene		0.0025	0.08		
Fluoranthene		0.0025	0.001		
Naphthalene		0.005	0.236		
2-Methylnaphthalene		0.0025	0.089		
4-Methylphenol		0.07 (MDL)	0.09		
Pyrene		0.0025	0.001		
Phenol		0.0025	0.047		

Notes:
mg/kg - milligram per kilogram; EPA – Environmental Protection Agency; SVOCs - Semi Volatile Organic Compounds; cPAH - carcinogenic polycyclic aromatic hydrocarbon; Total cPAH TEQ - The value is calculated using the toxicity equivalency factors in MTCA Table 708-2; NC- no criteria; MDL = method detection limit is provided if RL (reporting limit) is above SL

Table 3 Groundwater and Surface Water Sample Analytes

Analyte	Preparation Method /Analytical Method	Method Reporting Limit*	Lowest Initial Screening Level	Holding Time	Sample Container
Aluminum (ug/L)	Method 1638/1640*/200.7/200.8 with reductive precipitation	5	302	6 months if preserved/2 days if not preserved	Total samples - 500-mL plastic bottle with HNO_3 preservative to pH <2 Dissolved samples - Field filter into 500-mL plastic bottle with HNO_3 preservative to pH <2/0-6^{o}C
Antimony (ug/L)		1	5.6		
Arsenic (ug/L)		0.02	0.018		
Barium (ug/L)		1	1,000		
Cadmium (ug/L)		0.01	0.72		
Chromium (ug/L)		1	71		
Cobalt (ug/L)		1	4.8		
Copper (ug/L)		1	11		
Iron (ug/L)		50	300		
Lead (ug/L)		1	2.1		
Manganese (ug/L)		1	50		
Nickel (ug/L)		1	52		
Selenium (ug/L)		1	5		
Silver (ug/L)		1	3.2		
Zinc (ug/L)		5	100		
Thallium (ug/L)		0.01**	0.062		
Vanadium (ug/L)		0.05	80		
Mercury (ug/L)	200.8/1631 ICP-MS	0.01 (PQL)	0.012 (updated to be PQL)	28 days	
Cyanide (ug/L)	9012 / SM4500CN /E335.4	1	4	14 days	250mL HDPE, 0-6°C, NaOH
Hexavalent Chromium (only at MW-5R) ; groundwater only	200.8/218.6	0.05	0.05	30 days	8-ounce glass/0-6°C, NH42SO4+NH4OH
TPH Diesel and Oil Range Organics (mg/L) ; groundwater only	3510/NWTPH-Dx with EPH/VPH	0.1	0.5	14 days to extract; 40 days to analysis	Unpreserved 500-ml amber glass/0- 6^{o}C
VPH/EPH (mg/L) ; groundwater only					

Analyte	Preparation Method /Analytical Method	Method Reporting Limit*	Lowest Initial Screening Level	Holding Time	Sample Container
Chloride and fluoride (mg/L)	300.0	0.8 (fluoride) -0.5 (chloride)	0.96 (fluoride) - 230 (chloride)	6 months	Unpreserved , 500-mL plastic bottle/0- 6°C
Benzene (ug/L; groundwater only)	5030/EPA 8260C; potentially with SIM for groundwater	0.2	0.44	14 days (if preserved)	Three 40-ml vials preserved with hydrochloric acid/0- 6°C
Toluene (ug/L; groundwater only)		0.2	NC		
Ethylbenzene (ug/L; groundwater only)		0.2	NC		
Total Xylenes (ug/L; groundwater only)		0.6	NC		
cPAHs (ug/L; groundwater only)	3510/EPA 8270E SIM	0.0005	0.0051 MDL (benzo(a)pyrene)	7 days (if preserved)	0.5 Liter amber glass preserved with hydrochloric acid/0- 6°C
Fluoranthene (ug/L; groundwater only)		0.005	0.02		
1-methylnaphthalene (ug/L; groundwater only)		0.07	0.17		
Pyrene (ug/L; groundwater only)		0.02	0.015		

Notes:

ug/L - micrograms per liter; mg/L - milligrams per liter; PQL = practical quantitation limit; MDL = method detection limit; SIM – Selective Ion Mode; EPA – Environmental Protection Agency; NC- no criteria; NWTPH – Dx – Northwest Total Petroleum Hydrocarbons – Diesel Range Organics;

VPH = "volatile" aliphatic and aromatic petroleum hydrocarbons (VPH)/VPH ="extractable" aliphatic and aromatic petroleum hydrocarbons (EPH)

ICP-MS - plasma-mass spectrometry

*-Samples with elevated chloride concentrations may be sent to Brooks Applied Lab for metals analysis through EPA Method 1640 which ICP-MS to overcome the physical and chemical interferences presented by elevated concentrations of salts in water samples.

** -Thallium reporting limits are based on selective ion monitoring mode

All groundwater and surface water samples will be analyzed for all metals listed (total and dissolved) and for chloride and fluoride. All of the surface water samples will also be analyzed for cyanide. Some of the groundwater samples will be analyzed for DRO and ORO, BTEX, SVOCs, and hexavalent chromium, as noted in Table 15 of the SRIWP.

Table 4 Measurement Quality Objectives

Parameter	Precision (RPD; lab/field)	Accuracy	Completeness
All analysis	Soil: 20%/50% Water: 20%/35%	70-130%	100%

Attachment 1

Standard Operating Procedures and Field Forms

• No eating, smoking, drinking, chewing, or any hand to mouth contact should be permitted during cleaning operations

2 RESPONSIBILITIES

2.1 Sampling Technician

It will be the responsibility of the sampling technician to be familiar with the decontamination procedures outlined within this SOP, the HASP, the QAPP, and the Sampling Plan. The sampling technician is responsible for the proper decontamination of all field equipment and proper documentation. The sampling technician is also responsible for ensuring that all decontamination producers are following by all subcontractors. Decontamination may be required on heavy equipment; it is the responsible of the sampling technician to ensure all equipment has been properly decontaminated.

2.2 Field Project Manager

It will be the responsibility of the field project manager to ensure that the sampling technician understands the decontamination producers and has access to all materials required for decontamination. The field project manager is also responsible for all waste generated during decontamination producers.

3 REQUIRED MATERIALS

In addition to those materials provided by the subcontractor, the project geologist/sampling engineer may require:

- Decontamination agents
- Chemical free paper towels
- Waste storage containers
- Cleaning storage containers
- Cleaning brushes
- Pressure sprayers (if required)
- Squeeze bottles
- Plastic sheeting
- Aluminum foil
- Health and safety equipment (as required by HASP)
- Project notebook/field sheets/pen

Sampling equipment which comes in direct contact with environmental samples during the sample collection process should be constructed of stainless steel, teflon, or glass, unless specified otherwise in the Project Sampling Plan or QAPP.

4 METHOD

4.1 General Method Description

It should be assumed that all sampling equipment, even new items, are contaminated until the proper decontamination procedures have been performed, unless, certificate of analysis is available and demonstrates the items are clean.

It is important to set up a decontamination cleaning station. This will vary depending on site acitivites and site access. Generally speaking, an decontamination area for small/hand held equipment cleaning should include a barrier (e.g. plastic sheeting) to work on, should decontamination tubs and/or buckets and rinse bottles in order of use on top of the barrier. Decontamination solution containing solutions and water should be gathered and put into accessible containers within easy reach of the decontamination tubs). Record the source of the water in the field logbook.

For decontamination of drilling rigs or backhoes/excavators, establish an area for decontamination that will meet the program and site-specific requirements for collection of decontamination fluids. If necessary, set up a decontamination pad. If containerization of decontamination fluids associated with decontaminating large equipment (such as drilling rigs and backhoes/excavators) is required, it is imperative to ensure that the subcontractor will have appropriate equipment onsite. This equipment may include a portable electric generator and a high-pressure steam-cleaner or steam-jenny. In addition, a decontamination pad or portable containment system should be used to collect fluids. The contractor shall conduct gross decontamination (such as removing general mud from large equipment) prior to arriving at site.

All equipment used for sampling, testing, or measuring, including excavating and drilling equipment, that comes in contact with potentially sampled media will be decontaminated prior to use unless the equipment is prepackaged and sealed by a manufacturer of environmental sampling equipment. Reusable sampling equipment will also be decontaminated between sampling locations. If disposable sampling equipment (clean prepackaged materials) is used, this equipment will not be decontaminated before use and will be disposed of properly after one use. Disposable equipment will not be used at more than one sampling location.

The following presents decontamination procedures for manual sampling equipment and heavy equipment.

4.2 Equipment Decontamination – Small Hand Held Equipment

The following general decontamination steps should be applied to all equipment prior to initial use (unless using clean prepackaged environmental sampling equipment) or that have been utilized to collect sample media for analytical purposes. Site-specific project control documents may specify modifications to these procedures and should be followed when applicable. It is important to note that no acids or solvents will be used to decontaminate any electrical or electronic instrumentation unless specified by the manufacturer.

a. Physically remove visible material from the sampling equipment to the extent practical before decontaminating the equipment with decontamination fluids. If this material appears to be impacted based on visual observation, instrument readings, or other credible indication, collect and manage this material in accordance proper procedures.
b. Immerse (to the extent practicable) the equipment in the cleaning solution and scrub the equipment thoroughly with a stiff brush until visible residual material is removed and the equipment is visibly clean. Circulate detergent solution through equipment that cannot be disassembled such as submersible pumps (ASTM, 1990).
c. Rinse the equipment thoroughly with potable water.
d. Rinse the equipment with organic desorbing agent (e.g., isopropyl alcohol). If samples are not being collected for analysis of organic compounds, omit this step (ASTM, 1990).
e. Rinse the equipment thoroughly with potable or DI water.
f. To the extent practicable, allow the equipment to air dry in a clean area (equipment does not need to be completely dry before reuse; under certain weather conditions, complete air drying is not possible).
g. Change the initial decontamination solution daily and/or between sites at a minimum and more frequently as needed. Collect decontamination solvents in a separate container from water/detergent solutions and properly containerize, store, and dispose of decontamination solutions.

If decontaminated equipment will not be used immediately, the equipment may be wrapped in aluminum foil (if used for organics only) or sealed in a plastic bag for storage. Decontamination activities, including date, time, and reagents used, should be documented in the field logbook and decontaminated sampling equipment should be labeled with this information as appropriate.

4.3 Equipment Decontamination – Decontamination of Heavy Equipment

The following steps for decontamination can be applied to heavy equipment.

a. Physically remove as much of the visible material as possible from the heavy equipment after use and prior to steam cleaning. If contaminated material is suspected as determined by visual observations, instrument readings, or other means, collect material in an appropriate container. Otherwise, return the material to the area where it originated.
b. Place the heavy equipment on the decontamination pad in the decontamination area. If wash water is to be collected, ensure that the collection mechanism functions properly and that the decontamination pad has no leaks.
c. Steam clean parts of the heavy machinery that come into contact with visible material (such as tires, bulldozer bucket, augers, and back of drill rig).
d. For any portion of the heavy equipment that comes into contact with the sampling media, decontaminate by following listed in Section 4.2.
e. Containerize fluids, if appropriate. Place solids in a drum or other appropriate container.

5 QUALITY CONTROL

Quality control requirements are dependent on project-specific sampling objectives. The QAPP will provide requirements for equipment decontamination (frequency and materials), sample preservation and holding times, sample container types, sample packaging and shipment, as well as requirements for the collection of various quality assurance samples such as trip blanks, field blanks, equipment blanks, and field duplicate samples.

Equipment blanks and Field blanks are generally made by pouring laboratory-supplied deionized water into, over, or through the freshly decontaminated sampling equipment. Blanks should be labeled as a sample and submitted to the laboratory to be analyzed for the same parameters as the associated sample.

6 DOCUMENTATION

Various forms are required to ensure that adequate documentation is made of sample collection activities. These forms include:

- Boring logs
- Field log books
- Sample collection records
- Chain-of-custody records
- Shipping labels

The field team should document and log all field sampling decontamination methods. Repetitive decontamination of small items of equipment does not need to be logged each time the item is cleaned.

7 REFERENCES

ASTM. Standard Practice for Decontamination of Field Equipment Used at Nonradioactive Waste Sites: D 5088-90, 1990.

1 INTRODUCTION

1.1 Purpose and Applicability

This SOP describes the methods used for developing newly installed monitoring wells and/or existing wells which may require redevelopment/rehabilitation. This SOP is applicable to monitoring wells and/or small diameter recovery wells and piezometers.

Monitoring well development and/or redevelopment is necessary for several reasons:

- To improve/restore hydraulic conductivity of the surrounding formations as they have likely been disturbed during the drilling process, or may have become partially plugged with silt,
- To remove drilling fluids (water, mud), when used, from the borehole and surrounding formations, and
- To remove residual fines from well filter materials and reduce turbidity of groundwater, therefore, reducing the chance of chemical alteration of groundwater samples caused by suspended sediments.

Respective state or federal agency (regional offices) regulations may require specific types of equipment for use or variations in the indicated method of well development. Deviations from this SOP to accommodate other regulatory requirements should be reviewed in advance of the field program, should be explained in the project work plan, and must be documented in the field project notebook when they occur.

1.2 General Principles

Well development generally involves withdrawal of an un-specified volume of water from a well using a pump, surge block or other suitable method such that, when completed effectively, the well is in good or restored hydraulic connection with the surrounding water bearing unit and is suitable for obtaining representative groundwater samples or for other testing purposes.

1.3 Quality Assurance Planning Considerations

Field project personnel should follow specific quality assurance guidelines as outlined in the site-specific Quality Assurance Project Plan (QAPP) and/or Sampling Plan. The plan should indicate the preferred method of well development at a particular site based on project objectives, aquifer conditions, and agency requirements. Specific well performance criteria such as low turbidity values to be achieved following well development should also be specified as well as any requirements for collection/containerization and disposal of well development water.

1.4 Health and Safety Considerations

Monitoring well development may involve chemical hazards associated with materials in the soil or aquifer being characterized and may involve physical hazards associated with use of well development equipment. When wells are to be installed and developed on hazardous waste investigation sites, a Health and Safety Plan must be prepared and approved by the Health and Safety Officer before field work commences. This plan must be approved by the project Health and Safety Officer before work commences, must be distributed to all field project personnel, and must be adhered to as field activities are performed.

2 RESPONSIBILITIES

2.1 Project Geologist/Engineer

Development or oversight of development of new monitoring wells is the responsibility of the project geologist/engineer involved in the original installation of the well. Records of well development methods and results will be retained in the project file.

3 REQUIRED MATERIALS

Well development can be performed using a variety of methods and equipment. The specific method chosen for development of any given well is governed by the purpose of the well, well diameter and materials, depth, accessibility, geologic conditions, static water level in the well, and type of contaminants present, if any.

The following list of equipment, each with their own particular application, may be used to develop and/or purge monitoring wells.

3.1 Bailer Purging

A bailer is used to purge silt-laden water from wells after using other devices such as a surge block. In some situations, the bailer can be used to develop a well by bailing and surging, often accompanied with pumping. A bailer should be used for purging in situations where the depth to static water is greater than 25 feet and/or where insufficient hydraulic head is available for use of other development methods.

3.2 Surge Block Development

Surge blocks are commercially available for use with Waterra™-type pumping systems or may be manufactured using a rubber or teflon "plunger" attached to a rod or pipe of sufficient length to reach the bottom of the well. Well drillers usually can provide surge blocks if requested.

3.3 Pump Development

A pump is often necessary to remove large quantities of silt-laden ground water from a well after using the surge block. In some situations, the pump alone can be used to develop the well and remove the fines by overpumping. Since the purpose of well development is to remove suspended solids from a well and surrounding filter pack, the pump must be capable of moving some solids without damage. The preferred pump is a submersible pump which can be used in both shallow and deep ground water situations. A centrifugal pump may be used in shallow wells but will work only where the depth to static ground water is less than approximately 25 feet. Pumping may not be successful in low-yielding aquifer materials or in wells with insufficient hydraulic head.

3.4 Other Required Materials:

- Well development records (Figure 1)
- Health and Safety equipment
- Equipment decontamination materials
- Water quality instrumentation: nephelometer, pH, temperature, specific conductance meters, as required
- Field project notebook/pen

4 METHOD

4.1 General Preparation

- Well Records Review: Well completion diagrams should be reviewed to determine well construction characteristics. Formation characteristics should also be determined from review of available boring logs.
- Site Preparation: Well development, similar to groundwater sampling, should be conducted in as clean an environment as possible. This usually requires, at a minimum, placing sheet plastic on the ground to provide a clean working area for development equipment.
- IDW Containment: Provisions should be in place for collection and management of investigation-derived wastes (IDW), specifically well development water and miscellaneous expendable materials generated during the development process. The collection of IDW in drums or tanks may be required depending on project-specific requirements. The QAPP should specify the requirements for IDW containment.

- Water Level/Well Depth Measurement: The water level and well depth should be measured with a water level indicator and written on the well development record. This information is used to calculate the volume of standing water (i.e., the well volume) within the well.
- Equipment Decontamination: All down-well equipment should be decontaminated prior to use
- Removal of Drilling Fluids: Drilling fluids such as mud or water, if used during the drilling and well installation process, should be removed during the well development procedure. It is recommended that a minimum of 1.5 times the volume of added fluid be removed from the well during development. Drilling muds should initially have been flushed from the drilling casing during the well installation procedure with water added during the flushing process. If the quantity of added fluid is not known or could not be reasonably estimated, removal of a minimum of 10 well volumes of water is recommended during the development procedure.

4.2 Development Procedures

4.2.1 Development Method Selection

The construction details of each well shall be used to define the most suitable method of well development. Some consideration should be given to the potential degree of contamination in each well as this will impact IDW containment requirements.

The criteria for selecting a well development method include well diameter, total well depth, static water depth, screen length, the likelihood and level of contamination, and characteristics of the geologic formation adjacent to the screened interval.

The limitations, if any, of a specific procedure are discussed within each of the following procedures.

4.2.2 General Water Quality Measurements

Measure and record water temperature, pH, specific conductance, and turbidity periodically during development using the available water quality instruments. These measurements will aid in determining whether well development is proceeding efficiently, will assist in identifying when well development is complete, will determine whether the development process is effective or not with any given well and, potentially, may identify well construction irregularities (i.e., grout in well, poor well screen slot-size selection). Water quality parameters should be checked a minimum of 3 to 5 times during the development process.

4.2.3 Bailer Procedure

As stated previously, bailers shall preferably not be used for well development but may be used in combination with a surge block to remove silt-laden water from the well.

- When using a bailer to purge well water; select the appropriate bailer, then tie a length of bailer cord onto the end of it.
- Lower the bailer into the screened interval of the monitoring well. Silt, if present, will generally accumulate within the lower portions of the well screen.
- The bailer may be raised and lowered repeatedly in the screened interval to further simulate the action of a surge block and pull silt through the well screen.
- Remove the bailer from the well and empty it into the appropriate storage container.
- Continue surging/bailing the well until sediment-free water is obtained. If moderate to heavy siltation is still present, the surge block procedure should be repeated and followed again with bailing.
- Check water quality parameters periodically.

4.2.4 Surge Block Procedure

- A surge block effectively develops most monitoring wells. This device first forces water within the well through the well screen and out into the formation, and then pulls water back through the screen into the well along with fine soil particles. Surge blocks may be manufactured to meet the design criteria or may be purchased as an adaptor to fit commercially available well purging systems such as the Waterra system.
- Insert the surge block into the well and lower it slowly to the level of static water. Start the surge action slowly and gently above the well screen using the water column to transmit the surge action to the screened interval. A slow initial surging, using plunger strokes of approximately 3 feet, will allow material which is blocking the screen to separate and become suspended.
- After 5 to 10 plunger strokes, remove the surge block and purge the well using a pump or bailer. The returned water should be heavily laden with suspended silt and clay particles. Discharge the purged water into the appropriate storage container.
- Repeat the process. As development continues, slowly increase the depth of surging to the bottom of the well screen. For monitoring wells with long screens (greater than 10 feet) surging should be undertaken along the entire screen length in short intervals (2 to 3 feet) at a time. Continue this cycle of surging and purging until the water yielded by the well is free of visible suspended material.
- Check water quality parameters periodically.

4.2.5 Pump Procedure

- Well development using only a pump is most effective in monitoring wells that will yield water continuously. Theoretically, pumping will increase the hydraulic gradient and velocity of groundwater near the well by drawing the water level down. The increased velocity will move residual fine soil particles into the well and clear the well screen of this material. Effective development cannot be accomplished if the pump has to be shut off to allow the well to recharge.

- When using a submersible pump or surface pump, set the intake of the pump or intake line in the center of the screened interval of the monitoring well.
- Pump a minimum of three well volumes of water from the well and raise and lower the pump line through the screened interval to remove any silt/laden water. Continue pumping water from the well until sediment-free water is obtained. This method may be combined with the manual surge block method if well yield is not rapid enough to extract silt from the surrounding formations.
- Check water quality parameters periodically.

5 QUALITY CONTROL

A well has been successfully developed when one or more of the following criteria are met:

- The sediment load in the well has been eliminated or greatly reduced. Regulatory requirements may be in place which state that water turbidity values ranging from 5 to 50 NTU must be achieved at the end of the development procedure. Use of a nephelometer is required during the well development procedure to measure water turbidity if meeting a specific turbidity value is required by the regulations. Attaining low turbidity values in fine-grained formations may be difficult to achieve.

6 DOCUMENTATION

The Monitoring Well Development Record (Figure1) will be completed by the geologist or hydrogeologist conducting the development. In addition, a field project notebook should be maintained detailing any problems or unusual conditions which may have occurred during the development process.

7 Training/Qualifications

Well development procedures vary in complexity. It is recommended that initial development attempts be supervised by more experienced personnel. Field personnel should be health and safety certified as specified by OSHA (29 CFR 1910.120(e)(3)(i)) to work on sites where hazardous waste materials are considered to be present.

8 REFERENCES

Standard References for Monitoring Wells, Massachusetts Department of Environmental Protection, WSC-310-91, 1991.

EPA 1992. Monitoring Well Development Guidelines for Superfund Project Managers.

EPA 2001. Standard Operating Procedures (2044) Monitoring Well Development

Monitoring Well Development Record

Date:	**Well ID:**
Project Name:	**Location:**
Project Number:	**Developer:**
Check One	**Development Method:**
Original Development **Redevelopment**	**Well Construction Date**

Well Diameter		Geology at Screen Interval:
Total Well Depth		
Depth of Top of Screen		Purge Water and Sediment Disposal Method:
Depth of Bottom of Screen		
Water Level		
Three Well Volumes		**Well Volume = 3.14*(R^2*H*(CF)** R= Radius (feet), 2 inch = 0.17 feet H = Height of the water column CF = conversion factor = 7.48 gal/ft3

Water Quality Parameters					
Date/Time					
Approximate Volume Purged					
Color of Water/Notes					
Turbidity (NTU)					
pH					
Specific Conductivity					
Temperature					
During development periodically measure the water quality parameters Depending on project objectives and available time, development should proceed until these water quality parameters stabilize, or until the water has a turbidity of less than 50 nephelometric turbidity units (NTUs).					
Development should include the removal of a minimum of three well volumes.					

1 INTRODUCTION

1.1 Purpose and Applicability

This SOP provides guidance for installing groundwater monitoring wells. Monitoring wells are installed to monitor the depth to groundwater, to measure aquifer properties, and to obtain samples of groundwater for chemical analysis.

This SOP is applicable to installation of single monitoring wells within a borehole. The construction and installation of nested, multilevel or other special well designs is not covered within this SOP as these type of wells are not frequently constructed. This SOP applies to both overburden and bedrock monitoring wells.

Some states and EPA Regions have promulgated comprehensive guidelines for monitoring well construction and for subsurface investigation procedures. Deviations from this SOP to accommodate other regulatory requirements should be reviewed in advance of the field program, should be explained in the project work plan, and must be documented in the field project notebook when they occur.

1.2 General Principles

Monitoring well construction and installation generally involves drilling a borehole using conventional drilling equipment, installing commercially available well construction and filter/sealing materials, and development of the well prior to sampling. This SOP covers well construction and installation methods only. Borehole drilling and well development methods are covered under SOP-7115 (Subsurface Soil Sampling) and SOP-502 (Monitoring Well Development), respectively.

1.3 Health and Safety Considerations

Monitoring well installation may involve chemical hazards associated with materials in the soil or groundwater being investigated; and always involves physical hazards associated with drilling equipment and well construction methods. When wells are to be installed in locations where the aquifer and/or overlying materials may contain chemical hazards, a Health and Safety Plan (HASP) must be prepared and approved by the Health and Safety Officer before field work commences. This plan must be distributed to all field personnel and must be adhered to as field activities are performed.

1.4 Quality Assurance Planning Considerations

Field personnel should follow specific quality assurance guidelines as outlined in the site-specific QAPP. The following aspects of monitoring well design and installation procedures depend on project-specific objectives which should be addressed in the QAPP and in the project work plan:

- Borehole drilling method and diameter,
- Type of construction materials for well screen, riser, filter pack and seals,
- Diameter of well materials,
- Length of well screen,
- Location, thickness, and composition of annular seals, and
- Well completion and surface protection requirements.

2 RESPONSIBILITIES

2.1 Drilling Subcontractor

It is the responsibility of the drilling subcontractor to provide the necessary equipment for well construction and installation. Well construction materials should be consistent with project requirements.

2.2 Surveying Contractor

It is the responsibility of the surveying subcontractor to provide one or more of the following well measurements as specified in the project work plan: ground surface elevation, horizontal well coordinates, top of well casing elevation (i.e., top-of-casing, or measuring point elevation), and/or top of protective casing elevation.

2.3 Project Geologist/Engineer

t is the responsibility of the Project Geologist/Engineer to directly oversee the construction and installation of the monitoring well by the drilling subcontractor to ensure that the well-installation specifications defined in the project work plan are adhered to, and that all pertinent data are recorded on the appropriate forms.

2.4 Project Manager

It is the responsibility of the Project Manager to ensure that each project involving monitoring well installation is properly planned and executed.

3 REQUIRED MATERIALS

3.1 Well Construction Materials

Well construction materials are usually provided by the drilling subcontractor and most often consist of commercially available flush-threaded well screen and riser pipe constructed of PVC or stainless steel with a minimum 2-inch inside diameter. The length of the screen and the size of the screen slots should be specified in the project work plan.

3.2 Well Completion Materials

Well completion materials include silica sand, bentonite, cement, protective casings and locks. Completion materials are generally provided by the drilling subcontractor.

3.3 Other required material include the following:

- Potable water supply
- Fiberglass or steel measuring tape
- Water level indicator
- Well construction diagrams (Figure 1)
- Waterproof marker or paint (to label wells)
- Health and Safety supplies
- Equipment decontamination materials
- Field project notebook/pen

4 METHOD

4.1 General Preparation

4.1.1 Borehole Preparation

Standard drilling methods should be used to achieve the desired

drilling/well installation depths specified in the project work plan. Soil sampling, if conducted, should be conducted in accordance with SOP-400 (Subsurface Soil Sampling).

The diameter of the borehole must be a minimum of 2 inches greater than the outside diameter of the well screen or riser pipe used to construct the well. This is necessary so that sufficient annular space is available to install filter packs, bentonite seals, and grout seals. Bedrock wells may require reaming after coring in order to provide a large enough borehole diameter for well installation.

Rotary drilling methods requiring bentonite-based drilling fluids, if selected, should be used with caution to drill boreholes that will be used for monitoring well installation. The bentonite mud builds up on the borehole walls as a filter cake and permeates the adjacent formation, potentially reducing the permeability of the material adjacent to the well screen.

If water or other drilling fluids have been introduced into the boring during drilling or well installation, samples of these fluids should be obtained and analyzed for chemical constituents that may be of interest at the site. In addition, an attempt should be made to recover the quantity of fluid or water that was introduced, either by flushing the borehole prior to well installation and/or by over-pumping the well during development.

4.1.2 Well Materials Decontamination

Although new well materials (well screen and riser pipe) generally arrive at the site boxed and sealed within plastic bags, it is sometimes necessary to decontaminate the materials prior to their use. Well materials should be inspected by the project geologist/engineer upon delivery to check cleanliness. If the well materials appear dirty, or if local or regional regulatory guidance requires decontamination, then well material decontamination should be performed by the drilling subcontractor in accordance with SOP-100 (Decontamination of Field Equipment).

4.2 Well Construction Procedure

4.2.1 Depth measurement

Once the target drilling depth has been reached, the drilling subcontractor will measure the total open depth of the borehole with a weighted, calibrated tape measure. Adjustments of borehole depth can be made at this time by drilling further or installing a small amount of sand filter material to achieve the desired depth. If drilling fluids were used during the drilling process, the borehole should be flushed at this time using potable water. The water table depth may also be checked with a water level indicator if this measurement cannot be obtained with the calibrated tape.

4.2.2 Centralizers

In order to install a well which is centered within the borehole, it is recommended that centralizers be used. Centralizers are especially helpful for deep well installations where it may be difficult to position the well by hand. Centralizers may not be necessary on shallow water table well installations where the well completion depth is within 25 feet of the ground surface.

4.2.3 Well Construction

The well screen and riser pipe generally are assembled by hand as they are lowered into the borehole. Before the well screen is inserted into the borehole, the full length of the slotted portion of the well screen as well as the unslotted portion of the bottom of the screen should be measured with the measuring tape. These measurements should be recorded on the well construction diagram.

After the above measurement has been taken, the drilling subcontractor may begin assembling the well. As the assembled well is lowered, care should be taken to ensure that it is centered in the hole if centralizers are not used. The well should be temporarily capped before filter sand and other annular materials are installed.

4.2.4 Filter Sand Installation

The drilling subcontractor should fill the annular space surrounding the screened section of the monitoring well to at least 1 foot above the top of the screen with an appropriately graded, clean sand or fine gravel. In general, the filter pack should not extend more than 3 feet above the top of the screen to limit the thickness of the monitoring zone. If coarse filter materials are used, an additional 1-foot thick layer of fine sand should be placed immediately above the filter pack to prevent the infiltration of sealing components (bentonite or grout) into the filter pack. As the filter pack is placed, a weighted tape should be lowered in the annular space to verify the depth to the top of the layer. Depending upon depth, some time may be required for these materials to settle. If necessary, to eliminate possible bridging or creation of voids, placement of the sand pack may require the use of a tremie pipe. Tremie pipe sand pack installations are generally suggested for deep water table wells and for wells which are screened some distance beneath the water table.

4.2.5 Bentonite Seal Installation

A minimum 2-foot thick layer of bentonite pellets or slurry seal will be installed by the drilling subcontractor immediately above the well screen filter pack in all monitoring wells. The purpose of the seal is to provide a barrier to vertical flow of water in the annular space between the borehole and the well casing. Bentonite is used because it swells significantly upon contact with water. Pellets generally can be installed in shallow boreholes by pouring them very slowly from the surface. If they are poured too quickly, they may bridge at some shallow, undesired depth. As an option, powdered bentonite may be mixed with water into a very thick slurry and a tremie pipe used to inject the seal to the desired depth.

4.2.6 Annular Grout Seal Installation

This grout seal should consist of a bentonite/cement mix with a ratio of bentonite to cement of between 1:5 and 1:20. The grout ratio should be chosen based on site conditions with a higher percentage of bentonite generally used for formations with higher porosity. A mud balance should be used if a specific mud density is required at a particular site. Grout slurry should be pumped into the annular space using a side-discharging tremie pipe located about 2 feet above the sand pack. Side discharge will help preserve the integrity of the sand pack.

In situations where the monitoring well screen straddles the water table, the seal will be in the unsaturated zone and pure bentonites (pellets or powder) will not work effectively as seals without hydration. Dry bentonite may be used if sufficient time to hydrate the seal is allowed. Seal hydration requires the periodic addition of clean water. Optionally, seals in this situation may be a cement/bentonite mixture containing up to 10 percent bentonite by weight. This type of mixture shall be tremied to the desired depth in the borehole.

The borehole annulus will be grouted with seal materials to within 3 feet of the ground surface. Drill cuttings, even those known not to be contaminated, will not be used as backfill material.

4.2.7 Well Completion

The drilling subcontractor will cut the top of the well to the desired height and install a vented (if possible), locking cap. The upper portion of the well casing can optionally be drilled to allow venting. Well casings are usually cut to be a certain height above ground surface (typically 2.5 to 3 feet) or are cut to be flush with the ground surface.

4.2.8 Protective Casing/Concrete Pad Installation

The drilling subcontractor will install a steel guard pipe on the well as a protective casing. The borehole around the guard pipe will be dug out to an approximate 2 to 3-foot radius to a minimum depth of 1 foot at the center and 6 inches at the edges. After installing the protective casing, the excavation will be filled with a concrete/sand mix. The surface of the concrete pad will be sloped so that drainage occurs away from the well. Flush-mount protective casings may not require an extensive concrete pad and should be completed such that they are slightly mounded above the surrounding surface to prevent surface water from running over or ponding on top of the casing. It should be noted, however, that in areas subject to snowfall, flush-mount casings may have to be installed so that they are entirely flush with the ground surface as they may be damaged by snow plows.

Above-ground protective casings should also be vented or should have non-air tight caps. Road box installations should not be vented. Installation of additional guard pipes may be necessary around above-ground well completions in traffic areas. Protective casings should be lockable to prevent unauthorized access.

4.2.9 Well Numbering/Identification

The project geologist/engineer will number each well casing with an indelible marker or paint to identify the well. This is particularly important with nested or paired wells to distinguish between shallow and deep wells. The well should be labeled on both the outside of the protective casing and inside beneath the protective casing lid. A permanent identification tag may be installed the request of the well owner. For wells in the state of Washington, a Washington Department of Ecology identification tag will be installed inside the well completion of secured to the outside protective cover.

4.2.10 Measuring Point Identification

The project geologist/engineer will mark the measuring point from which water level measurements will be made at a specific location along the upper edge of the well casing. PVC wells can easily be notched with a pocket knife or saw. Stainless steel wells (or PVC wells) can be marked with a waterproof marker on the outside of the well casing with an arrow pointing to the measuring point location. The measuring point is the point which will require surveying during the well elevation survey task.

4.2.11 Well Measurements

Upon completion, the following well measurements should be taken by the project geologist/engineer and recorded on the well construction diagram (Figure 1):

- Depth to static water level if water level has stabilized,
- Total length of well measured from top-of-well casing,
- Height of well casing above ground surface,
- Height of protective casing above ground surface,
- Depth of bottom of protective casing below ground surface (may be estimated).

Well screen filter pack, bentonite seal and annular seal thicknesses and depths should also be recorded on the well construction diagram.

4.2.12 Disposal of Drilling Waste

Drill cuttings and other investigation-derived wastes such as drilling mud or well development/purge water must be properly contained and disposed of. Site-specific requirements for collection and removal of these waste materials should be outlined within the project work plan. Containment of these materials should be performed by the drilling subcontractor.

4.2.13 Well Development

At some point after installation of a well and prior to use of the well for water-level measurements or collection of water quality samples, development of the well shall be undertaken in accordance with SOP-502 (Monitoring Well Development). Well development may be performed by the drilling subcontractor if contracted to do so, or by the project geologist/engineer or other project staff.

4.2.14 Well Elevation Survey

At the completion of the well installation program, all monitoring wells are usually surveyed to provide, at a minimum, the top-of-casing measuring point elevation for water level monitoring purposes. Other surveyed points which may be required by the project work plan include: ground surface elevation, top of protective casing elevation, and well coordinate position. Well elevation surveys are usually conducted by a surveying subcontractor.

5 QUALITY CONTROL

Certain quality control measures should be taken to ensure proper well completion.

The borehole will be checked for total open depth, and extended by further drilling or shortened by backfilling, if necessary, before any well construction materials are placed.

Water level and non-aqueous phase liquid (NAPL) presence will be checked during well installation to ensure that the positions of well screen, sand pack, and seal, relative to water level, conform to project requirements.

The depth to the top of each layer of packing (i.e., sand, bentonite, grout, etc.) will be verified and adjusted if necessary to conform to project requirements before the next layer is placed.

If water or other drilling fluids have been introduced into the boring during drilling or well installation, samples of these fluids may be required for analysis of chemical constituents of interest at the site.

6 DOCUMENTATION

All well construction data will be recorded on the Monitoring Well Construction Detail form (Figure 1). All wells will be referenced onto the appropriate site map. A field notebook and/or boring log will be used as additional means of recording data. In no case will the notebook or boring log take the place of the well construction diagram.

7 TRAINING/QUALIFICATIONS

Well construction and installation requires a moderate degree of training and experience as numerous drilling situations may occur which will require field decisions to be made. It is recommended that inexperienced personnel be supervised for several well installations before working on their own. Experienced drillers are also of great assistance with problem resolution in the field. Field personnel should be health and safety certified as specified by OSHA (29 CFR 1910.120(e)(3)(i)) to work on sites where hazardous waste materials are considered to be present. Well installations will be completed by over installed with oversight by a state licensed well driller.

8 REFERENCES

Standard References for Monitoring Wells, Massachusetts Department of Environmental Protection, WSC-310-91, 1991.

APPENDIX: DEFINITIONS

Annulus: The measured width between the borehole wall and the outside of the well screen or riser pipe.

Bentonite Seal: A granular, chip, or pellet-size bentonite material that is often used to provide an annular seal above the well screen filter pack. This seal is typically installed dry followed by in-place hydration with or without the addition of water. Hydrated bentonite is sometimes used as a grout seal.

Bottom Cap/Plug: Threaded or slip-on cap placed at the bottom of the well prior to installation. Often serves as a sump for accumulation of silt which settles within the well. The measured length from the lowermost well screen slot to the bottom of the bottom cap is known as the sump or tail pipe portion of the well.

Centralizers: Stainless steel expansion clamps which, when fitted to well screens or riser pipe, expand to contact the borehole walls positioning the well centrally within the open borehole. Centralizers assist with even positioning and distribution of filter pack and sealant materials and assist with maintaining well plumbness.

Expansion Cap/Well Cap: Cap used to cover the opening at the top of the well riser pipe. Expansion caps are equipped with a rubber gasket and threaded wing nut which, when turned, provides a watertight seal. Expansion caps may also be locked, and generally are recommended for use with flush-constructed wells where road box protective casings are also used. Other well caps may include slip-on or threaded caps made of the same material as the well casing.

Filter Pack: A well-graded, clean sand or gravel placed around the well screen to act as a filter in preventing the entry of very fine soil particles into the well.

Grout Seal: A cement/bentonite mixture used to seal a borehole that has been drilled to a depth greater than the final well installation depth or to seal the remaining borehole annulus once the well has been installed. Occasionally, pure cement or pure bentonite is used as a grout seal.

Measuring Point: A selected point at the top of the well casing (riser pipe) used for obtaining periodic water-level measurements. The measuring point should consist of either a notch or indelibly marked point on the upper surface of the casing. Typically, the highest point on the casing (if not level) is used as the measuring point. The measuring point is also the point that is surveyed when well elevation data is obtained.

Protective Casing: A locking metal casing, placed around that portion of the well riser pipe that extends above the ground surface. The protective casing is generally cemented in place when the concrete pad is constructed around the well.

APPENDIX: DEFINITIONS

Riser Pipe: The section of unperforated well casing material used to connect the well screen with the ground surface. Frequently, it is made of the same material and has the same diameter as the well screen. Riser pipe is typically available pre-cleaned and pre-threaded for immediate use.

Road Box: A protective casing that is flush-mounted with the ground around a well installation. Road boxes are used in areas where the monitoring well cannot extend above the ground surface for traffic or security reasons. Road boxes usually require a special key to open.

Tremie Pipe: A small diameter pipe which fits in the open borehole annulus and is used to inject filter sands or hydrated seal materials under pressure.

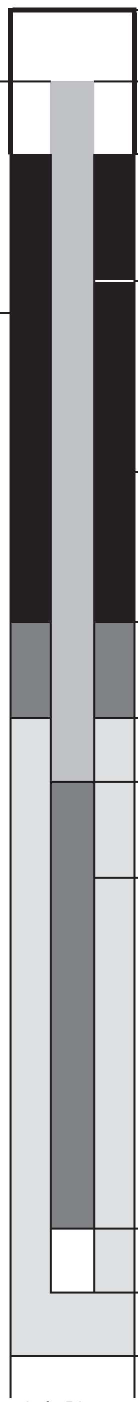
Well Screen: That portion of the well casing material that is perforated in some manner so as to provide a hydraulic connection to the aquifer. Typically a well screen is purchased pre-slotted, pre-cleaned, and pre-threaded for immediate use.

Vent Hole: Small diameter hole drilled in the upper portion of the well riser pipe which provides atmospheric venting of the well. Allows for constant equilibration of the water level with changing atmospheric conditions. In flood-prone areas, or with flush-mount wells, vent holes should not be used.

Monitoring Well Construction Detail

CRETE CONSULTING, INC.	*Client:*	WELL ID:
	Project Number:	
	Site Location:	*Date installed:*
	Well Location:	*Inspector:*
	Method:	*Contractor:*

MONITORING WELL CONSTRUCTION DETAIL



		Depth from G.S. (feet)	Elevation(feet) Datum ________
Measuring Point for Surveying & Water Levels	Top of Steel Guard Pipe	________	________
	Top of Riser Pipe	________	________
	Ground Surface (G.S.)	________	________
Cement, Bentonite, Bentonite Slurry Grout, or Native Materials	Riser Pipe:		
	Length ________		
	Inside Diameter (ID) ________		
	Type of Material ________		
____ % Cement			
____ % Bentonite	Bottom of Steel Guard Pipe		
____ % Native Materials			
	Top of Bentonite	________	________
	Bentonite Seal Thickness ________		
	Top of Sand	________	________
	Top of Screen	________	________
	▼ Stabilized Water Level	________	________
	Screen:		
	Length ________		
	Inside Diameter (ID) ________		
	Slot Size ________		
	Type of Material ________		
	Type/Size of sand ________		
	Sand Pack Thickness ________		
	Bottom of Screen	________	________
	Bottom of Tail Pipe:	________	________
	Length ________		
	Bottom of Borehole	________	________

Borehole Diameter ________

Describe Measuring Point:

____

________________ Signature

________________ Date

CRETE
CONSULTING, INC.

DAILY FIELD REPORT	
PROJECT NAME:	DATE:
LOCATION:	ARRIVE AT SITE:
COMPLETED BY:	DEPART SITE:
WEATHER CONDITIONS:	REVIEWED BY:

PURPOSE:

OBSERVATIONS AND SUMMARY:

1 INTRODUCTION

1.1 Purpose and Applicability

This Standard Operating Procedure (SOP) describes the methods available for collecting subsurface soil samples using commercially available Geoprobe™ Systems or split spoon sampling methods or similar soil sampling equipment. Sub surface soil samples may be obtained using this system for purposes of determining subsurface soil conditions and for obtaining soil samples for physical and/or chemical evaluation.

This SOP covers subsurface soil sampling using Geoprobe™ Systems equipment; specifically, the Macro-Core Soil Sampler, and the Large Bore Sampler. Use of this sampling equipment requires use of the Geoprobe™ hydraulically-powered percussion/probing machine. The Geoprobe™ sampling methods are applicable to unconsolidated soil/fill materials and to a maximum depth of approximately 15-30 feet. The maximum depth is dependent on the site specific soil density because the sampling equipment is hydraulically-powered. Sample recovery is also dependent on grain size as very coarse gravel, cobbles, and boulders will occasionally cause premature refusal of the sampler.

This SOP also covers subsurface soil sampling by split spoon, which is a common method for obtaining samples at deeper depths (greater than 20 feet) but can also be used to collect shallower samples. Other types of samplers such as thin-wall tube samples (e.g. Shelby tubes), piston samplers and continuous core barrel samplers but are not discussed in this SOP, details of sampling related to these types of samplers can be found in the American Society of Testing and Materials standards.

1.2 General Principles

1.2.1 Geoprobe Sampling

The percussion/probing machine is typically mounted onto the bed of a truck or ATV-mounted so that a stable working platform is established. The percussion/probing machine pushes and hammers the soil sampling equipment vertically into the ground within the targeted sampling interval. The soil sampler is then extracted from the ground to recover the sample.

The Macro-Core Sampler consists of a 45-inch long by 1.5-inch diameter open-ended steel sampling tool with liners made of clear plastic (cellulose acetate butyrate), stainless steel, or teflon. The tool is designed for use in a continuous sampling capacity in an open borehole up to depths of approximately 30-50 feet. The borehole walls are required to stay open in order to collect a sample from the next depth interval. Once the sampling tool is removed from the ground, the inserted liner containing the soil sample is removed from the tool. The soil sample is then cut from or extracted from the liner. This sampling tool is most often used for soil profiling and collection of larger volume soil samples (1,300 ml).

The Large Bore Sampler consists of a 22-inch long by a slightly over 1-inch diameter steel sampling tool and may be used for sampling to depths of approximately 30-50 feet. Various liner types are available for use with this sampler, and include: plastic, brass, stainless steel, and teflon. The metal liners are available in segmented 6-inch lengths. The sampler is designed for discrete interval sampling and is not affected significantly by borehole wall collapse. This sampler is similar to a piston sampler where a retractable drive (piston) point is withdrawn when the targeted sampling interval is achieved and the soil sample enters the sampler. Once the sampler is removed from the ground, the inserted liner containing the soil sample is extracted from the sampler and the soil sample is then cut from or extracted from the liner. The segmented liner materials and discrete interval sampling capability gives this device greater suitability for collection of smaller volume soil samples (320 ml).

1.2.2 Split Spoon Sampling

Split-spoon subsurface sampling methods require the use of a drilling rig (e.g. hollow-stem auger) to drill a borehole in which a split spoon sampling device is inserted and then driven to collect soil at the desired depth. The sampling device is driven using a weighted hammer and retrieved and opened to remove the recovered soil sample. Soil samples can be collected at continuous intervals or at pre-selected intervals. Typical split spoon samplers are used on a 2 inch diameter auger, though sampling devices come in a variety of sizes to fit difference auger diameters.

1.3 Quality Assurance Planning Considerations

Sampling personnel should follow specific quality assurance guidelines as outlined in the site-specific Quality Assurance Project Plan (QAPP). Proper quality assurance requirements should be provided which will allow for collection of representative samples from representative sampling points. Quality assurance requirements outlined in the QAPP typically suggest the collection of a sufficient quantity of field duplicate, field blank, and other samples.

1.4 Health and Safety Considerations

All utilities (electric, water, sewer, etc.) or property owners who may have equipment or transmission lines buried in the vicinity of proposed investigation area should be notified. Sufficient time should be allowed after notification (typically 3 working days) for the utilities to respond and mark locations of any equipment that may be buried on site. The estimated location of utility installations, such as sewer, telephone, electric, water lines and other underground installations that may reasonably be expected to be encountered during excavation work, shall be verified by the site owner prior to opening an excavation and may require a private utility locate to verify location and or material present.

The health and safety considerations for the site, including both potential physical and chemical hazards, will be addressed in the site-specific Health and Safety Plan (HASP). All field activities will be conducted in conformance to this HASP.

2 RESPONSIBILITIES

2.1 Project Geologist/Engineer

It will be the responsibility of the project geologist/sampling engineer to conduct subsurface soil sampling in a manner which is consistent with this SOP. The project geologist/sampling engineer will observe all activities pertaining to subsurface soil sampling to ensure that the SOP is followed, and to record all pertinent data onto a boring log. It is also the project geologist/sampling engineer's responsibility to indicate the specific targeted sampling depth or sampling interval to the drilling subcontractor. The project geologist/sampling engineer is also responsible for the collection of representative environmental or stratigraphic characterization samples once the sampling device has been retrieved and opened. Additional sample collection responsibilities include labeling, handling, and storage of samples until further chain-of-custody procedures are implemented.

2.2 Drilling Subcontractor

It will be the responsibility of the drilling subcontractor to provide the necessary Geoprobe™ or auger drilling equipment for obtaining subsurface soil samples. For Geoprobe™ equipment this generally includes the truck or ATV-mounted percussion/probing machine and one or more Macro-Core and Large Bore samplers in good operating condition, appropriate liners, and other necessary equipment for borehole preparation and sampling. For split spoon sampling a drill rig – such as a hollow-stem auger drill rig – and one or more split spoon sampling devices which fit with the drill rig augers, all of which should be in good operating condition.

It is the drilling subcontractor's responsibility to provide and maintain their own boring logs if desired. Equipment decontamination materials should also be provided by the subcontractor and should meet project specifications.

3 REQUIRED MATERIALS

In addition to those materials provided by the subcontractor, the project geologist/sampling engineer will require:

- Project Sampling Plan, QAPP, and HASP

- Field records/logbook (boring logs)
- Sampling spoons and sample collection bowl
- Stakes and/or fluorescent flagging for marking locations
- Sample kit (bottles, labels, custody records and tape, cooler)
- Folding rule or tape measure
- Equipment decontamination materials (as required by QAPP)
- Health and safety equipment (as required by HASP)
- Sheet plastic
- Decontamination materials and solutions

Sampling equipment which comes in direct contact with environmental samples during the sample collection process should be constructed of stainless steel, teflon, or glass, unless specified otherwise in the Project Sampling Plan or QAPP.

4 METHOD

4.1 General Method Description – Geoprobe

Geoprobe™ soil sampling methods generally involve collection of soil samples by driving the sampling tool directly into the ground using the percussion/probing machine and without the aid of hollow-stem augers or other casing-installed drilling methods. Both the Macro-Core and Large Bore soil samplers consist of metal tubes of seamless construction which can not be split apart like split-spoons. Liner/sleeve inserts are required in order to extract an intact soil core/sample from the sampling device.

Both sampling devices operate by being directly pushed/hammered into the ground by the percussion/probing machine. The borehole is created as the sampling device is advanced downward. The Macro-Core Sampler collects samples continuously and requires that an open borehole be maintained for efficient sample recovery. The Large Bore Sampler contains a piston tip/drive point which allows for advancing the sampler to a designated depth for discrete interval sampling. The piston tip is retracted when the desired sampling interval is reached. When the soil sampling device is retrieved from the borehole, the drive head, cutting shoe and/or piston assembly is removed, and the liner insert with sample is removed from the sampling device. The project geologist/sampling engineer is then given access to the sample for whatever purpose is required.

4.2 General Method Description – Split Spoon Sampling

Split spoon sampling devices are typical construction of steel and most commonly available in lengths of 18 and 24 inches. Sampling device diameters are typical 1.5 to 3 inches. The sampling device includes a long tubular column with two halves that split apart lengthwise, a drive head is located on the upper end with a ball-check valve for venting and a hardened steel cutting shoe is located at the bottom. Soil enters the sampling device through the hardened steel cutting shoe as the sampler is driven into the ground to the required depth. Inside the cutting shoe is often a plastic or metal basket that prevents the soil sample from falling out of the shoe as the sample is retrieved.

Soil borings completed with a hollow-stem auger (typical for completing soil borings for the collection of soil samples) must have casing/augers of sufficient diameter to allow for the collection of the minimum soil sample volume required in the Sampling Plan. The casing/augers are advanced to the required sampling depth per the Sampling Plan. If hollow-stem augers are used, a temporary plug shall be used in the lead auger to prevent the auger from becoming filled with drill cuttings while drilling is in progress.

Use of added or recirculated water during drilling is permitted when necessary but should be minimized to avoid any possible impacts to the sample quality. Water usage shall be documented in the field notebook and should follow the QAPP or Sampling Plan.

4.3 Equipment Decontamination

Each sampling device must be decontaminated prior to its initial use and following collection of each soil sample. If sampling for soil logging only is conducted, thorough sampler decontamination between samples may not be necessary although sufficient cleansing is necessary for the sampler to operate properly. Site-specific requirements for equipment decontamination should be outlined in the Project Sampling Plan.

4.4 Sampling Procedures - Macro-Core Sampler

These procedures are excerpted from Geoprobe™ Systems literature. This SOP assumes that the subcontractor will perform sampling; therefore, detailed procedures regarding sample aquisition are not provided.

4.4.1 Sampler Preparation

- Decontaminate the sampler parts (cutting shoe, sample tube, liners) before assembly.
- Assemble the sampler by first placing the liner over the inside end of the cutting shoe, then inserting the liner/shoe assembly into the sample tube, and then finally threading the cutting shoe into the sample tube. Tighten the cutting shoe with the shoe wrench.
- Thread the sampler onto the drive head.

4.4.2 Sampling

- Using the percussion/probing machine, drive the sampler into the ground until the drive head reaches the ground surface.
- For deeper samples, the borehole walls must remain stable. The cutting shoe is designed with a tapered surface to limit sidewall scraping. Add additional probe rods until the sampler reaches the targeted sample interval, then drive the sampler through the desired sample interval.
- Use the machine hydraulics to pull the sampler from the borehole.

4.4.3 Sample Recovery

- Once the sampler has been removed from the borehole, the sampler must be unthreaded from the drive head, the cutting shoe unthreaded from the sampler, and the liner/shoe assembly removed from the sample tube.
- Disconnect the cutting shoe from the liner which contains the soil sample. The recovered soil sample may now be viewed, logged, and extracted from the liner for analysis (refer to Section 4.5 for sample containment procedures).

4.5 Sampling Procedures - Large Bore Sampler

These procedures are excerpted from Geoprobe™ Systems literature. This SOP assumes that the subcontractor will perform sampling; therefore, detailed procedures regarding sample acquisition are not provided. Additional detailed sampling procedures for this specific item of equipment is presented in Geoprobe™ Technical Bulletin No.93-660, appended to this SOP.

4.5.1 Sampler Preparation

- Decontaminate the sampler parts (cutting shoe, piston rod/tip, sample tube, liners) before assembly.
- Assemble the sampler by first placing the liner on the cutting shoe, then threading the liner/shoe assembly into the sample tube, then connecting the piston tip to the piston rod, and then finally inserting the piston tip/rod assembly into the sample tube. Tighten the cutting shoe with the shoe wrench.
- Thread the sampler onto the drive head. Thread the stop-pin onto the drive head (stop-pin holds the piston tip/rod in place while driving the sampler to the desired sample interval).

4.5.2 Sampling

- Using the percussion/probing machine, drive the sampler into the ground until the upper portion of the targeted sampling interval is achieved.

- Unthread and remove the stop-pin from the drive head using extension rods. This will activate the piston tip/rod.
- Drive the sampler through the targeted sampling interval to collect the sample. The piston tip/rod will retract as the sample enters the sample tube.
- Use the machine hydraulics to pull the sampler from the ground.

4.5.3 Sample Recovery

- Once the sampler has been removed from the ground, the sampler must be unthreaded from the drive head, then the cutting shoe unthreaded from the sample tube, and the liner/shoe assembly removed from the sample tube.
- Disconnect the cutting shoe from the liner which contains the soil sample. The recovered soil sample may now be viewed, logged, and extracted from the liner for analysis (below).

4.6 Sampling Procedures – Split Spoon Sampler

- Decontaminate the sampler parts (cutting shoe, piston rod/tip, sample tube, baskets) before assembly.
- Assemble the sampler by placing the 2 split halves together, thread the cutting shoe (with the basket inserted, if used) and then place the top ball check valve. Tighten the cutting shoe with the shoe wrench.
- Thread the sampling device to the drilling auger.

4.6.1 Sampling

- The driller will lower the split spoon into the borehole. The sampler will be driven, using Standard Penetration Test in ASTM Standards (ASTM D 1586-84) with a 140-pound hammer with a vertical free drop of 30 inches using two turns of rope on the cathead. The number of hammer blows required for every 6 inches of penetration will be recorded on the boring log.
- Once the split spoon is driven to depth, or to refusal, it will be removed, buy the driller, from the borehole.

4.6.2 Sample Recovery

- Once the sampler has been removed from the ground, the sampler must be unthreaded from the drive head, then the cutting shoe unthreaded from the sample tube, and the liner/shoe assembly removed from the sample tube.
- Disconnect the cutting shoe from the liner which contains the soil sample. The recovered soil sample may now be viewed, logged, and extracted for analysis (below).

4.7 Sample Containment

4.7.1 General

- The soil sample can be removed from the liner/split spoon device following viewing and/or logging. Non-segmented plastic or teflon liners should be cut with a utility knife into approximate 6-inch lengths to facilitate sample extraction or to isolate specific sample zones targeted for analysis. Segmented metal liners can be manually separated.
- Once the liner has been separated, the soil sample may be extracted from the individual liner segments with a spoon or spatula. Except for volatile organic samples (see below), the soil sample should be placed into a sample collection pan and homogenized. Place the sample directly into the required sample container.
- Once filled, the sample container should be properly capped, cleaned and labeled. Sample chain-of-custody and preservation procedures should then be initiated.
- Perform equipment decontamination following containment of the sample.

4.7.2 Volatile Organic Samples

- Using Geoprobe methods, the use of teflon liners is preferred when sampling for analysis of volatile organic compounds (VOC) because these liners are more inert. In order to limit the potential for loss of volatiles, the soil sample should be removed from the liner as soon as possible after sample recovery. VOC soil samples should be selected from a central point within the liner unless another specific sample zone has been targeted. The liner should be cut with a knife and the sample immediately extracted and containerized. Clean and label the container and place it into acooler immediately. Residual sample may then be used to fill other sample or logging requirements.
- Using a split spoon sampling methods, to limit the potential loss of volatiles during sample collection, the soil sample needs to be obtained as quickly and as directly (from the sampler) as possible. This generally means the VOC sample is collected and placed in the sample container as soon as the split spoon is opened, prior to inspection of the soil or the collection of other samples. The VOC sample should be collected from a discrete portion of the entire sample interval and not composited or homogenized in the field, as this can cause VOC to volatize with the air.

5 QUALITY CONTROL

Quality control requirements are dependent on project-specific sampling objectives. The QAPP will provide requirements for equipment decontamination (frequency and materials), sample preservation and holding times, sample container types, sample packaging and shipment, as well as requirements for the collection of various quality assurance samples such as trip blanks, field blanks, equipment blanks, and field duplicate samples.

6 DOCUMENTATION

Various forms are required to ensure that adequate documentation is made of sample collection activities. These forms include:

- Boring logs
- Field log books
- Sample collection records
- Chain-of-custody records
- Shipping labels

Boring logs will provide visual and descriptive information for each sample collected and are often the most critical form of documentation generated during a soil sampling program. The field log book is kept as a general log of activities and should not be used in place of the boring log. Occasionally, sample collection records are used to supplement boring logs, especially for environmental samples which have been collected for laboratory analysis. Chain-of-custody forms are transmitted with the samples to the laboratory for sample tracking purposes. Shipping labels are required if sample coolers are to be transported to the laboratory by a third party (courier service). Original copies of these records should be maintained in the appropriate project files.

7 REFERENCES

Geoprobe™ Systems, August 1993, "1993-94 Equipment and Tools Catalog".

ASTM D 1586-84 - Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils

1 INTRODUCTION

1.1 Purpose and Applicability

This standard operating procedure (SOP) is concerned with the collection of valid and representative samples of groundwater from direct push temporary borings. The scope of this document is limited to field operations and protocols applicable during groundwater sample collection.

This SOP is written in a broad-based manner and considers the application of a variety of sampling equipment in the collection of representative groundwater samples. Respective state and/or federal agency regulations may require specific types of equipment to be used when applying this SOP to a particular project. The project manager should review the applicable regulatory requirements, if any, prior to the start of the field sampling program. Deviations from this SOP to accommodate regulatory requirements should be reviewed in advance of the field program and documented in the project work plan.

Specific methods for groundwater sampling from temporary borings will depend on the drilling methods and tools used to install the monitoring point. It is typical to collect samples from drilling tooling (such as the Geoprobe© groundwater sampling tool) or to install a temporary wells. Piezometers may also be used, which are often selected when determining water quality as it discharges to a surface water body. For this SOP the term ‘sampling point’ is used to reference various temporary groundwater monitoring points used to evaluate groundwater quality. Field notes should document the specific sampling point construction details/type and methods for sample collection.

1.2 Quality Assurance Planning

Sampling personnel should follow specific quality assurance guidelines as outlined in the site-specific QAPP. Proper quality assurance requirements should be provided which will allow for collection of representative samples from representative sampling points. Quality assurance requirements typically suggest the collection of a sufficient quantity of quality control (QC) samples such as field duplicate, equipment and/or field blanks and matrix spike/matrix spike duplicate (MS/MSD) samples. These requirements should be outlined in the QAPP.

1.3 Health and Safety Considerations

Groundwater sampling may involve chemical hazards associated with the materials being sampled. Adequate health and safety measures must be taken to protect project sampling personnel from potential chemical exposures or other hazards.

These measures must be addressed in the project Health and Safety Plan (HASP). This plan must be approved by the project Health and Safety Officer before work commences, must be distributed to all personnel performing sampling, and must be adhered to as field activities are performed.

2 RESPONSIBILITIES

2.1 Project Manager

The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the measurements in accordance with this SOP and the project-specific work plan.

2.2 Sampling Technician

It is the responsibility of the sampling technician to be familiar with the sampling procedures outlined within this SOP and with specific sampling, quality assurance, and health and safety requirements outlined within project-specific work plans (Sampling Plan, HASP, and QAPP). The sampling technician is responsible for collection of groundwater samples and for proper documentation of sampling activities as samples are being collected.

3 REQUIRED MATERIALS

Groundwater sampling objectives may vary significantly between projects. Project objectives should be defined within the project-specific work plans. The list of required materials below identifies the types of equipment which may be used for a range of groundwater sampling applications. From this list, a project-specific equipment list should be selected based upon project objectives and other factors such as the depth to groundwater, well construction, and analytical parameters, among others. The various types of sampling equipment which may be used include:

<u>Field Instruments</u>

• Water level measuring device

• Interface probe or product detection paste

• Individual or multi-parameter meter(s) to measure temperature, pH, specific conductance, dissolved oxygen (DO) oxidation reduction potential (ORP), and/or turbidity

<u>Sampling Equipment</u>

• Reusable or disposable bailers

• Peristaltic pump

• Bladder pump

• tubing

Sample Preparation Equipment

• Filtration equipment

• Sample kit (i.e., bottles, labels, preservatives, custody records, cooler)

General Equipment

• Project-specific sampling plans (SAP, QAPP, HASP)

• Sample collection records

• Field notebook/pen

• Waterproof marker pens

• Deionized water dispenser bottler

• Buckets

• Coolers, or sample shuttles

• Instrument calibration solutions

• Power source (generator of 12V marine battery)

• Equipment decontamination supplies

• Health and safety supplies

• First-Aid kit

• Tool box

Expendable Materials

• Deionized water supply

- Disposable bailer string (nylon or polypropylene)
- 0.45 micron filters
- Paper towels
- Plastic sheeting
- Ice/blue ice for sample preservation
- Disposable latex powder-free glove liners
- Disposable nitrile gloves
- Plastic trash bags
- Ziplock® bags

This equipment list was developed to aid in field organization and should be used in preparation for each sampling event. Depending on the site-specific sampling plan, additional material and equipment may be necessary and should be determined before the scheduled sampling event. Similarly, not all of the items shown in this list may be necessary for any one sampling event.

4 Method

4.1 Free Product Determination

Sampling points that may potentially contain free product should be assessed for product with an interface probe or product detection paste. Interface probes generally operate on the same principle as a water level tape although they are designed to register water and product levels usually with different audible tones. Product paste generally is used in combination with some type of measuring tape which is lowered into the well with a coating of paste applied to it. Sampling points containing free product are generally not used for groundwater sampling, since the concentration of contaminants present in the free product can adversely affect the quality of the water sample, lending to a non-representative water sample.

4.2 Water Level Measurement

To obtain a water level measurement, lower the probe of a water level measuring device into the open sampling point until the audible sound of the unit is detected or the light on an electronic sounder illuminates. At this time the precise measurement should be determined (to nearest 0.01 feet) by repeatedly raising and lowering the tape to converge on the exact measurement. Obtain the reading of the from a consistent measuring point within the project, typically this is the top of the sampling point device. Conver this to the top of ground surface so that the water level measurement can be applied across the site. The water level measurement should be entered on the Groundwater Sample Collection Record or in the field records.

The measurement device shall be decontaminated immediately after use with a non-phosphatic detergent and rinsed with distilled water. Generally, only that portion of the tape which enters the water table should be cleaned. It is important that the measuring tape is never placed directly on the ground surface or allowed to become kinked. Measuring devices, including interface probes, which come into contact with free product will likely require more thorough decontamination.

4.3 Sample Point Purging

Prior to sample collection, purging must be performed for all sampling points to remove turbidity generated during the disturbance of the soil column during installation of the sampling point/soil boring. Purging of stagnant water from within the casing and gravel pack, which is required when sampling monitoring wells, is not needed when sampling from temporary borings. Because the boring was installed directly into the water column, there has not been time for water to accumulate and become trapped within the opening of the sampling point or any filter packs (if present). Typically purging is completed until the turbidity has visually decreases.

Often one round of water quality measurements is collected prior to collecting the groundwater sample. This information provides a snap shot of water conditions at the time of sampling but may not be required for all projects. Measurements of the pumping rate, turbidity, temperature, pH, and specific conductance (and/or other parameters as required) should be made at the end of purging and documented on the Groundwater Sample Collection Record or in the field logbook.

NOTE: This SOP only describes the most common equipment and methods used for purging. Other purging equipment, as well as dedicated equipment, can be used provided that the method employed does not have an adverse effect on the overall quality of the groundwater.

4.3.1 Bailing

General

Bailing is often the most convenient method for sample point purging. Bailers are constructed using a variety of materials including PVC, polyethylene, stainless steel, and Teflon®. Teflon® bailers are generally most "inert" and are available in reusable and disposable form. Disposable polyethylene bailers are relatively inert and inexpensive. Reusable stainless steel and PVC bailers must be decontaminated between uses. Most commercially available bailers are constructed to fit into a 2-inch diameter sampling point, although other bailer diameters are available.

Bailing presents two potential problems with purging. First, increased suspended solids may be present in samples as a result of the turbulence caused by raising and lowering the bailer through the water column. High solids concentrations may affect sample representativeness. Second, bailing may be less feasible for deep sample points or sample points which require a large volume of water to be removed during purging because of the time involved with continuous insertion and removal/emptying of the bailer.

Bailing Procedure

Obtain a clean bailer and a spool of clean polypropylene or nylon bailer cord. Uncover the top end of the bailer and tie a bowline knot, or equivalent, through the bailer loop. Test the knot and the bailer itself to ensure that all knots and parts are secure prior to inserting the bailer into the sample point.

Remove the protective wrapping from the bailer, and lower the bailer to the bottom of the sample point and cut the cord at a proper length. Bailer rope should never touch the ground surface at any time during the purge routine. Tie a hand loop at the end of the bailer cord.

Raise the bailer by grasping a section of cord using each hand alternatively in a "rocking" action. This method requires that the sampler's hands be kept approximately 2-3 feet apart and that the bailer rope is alternately looped onto or off each hand as the bailer is raised and lowered.

Grab the bailer with one hand as it emerges from the sample point. Pour the bailed groundwater from the bailer into a graduated bucket to measure the purged water volume. Repeat this procedure until one turbidity has visually decreased.

4.3.2 Surface Pumps

Sample point purging using pumps located at the ground surface can be performed with peristaltic or centrifugal pumps if the water level in the sample point is within approximately 20 feet of the top of the sample point.

Peristaltic Pump Procedure

Attach a new suction and discharge line to the peristaltic pump. Silicon tubing must be used through the pump head and must meet the pump head specifications. A second type of tubing may be attached to the silicon tubing for use as the suction and discharge continuous discharge. If drawdown causes the discharge to stop, the suction line will be lowered very slowly further down into the sample point until pumping restarts.

Measure the length of the suction line and lower it down the sample point until the end is in the upper foot or more of the water column. Start the pump and direct the discharge into a graduated bucket. Adjust the pumping rate with the speed control knob so that a smooth flowing discharge is attained.

Centrifugal Pump Procedure

Attach a new suction and discharge line to the centrifugal pump. Start the pump and record the stabilized rate of discharge.

4.3.3 Down-Well Pumps

Groundwater withdrawal using non-dedicated down-well pumps may be performed with a submersible pump or a bladder pump. Electric submersible pumps provide an effective means for sample point purging and in some cases sample collection. Submersible pumps are particularly useful for situations where the depth to water table is greater than 20 feet and where the depth or diameter of the sample point requires that a large purge volume be removed before sample collection.

Commonly available submersible pumps include the Johnson-Keck pump model SP-82, the Grunfos Ready-Flow 2 pump, and disposable marine galley pumps, all of which are suited for operation in 2-inch or larger internal diameter sample points.

Bladder pumps usually consist of a stainless steel pump housing with an internal teflon or polyethylene bladder. Discharge tubing is generally made from teflon, polyethylene, or teflon-lined polyethylene. The pump is operated by lowering it into the water column within the screen, then pulsing air into the bladder with an air compressor and pump controller unit. Pumps and controllers are often not interchangeable between manufacturers; therefore, it is usually necessary to have both items provided by the same manufacturer. Pump bladders are generally field-serviceable and replaceable.

The presence of free product should be determined before inserting the submersible pump into the sample point because free product may contaminate the pump's internal mechanisms making it extremely difficult to decontaminate. An interface probe should be used to check for free product, discussed above.

4.4 Sample Collection Methods and Procedures

4.4.1 Objectives

Groundwater samples can be collected using similar methods employed for purging, provided these methods do not adversely affect the quality of the groundwater. These methods include bailing, surface pumping and down-well pumping.

In most cases during sampling, groundwater will be transferred to the appropriate containers directly for the discharge source. During transfer, discharge tubing and other equipment shall not contact the inside of the sample containers. In addition, a clean pair of nitrile or latex gloves will be worn during sample collection and handling.

As a general rule of thumb, samples should be collected in order of decreasing volatilization of the target parameters. The preferred order of sample collection is as follows: volatile organic compounds, extractable organic compounds (e.g., semivolatile organic compounds, PCBs, pesticides), metals, and general water chemistry (ions and turbidity).

4.4.2 Bailers

The methods and procedures described in this section also apply to collecting groundwater samples with a bailer. If a bailer was used to purge, the same bailer may be used for sampling. If other purging equipment was used, a decontaminated or new disposable bailer should be used for sampling.

When volatile organic compounds are the target sampling parameter, a bottom discharge tip should be used during sample transfer. A discharge tip restricts the outflow of the sample from the bailer and diminishes the potential for volatilization. Reusable bailers may require a special screw-on tip fitted with a bottom discharge top. Disposable bottom discharge tips are usually supplied with disposable bailers.

4.4.3 Surface Pumps

The methods and procedures described in this section for peristaltic and centrifugal pumps also apply to groundwater sample collection.

Peristaltic Pumps

Peristaltic pumps equipped with the appropriate type tubing will be used to collect groundwater from sample points in which the water resides at a depth less than 20 feet. Sample bottles shall be filled directly from the pump's discharge line and care shall be taken to keep the discharge tube from contacting the sample container.

Groundwater samples requiring filtration prior to placement in sample containers can be placed in intermediate containers for subsequent filtration, or may be filtered directly with in-line disposable 0.45-micron filters.

After sampling is complete, all used tubing and filters shall be disposed of appropriately.

Centrifugal Pumps

Centrifugal pumps are generally not recommended for use in sample collection, especially when volatile organic compounds are the target analyte of interest. Samples for other analytes, however, may be obtained with use of an in-line sample trap. It is suggested that if samples cannot be obtained before going through the pump, that samples be obtained by using a bailer once purging is complete and pumping has ceased. Collecting samples from the pump discharge is not recommended.

After sampling is complete, all suction line tubing should be disposed of properly.

4.4.4 Down-Well Pumps

Electric Submersible Pump

Using the pump methods described in Section 4.9.4, groundwater samples can be collected directly from the pump discharge line, provided the discharge line is composed of inert material. Sample bottles will be filled directly from the discharge line of the pump. This method is generally not recommended for collection of volatile organic samples.

Bladder Pumps

Groundwater samples, including those collected for VOC analysis may be collected directly from the pump discharge tubing under active pumping conditions. Sample bottles will be filled directly from the discharge line of the pump.

After sampling is complete, the pump, discharge line and power cord shall be decontaminated and/or disposed of as required by the project-specific work plan.

4.5 Sample Filtration

Groundwater samples collected for total dissolved metals analyses will be filtered prior to being placed in sample containers and properly preserved. Groundwater filtration will be performed using a peristaltic pump and a 0.45-micron in-line water filter. Disposable filters are commonly available in 0.45-micron size. Low-capacity or high-capacity cartridges are available and may be selectively used based on sample turbidity.

The filtration of groundwater samples shall be performed either directly from the pump discharge line or from laboratory-supplied intermediate containers. In either case, purging shall be performed first. Fresh groundwater shall then be filtered directly into sample containers.

4.6 Sample Handling

All samples collected should be packaged and handled according to ensure no breakage during shipping. Preservatives should be used where analytical methods require preservation. The QAPP will indicate the type of sample preservation necessary.

5 QUALITY CONTROL

5.1 Field Blank/Equipment Blank Sample Collection

Field blank samples serve as a quality assurance check of equipment and field conditions at the time of sampling. Field blank samples are usually prepared by transferring analyte-free water into a clean set of sample containers, then analyzing it as a sample. Sometimes, the analyte-free water is transferred over or through the sampling device before it is placed into the sample containers. This type of field blank sample is known as an equipment blank. The QAPP contains specific information regarding the type and number of field blanks or equipment blanks required for collection.

5.2 Field Duplicate Sample Collection

Field duplicate samples are collected for the purpose of providing two sets of results for comparison. These samples are used to assess precision. Duplicate samples are usually prepared by splitting the sample into two sets of sample containers, then analyzing each set as a separate sample. The QAPP contains specific information regarding the type and number of duplicate samples for collection.

5.3 MS/MSD Sample Collection

MS/MSDs provide information about the effect of the sample matrix on digestion and measurement methodology. For samples submitted for MS/MSD analysis, triple sample volume is generally required (contact the analytical laboratory for information specific to the project analytical parameters). The QAPP contains specific information regarding the frequency of MS/MSD samples.

6 DOCUMENTATION

Specific information regarding sample collection should be documented in several areas: the sample chain-of-custody record, sample collection record, field notebook, and sample labels, tags. Additional information regarding each form of documentation is presented in the following paragraphs:

6.1 Sample Chain-of-Custody Record

This standard form requires input of specific information regarding each collected sample for laboratory analytical purposes. The information requested includes site name and location, project number, field notebook reference, collection date and type of analysis requested. Each sample submitted for analysis is also listed individually using its field identification number, number and type of container, and requested analyses.

6.2 Groundwater Sample Collection Record

This form (Attachment 1 or 2) requires input of specific information regarding the collection of each individual sample including sample identification, water quality parameters (if collected), collection method, and containers/preservation requirements.

6.3 Field Logbook

This logbook should be dedicated to the project and should be used by field personnel to maintain a general log of activities throughout the sampling program. This logbook should be used in support of, and in combination with, the sample collection record. Documentation within the logbook should be thorough and sufficiently detailed to present a concise, descriptive history of the sample collection process.

6.4 Sample Labels/Tags

Sample labels shall be completed at the time each sample is collected and attached to each sample container. Labels will include the information listed below.

- Client or project name/project number
- Sample number
- Sample designation
- Analysis type
- Preservative
- Sample collection date
- Sample collection time
- Sampler's name

7 TRAINING/QUALIFICATIONS

Groundwater sample collection is a relatively involved procedure requiring formal training and a variety of equipment. It is recommended that initial sampling attempts be supervised by more experienced personnel. Sampling technicians should be health and safety certified as specified by OSHA (29 CFR 1910.120(e)(3)(i)) to work on sites where hazardous waste materials are considered to be present.

Groundwater Sample Collection Record (*Direct Push Temporary Boring or **Monitoring Well)

Date:	**Well ID:**
Project Name:	**Location:**
Project Number:	**Collector(s):**
Start Time:	**End Time:**

Water Level Data

Total Well Depth:		Water Table Depth:	
Screen Interval:		Tubing Placement Depth:	
Well Volume		**Well Volume = 3.14*(R^2*H*(CF)** R= Radius (feet), 2 inch = 0.17 feet H = Height of the water column CF = conversion factor = 7.48 gal/ft3	
Purge Method:		Purge Rate:	

Water Quality Parameters

Time (24 hr)	Vol. Purged (L)	Temp (C)	pH	Spec. Cond (uS/cm)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Flow Rate (ml/min)	DTW	Color/ Odor

Acceptance Criteria for Monitoring Well Low Flow Sampling is Defined (For Monitoring Well Samples):

Temp 3%	pH +/- 1.0 unit	Spec. Cond 3%	DO 10%		
Turbidity <5 NTU*	ORP +/- 10 MV	Drawdown <0.3'*			
Sample Collection:			Duplicate Details:		

*Grab groundwater samples collected from direct push borings may not include groundwater parameters or low flow stabilization criteria.

**Achievement of turbidity levels of less than 5 NTU, and stable drawdowns of less than 0.3 feet, while desirable, are not mandatory. If after 2 hours of purging indicator field parameters have not stabilized, discontinue purging, collect samples and provide full explanation of attempts to achieve stabilization.

1 INTRODUCTION

1.1 Purpose and Applicability

This standard operating procedure (SOP) is concerned with the collection of valid and representative samples of groundwater from monitoring wells. The scope of this document is limited to field operations and protocols applicable during groundwater sample collection.

This SOP is written in a broad-based manner and considers the application of a variety of sampling equipment in the collection of representative groundwater samples. Respective state and/or federal agency regulations may require specific types of equipment to be used when applying this SOP to a particular project. The project manager should review the applicable regulatory requirements, if any, prior to the start of the field sampling program. Deviations from this SOP to accommodate regulatory requirements should be reviewed in advance of the field program and documented in the project work plan.

This SOP has been developed based on the Washington State Department of Ecology (Ecology) Standard Operating Procedure for Purging and Sampling Monitoring Wells plus Guidance on Collecting Samples for Volatiles and other Organic Compounds (Ecology 2014) and the Environmental Protection Agency Low Stress Purging and Sampling Procedures for Collection of Groundwater Samples from Monitoring Wells (EPA 2017).

1.2 Quality Assurance Planning

Sampling personnel should follow specific quality assurance guidelines as outlined in the site-specific QAPP. Proper quality assurance requirements should be provided which will allow for collection of representative samples from representative sampling points. Quality assurance requirements typically suggest the collection of a sufficient quantity of quality control (QC) samples such as field duplicate, equipment and/or field blanks and matrix spike/matrix spike duplicate (MS/MSD) samples. These requirements should be outlined in the QAPP. Additional information regarding quality assurance sample collection relevant to groundwater sampling is contained in Section 5.0 of this SOP.

1.3 Health and Safety Considerations

Groundwater sampling may involve chemical hazards associated with the materials being sampled. Adequate health and safety measures must be taken to protect project sampling personnel from potential chemical exposures or other hazards.

These measures must be addressed in the project Health and Safety Plan (HASP). This plan must be approved by the project Health and Safety Officer before work commences, must be distributed to all personnel performing sampling, and must be adhered to as field activities are performed.

2 RESPONSIBILITIES

2.1 Project Manager

The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the measurements in accordance with this SOP and the project-specific work plan.

2.2 Sampling Technician

It is the responsibility of the sampling technician to be familiar with the sampling procedures outlined within this SOP and with specific sampling, quality assurance, and health and safety requirements outlined within project-specific work plans (Sampling Plan, HASP, and QAPP). The sampling technician is responsible for collection of groundwater samples and for proper documentation of sampling activities as samples are being collected.

3 REQUIRED MATERIALS

Groundwater sampling objectives may vary significantly between projects. Project objectives should be defined within the project-specific work plans. The list of required materials below identifies the types of equipment which may be used for a range of groundwater sampling applications. From this list, a project-specific equipment list should be selected based upon project objectives and other factors such as the depth to groundwater, well construction, required purge volumes, and analytical parameters, among others. The various types of sampling equipment which may be used include:

<u>Well Purging Equipment</u>

- Bailers
- Bladder pumps
- Submersible pumps
- Peristaltic pumps
- Centrifugal Pumps
- WaterraTM pumps

Field Instruments

• Individual or multi-parameter meter(s) to measure temperature, pH, specific conductance, dissolved oxygen (DO) oxidation reduction potential (ORP), and/or turbidity

• Water level measuring device

• Interface probe or product detection paste

Sampling Equipment

• Reusable or disposable bailers

• Peristaltic pump

• Bladder pump

Sample Preparation Equipment

• Filtration equipment

• Intermediate containers

• Sample kit (i.e., bottles, labels, preservatives, custody records, cooler)

General Equipment

• Project-specific sampling plans (SAP, QAPP, HASP)

• Sample collection records

• Field notebook/pen

• Waterproof marker pens

• Deionized water dispenser bottler

• Sample cup

• Buckets

• Coolers, or sample shuttles

• Instrument calibration solutions

• Power source (generator of 12V marine battery)

• Equipment decontamination supplies

• Health and safety supplies

• First-Aid kit

• Tool box

<u>Expendable Materials</u>

• Deionized water supply

• Disposable bailer string (nylon or polypropylene)

• 0.45 micron filters

• Paper towels

• Plastic sheeting

• Ice/blue ice for sample preservation

• Disposable latex powder-free glove liners

• Disposable nitrile gloves

• Plastic trash bags

• Ziplock® bags

This equipment list was developed to aid in field organization and should be used in preparation for each sampling event. Depending on the site-specific sampling plan, additional material and equipment may be necessary and should be determined before the scheduled sampling event. Similarly, not all of the items shown in this list may be necessary for any one sampling event.

4 Method

4.1 Free Product Determination

Wells that may potentially contain free product should be assessed for product with an interface probe or product detection paste. Interface probes generally operate on the same principle as a water level tape although they are designed to register water and product levels usually with different audible tones. Product paste generally is used in combination with some type of measuring tape which is lowered into the well with a coating of paste applied to it. Wells containing free product are generally not used for groundwater sampling, since the concentration of contaminants present in the free product can adversely affect the quality of the water sample, lending to a non-representative water sample.

4.2 Water Level Measurement

To obtain a water level measurement, lower the probe of a water level measuring device into the well until the audible sound of the unit is detected or the light on an electronic sounder illuminates. At this time the precise measurement should be determined (to nearest 0.01 feet) by repeatedly raising and lowering the tape to converge on the exact measurement. Obtain the reading of the TOC measuring point. The water level measurement should be entered on the Groundwater Sample Collection Record or in the field records.

The measurement device shall be decontaminated immediately after use with a non-phosphatic detergent and rinsed with distilled water. Generally, only that portion of the tape which enters the water table should be cleaned. It is important that the measuring tape is never placed directly on the ground surface or allowed to become kinked. Measuring devices, including interface probes, which come into contact with free product will likely require more thorough decontamination.

4.3 Purge Volume Calculation

Wells designated for sampling require purging to remove stagnant water in the well. A single casing volume of groundwater will be calculated after measuring the length of the water column and checking the well casing diameter.

The amount of standing water can be calculated using a variety of methods. One equation is:

Well volume: V = 0.041 x HD2 = ____ gallons, where

- V is volume of water in the well, in gallons,
- H is height of water column in well (i.e. total well depth – measured depth to water), in feet, and
- D is the inside diameter of the well casing, in inches

4.4 Well Purging Methods and Procedures

4.4.1 Objectives

Prior to sample collection, purging must be performed for all groundwater monitoring wells to remove stagnant water from within the casing and gravel pack and to ensure that a representative groundwater sample is obtained.

There are three general types of non-dedicated equipment used for well purging and include: bailers, surface pumps and down-well pumps. The purge method and equipment selected should be specified in the project-specific work plans.

NOTE: This SOP only describes the most common equipment and methods used for purging. Other purging equipment, as well as dedicated equipment, can be used provided that the method employed does not have an adverse effect on the overall quality of the groundwater.

Regardless of the purge method, purge water temperature, pH, and specific conductance will be monitored at predetermined purge volumes and recorded on the Groundwater Sample Collection Record. Additional water quality parameters may be required by the project-specific sampling plan. In general, purging will be considered complete following the withdrawal of at least 3 to 5 well volumes of groundwater and when all field parameters have stabilized.

Purging a well to dryness may occur under some low-yield conditions or tidal conditions. When the well recovers, a cascading effect may occur within the screened zone which can volatilize some organic compounds. This may be considered inappropriate by regulatory agencies when volatile organic compounds (VOC) are the target analyte of interest. Purging a well to dryness, then sampling after it has recovered may be acceptable for other target analytes, however. Under low yield conditions, low-flow sampling pumps such as bladder pumps may be required for VOC sample collection.

4.4.2 Bailing

<u>General</u>

Bailing is often the most convenient method for well purging especially if only a small volume of purge water is required during the purge routine. Bailers are constructed using a variety of materials including PVC, polyethylene, stainless steel, and Teflon®. Teflon® bailers are generally most "inert" and are available in reusable and disposable form. Disposable polyethylene bailers are relatively inert and inexpensive. Reusable stainless steel and PVC bailers must be decontaminated between uses. Most commercially available bailers are constructed to fit into a 2-inch diameter well, although other bailer diameters are available.

Waterra™ foot valves are essentially bailer check valves which manually thread onto the bottom of standard pump tubing (polyethylene, teflon). The foot valves are commercially available in a variety of diameters in stainless steel, Teflon®, and high-density plastic (Delrin). The foot valves operate by manually or mechanically raising and lowering the valve assembly within the water column which raises the water level within the discharge tube. Flow rates usually in the vicinity of 1 gallon per minute can be achieved with these devices.

Measurements of the pumping rate, temperature, pH, and specific conductance (and/or other parameters as required) should be made after each purge volume is removed and documented on the Groundwater Sample Collection Record or in the field logbook. Samples may be collected after the required purge volume has been withdrawn and the field parameters have stabilized to within 10% of their preceding measurement. Project-specific sampling objectives may require that the sample be collected with a bailer.

Bailing presents two potential problems with well purging. First, increased suspended solids may be present in samples as a result of the turbulence caused by raising and lowering the bailer through the water column. High solids concentrations may affect sample representativeness. Second, bailing may be less feasible for deep wells or wells which require a large volume of water to be removed during purging because of the time involved with continuous insertion and removal/emptying of the bailer.

Bailing Procedure

Obtain a clean bailer and a spool of clean polypropylene or nylon bailer cord. Uncover the top end of the bailer and tie a bowline knot, or equivalent, through the bailer loop. Test the knot and the bailer itself to ensure that all knots and parts are secure prior to inserting the bailer into the well.

Remove the protective wrapping from the bailer, and lower the bailer to the bottom of the monitoring well and cut the cord at a proper length. Bailer rope should never touch the ground surface at any time during the purge routine. Tie a hand loop at the end of the bailer cord.

Raise the bailer by grasping a section of cord using each hand alternatively in a "rocking" action. This method requires that the sampler's hands be kept approximately 2-3 feet apart and that the bailer rope is alternately looped onto or off each hand as the bailer is raised and lowered.

Grab the bailer with one hand as it emerges from the well. Pour the bailed groundwater from the bailer into a graduated bucket to measure the purged water volume. Repeat this procedure until one complete purge volume of water is removed from the well.

At the end of one complete well purge volume, place a small of purged water into a sample cup. Measure temperature, pH and specific conductance (and for other assigned parameters) and record the results on the Groundwater Sample Collection Record or in the field logbook. Samples may be collected after the required purge volume has been withdrawn and the specific field parameters have stabilized to within 10% of their preceding measurement.

4.4.3 Surface Pumps

General

Well purging using pumps located at the ground surface can be performed with peristaltic or centrifugal pumps if the water level in the well is within approximately 20 feet of the top of the well.

Peristaltic pumps provide a low rate of flow typically in the range of 0.02-0.2 gallons/minute (75-750 ml/min). For this reason, peristaltic pumps are not particularly effective for well purging. Peristaltic pumps are suitable for purging situations where disturbance of the water column must be kept minimal for particularly sensitive analyses.

Centrifugal pumps are designed to provide a high rate of pumping, in the range of 5 to 40 gallons/minute (gpm), depending on pump capacity. Discharge rates can also be regulated somewhat, provided the pump has an adjustable throttle. These pumps also require polyethylene or teflon-lined polyethylene tubing as suction line. The pump may also require priming to initiate flow.

Peristaltic Pump Procedure

Attach a new suction and discharge line to the peristaltic pump. Silicon tubing must be used through the pump head and must meet the pump head specifications. A second type of tubing may be attached to the silicon tubing for use as the suction and discharge continuous discharge. If drawdown causes the discharge to stop, the suction line will be lowered very slowly further down into the well until pumping restarts.

Measurements of temperature, pH and specific conductance (and/or other assigned parameters) should be made after each well purge volume and documented on the Groundwater Sample Collection Record or in the field logbook. Samples may be collected after the required purge volume has been removed and the specific field parameters have stabilized to within 10% of their preceding measurement. Project-specific sampling objectives may require that the sample be collected with a bailer.

Measure the length of the suction line and lower it down the monitoring well until the end is in the upper foot or more of the water column. Start the pump and direct the discharge into a graduated bucket. Adjust the pumping rate with the speed control knob so that a smooth flowing discharge is attained.

Centrifugal Pump Procedure

Attach a new suction and discharge line to the centrifugal pump. Start the pump and record the stabilized rate of discharge. As with other well purging systems, measurement of temperature, pH, and specific conductance (or other parameters as required) will be made after each well purge volume has been removed. These measurements shall be recorded on the Groundwater Sample Collection Record or in the field logbook. Samples may be collected after the required purge volume has been removed and the field parameters have stabilized to within 10% of their preceding measurement. Project-specific sampling objectives may require that the sample be collected with a bailer.

4.4.4 Down-Well Pumps

Groundwater withdrawal using non-dedicated down-well pumps may be performed with a submersible pump or a bladder pump.

Electric submersible pumps provide an effective means for well purging and in some cases sample collection. Submersible pumps are particularly useful for situations where the depth to water table is greater than 20 feet and where the depth or diameter of the well requires that a large purge volume be removed before sample collection.

Commonly available submersible pumps include the Johnson-Keck pump model SP-82, the Grunfos Ready-Flow 2 pump, and disposable marine galley pumps, all of which are suited for operation in 2-inch or larger internal diameter wells.

Recently, the use of bladder pumps (positive gas-displacement pumps) has been promoted by the EPA for use in well purging and sampling primarily because the pumps can be operated at low flow rates (less than 1 liter per minute). Bladder pumps generally reduce the potential turbidity of the sample and theoretically reduce the potential for loss of VOC constituents, ultimately providing a more representative groundwater sample. Use of bladder pumps may require additional time for purging and sampling because of the low flow rate. Please note, however, that when using bladder pumps, it may not be necessary to purge an entire well volume of water prior to each check of the water quality parameters. Well purging is accomplished at such a low rate that, theoretically, the influent flow into the pump represents groundwater flow through the well screen, thereby eliminating the requirement for purging several entire well volumes of water before sample collection.

Bladder pumps usually consist of a stainless steel pump housing with an internal teflon or polyethylene bladder. Discharge tubing is generally made from teflon, polyethylene, or teflon-lined polyethylene. The pump is operated by lowering it into the water column within the well screen, then pulsing air into the bladder with an air compressor and pump controller unit. Pumps and controllers are often not interchangeable between manufacturers; therefore, it is usually necessary to have both items provided by the same manufacturer. Pump bladders are generally field-serviceable and replaceable.

A check of well condition may be required prior to inserting any down-well pump if the well has not been sampled for some time or if groundwater quality conditions are not known. The well condition check should include a check of casing plumbness as a bent well casing could cause a pump to get stuck. Casing plumbness can be checked by lowering a clean cylindrical tube with the approximate pump dimensions into the well. If the well casing is not plumb then an alternative purging method should be used.

The well inspection should also include a check of air quality or headspace conditions within the well for potentially explosive gasses and a check for free product which could foul the pump. Well casing headspace conditions can be monitored with a photoionization detector (PID) and/or an explosimeter for the presence of potentially explosive gasses. If potentially hazardous conditions exist, then an alternative purging method should be used. In general, it is rare for explosive conditions to be present.

The presence of free product should be determined before inserting the submersible pump into the well because free product may contaminate the pump's internal mechanisms making it extremely difficult to decontaminate. An interface probe should be used to check for free product.

Electric Submersible Pump Procedure

Once the above well conditions have been assessed, and assuming it's safe to precede, slowly lower the submersible pump with attached discharge line into the monitoring well taking notice of any roughness or restriction within the well riser pipe. The pump should be placed in the uppermost section of the static water column of the monitoring well. The power cord should be attached to the discharge line with an inert material (i.e., zip-ties) to prevent the power cord from getting stuck between the pump, discharge line, and the well casing. Secure the discharge line and power cord to the well casing, using tape or a clamp, taking care not to crimp or cut either the discharge line or power cord.

Connect the power cord to the power source (i.e., rechargeable battery pack, auto battery, or generator) and turn the pump on. Voltage and amperage meter readings on the pump controller (if provided) should be monitored closely during purging. The operations manual for the specific pump used should be reviewed regarding changes in voltage/amperage and the potential impacts on pump integrity. Pumping should be discontinued if warning conditions occur and/or if the well is pumped to where drawdown falls below the pump's intake level.

If drawdown continues to the extent that the well is pumped dry, the pump should be shut off and the well allowed to recharge. This on/off cycle may be necessary in order to purge the well properly.

Measurements of the pumping rate, temperature, pH, and specific conductance (and/or other required parameters) should be made after each purge volume is removed and documented on the Groundwater Sample Collection Record or in the field logbook. Samples may be collected after the required purge volume has been withdrawn and the field parameters have stabilized to within 10% of their preceding measurement. Project-specific sampling objectives may require that the sample be collected with a bailer.

Bladder Pump Procedure

To operate the bladder pump system, the pump and discharge line should be lowered into the well close to the bottom of the well screen, and then secured to the well casing with a clamp. The air compressor should then be turned on to activate pumping. The pump controller is used to vary the discharge rate to the required flow.

Measurements of the pumping rate, temperature, pH, and specific conductance (and/or other required parameters) should be made at periodic intervals while water is removed and documented on the Groundwater Sample Collection Record or in the field logbook. Samples may be collected after the required field parameters have stabilized to within 10% of their preceding measurement. Generally, because of the low flow rate, samples are usually obtained from the bladder pump discharge line.

4.5 Sample Collection Methods and Procedures

4.5.1 Objectives

Groundwater samples can be collected using similar methods employed for purging, provided these methods do not adversely affect the quality of the groundwater. These methods include bailing, surface pumping and down-well pumping.

In most cases during sampling, groundwater will be transferred to the appropriate containers directly for the discharge source. During transfer, discharge tubing and other equipment shall not contact the inside of the sample containers. In addition, a clean pair of nitrile or latex gloves will be worn during sample collection and handling.

As a general rule of thumb, samples should be collected in order of decreasing volatilization of the target parameters. The preferred order of sample collection is as follows: volatile organic compounds, extractable organic compounds (e.g., semivolatile organic compounds, PCBs, pesticides), metals, and general water chemistry (ions and turbidity).

4.5.2 Bailers

The methods and procedures described in this section also apply to collecting groundwater samples with a bailer. If a bailer was used to purge the well, the same bailer may be used for sampling. If other well purging equipment was used, a decontaminated or new disposable bailer should be used for sampling.

When volatile organic compounds are the target sampling parameter, a bottom discharge tip should be used during sample transfer. A discharge tip restricts the outflow of the sample from the bailer and diminishes the potential for volatilization. Reusable bailers may require a special screw-on tip fitted with a bottom discharge top. Disposable bottom discharge tips are usually supplied with disposable bailers.

Bailer cord shall be discarded after sampling is completed. Disposable bailers should only be used in one well. Reusable bailers should be appropriately decontaminated between uses.

4.5.3 Surface Pumps

The methods and procedures described in this section for peristaltic and centrifugal pumps also apply to groundwater sample collection.

Peristaltic Pumps

Peristaltic pumps equipped with the appropriate type tubing will be used to collect groundwater from wells in which the water resides at a depth less than 20 feet. Sample bottles shall be filled directly from the pump's discharge line and care shall be taken to keep the discharge tube from contacting the sample container.

Groundwater samples requiring filtration prior to placement in sample containers can be placed in intermediate containers for subsequent filtration, or may be filtered directly with in-line disposable 0.45-micron filters.

After sampling is complete, all used tubing and filters shall be disposed of appropriately.

Centrifugal Pumps

Centrifugal pumps are generally not recommended for use in sample collection, especially when volatile organic compounds are the target analyte of interest. Samples for other analytes, however, may be obtained with use of an in-line sample trap. It is suggested that if samples cannot be obtained before going through the pump, that samples be obtained by using a bailer once purging is complete and pumping has ceased. Collecting samples from the pump discharge is not recommended.

After sampling is complete, all suction line tubing should be disposed of properly.

4.5.4 Down-Well Pumps

Electric Submersible Pump

Using the pump methods described in Section 4.9.4, groundwater samples can be collected directly from the pump discharge line, provided the discharge line is composed of inert material. Sample bottles will be filled directly from the discharge line of the pump. This method is generally not recommended for collection of volatile organic samples.

Bladder Pumps

Groundwater samples, including those collected for VOC analysis may be collected directly from the pump discharge tubing under active pumping conditions. Sample bottles will be filled directly from the discharge line of the pump.

After sampling is complete, the pump, discharge line and power cord shall be decontaminated and/or disposed of as required by the project-specific work plan.

Low Volume and Poor Recovery Wells - Purging and Sampling Procedures

Even with a low pumping rate, some wells experience significant drawdown or in extreme cases may even purge dry. Slow recovering wells or wells that purge dry require extra care in order to be purged and sampled with minimal disturbance to the water column and fine materials in and around the well screen.

For low volume and poor recovery wells, review past field data sheets if available for previous purge rates, amounts of drawdown, and purge volume prior to sample collection. Measure the well's water level. If you suspect the well may be low yielding, calculate the amount of standing water in one well volume as described in step 4.3.

If the well is not equipped with a dedicated sampling system, install a decontaminated pump or pump tubing. Slowly lower the equipment through the water column to avoid stirring up particulates. The final pump intake depth should be near the bottom of the screened interval. To prevent stirring up particulates it is important not to touch the well bottom. Record the intake depth on the field data sheet.

Once the pump or pump tubing is in place, slowly lower the water level probe back into the well. It is important to frequently measure the water level throughout purging in low volume or poor recovery wells to enable the pump rate to be adjusted downward if necessary.

Start purging at a rate less than 0.5 liter per minute if the pump capacity allows. Record the pump rate on the field data sheet. At regular intervals record field parameter values, water level, time of measurement, and amount of purge water discharged. Allow at least one complete exchange of water in the flow cell between measurements. Note and provide qualifying remarks if parameter readings are anomalous, the water level is dropping or if at some point the water level stabilizes. Record observations on the pumped waters appearance (e.g. clarity, odor, etc.) during purging and sampling. Continue purging until field parameters stabilize.

Attempts should be made to avoid purging low yielding wells dry. However, if this is not possible shut the pump off and allow the well to recover at least once before collecting samples. This generally constitutes an adequate purge, and the well can be sampled as soon as it has recovered sufficiently to produce an adequate volume of water to fill the sample containers. If time permits, purge the well a second time and allow it to recover before sampling. Samples should be collected within 24 hours of the final purge/recovery cycle.

It should be noted that there can be significant alterations in groundwater chemistry when a well is purged dry and allowed to recover before sampling. Groundwater chemistry can change as formation water surrounding or entering the screened interval of the well is exposed to air which can affect volatile organics and redox sensitive analytes. Increased turbidity can also be an issue when sampling metals and some general chemistry parameters (Ecology 2014). Collect samples once field parameters stabilize and any end of purge analysis has been conducted.

If the well has been purged dry and allowed to recover, field parameters should be measured after sample collection if there is an adequate volume of water. Sample containers should be filled in the order specified in the project QAPP. However, when sampling low-yielding wells which may not have a sufficient volume of water to fill all the sample containers, the relative importance of each analyte should be evaluated. Samples for analytes of most interest should be collected first.

4.6 Sample Filtration

Groundwater samples collected for total dissolved metals analyses will be filtered prior to being placed in sample containers and properly preserved. Groundwater filtration will be performed using a peristaltic pump and a 0.45-micron in-line water filter. Disposable filters are commonly available in 0.45-micron size. Low-capacity or high-capacity cartridges are available and may be selectively used based on sample turbidity.

The filtration of groundwater samples shall be performed either directly from the pump discharge line or from laboratory-supplied intermediate containers. In either case, well purging shall be performed first. Fresh groundwater shall then be filtered directly into sample containers.

4.7 Sample Handling

All samples collected should be packaged and handled according to ensure no breakage during shipping. Preservatives should be used where analytical methods require preservation. The QAPP will indicate the type of sample preservation necessary.

5 QUALITY CONTROL

5.1 Field Blank/Equipment Blank Sample Collection

Field blank samples serve as a quality assurance check of equipment and field conditions at the time of sampling. Field blank samples are usually prepared by transferring analyte-free water into a clean set of sample containers, then analyzing it as a sample. Sometimes, the analyte-free water is transferred over or through the sampling device before it is placed into the sample containers. This type of field blank sample is known as an equipment blank. The QAPP contains specific information regarding the type and number of field blanks or equipment blanks required for collection.

5.2 Field Duplicate Sample Collection

Field duplicate samples are collected for the purpose of providing two sets of results for comparison. These samples are used to assess precision. Duplicate samples are usually prepared by splitting the sample into two sets of sample containers, then analyzing each set as a separate sample. The QAPP contains specific information regarding the type and number of duplicate samples for collection.

5.3 MS/MSD Sample Collection

MS/MSDs provide information about the effect of the sample matrix on digestion and measurement methodology. For samples submitted for MS/MSD analysis, triple sample volume is generally required (contact the analytical laboratory for information specific to the project analytical parameters). The QAPP contains specific information regarding the frequency of MS/MSD samples.

6 DOCUMENTATION

Specific information regarding sample collection should be documented in several areas: the sample chain-of-custody record, sample collection record, field notebook, and sample labels, tags. Additional information regarding each form of documentation is presented in the following paragraphs:

6.1 Sample Chain-of-Custody Record

This standard form requires input of specific information regarding each collected sample for laboratory analytical purposes. The information requested includes site name and location, project number, field notebook reference, collection date and type of analysis requested. Each sample submitted for analysis is also listed individually using its field identification number, number and type of container, and requested analyses.

6.2 Groundwater Sample Collection Record

This form (Attachment 1 or 2) requires input of specific information regarding the collection of each individual sample including sample identification, water quality parameters, collection method, and containers/preservation requirements.

6.3 Field Logbook

This logbook should be dedicated to the project and should be used by field personnel to maintain a general log of activities throughout the sampling program. This logbook should be used in support of, and in combination with, the sample collection record. Documentation within the logbook should be thorough and sufficiently detailed to present a concise, descriptive history of the sample collection process.

6.4 Sample Labels/Tags

Sample labels shall be completed at the time each sample is collected and attached to each sample container. Labels will include the information listed below.

- Client or project name/project number
- Sample number
- Sample designation
- Analysis type
- Preservative
- Sample collection date
- Sample collection time
- Sampler's name

7 TRAINING/QUALIFICATIONS

Groundwater sample collection is a relatively involved procedure requiring formal training and a variety of equipment. It is recommended that initial sampling attempts be supervised by more experienced personnel. Sampling technicians should be health and safety certified as specified by OSHA (29 CFR 1910.120(e)(3)(i)) to work on sites where hazardous waste materials are considered to be present.

8 REFERENCES

Washington State Department of Ecology (Ecology) Standard Operating Procedure for Purging and Sampling Monitoring Wells plus Guidance on Collecting Samples for Volatiles and other Organic Compounds. Version 2.0. January 27, 2014.

EPA, Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells, EQASOP-GW4. Revised September 19, 2017.

EPA, Handbook for Sampling and Sample Preservation of Water and Wastewater, EPA-600/4-82-029, September 1982.

EPA, RCRA Groundwater Monitoring Technical Enforcement Guidance, November 1992.

Geotrans, Inc., RCRA Permit Writer's Manual, Groundwater Protection, prepared for the U.S. EPA, Contract No. 68-01-6464, October 1983.

Code of Federal Regulations, Chapter 40 (Section 261.4(d)).

Low Flow Groundwater Sample Collection Record

Date:	**Well ID:**
Project Name:	**Location:**
Project Number:	**Collector(s):**
Start Time:	**End Time:**

Water Level Data

Total Well Depth:		Water Table Depth:	
Screen Interval:		Tubing Placement Depth:	
Well Volume		**Well Volume = 3.14*(R^2*H*(CF)** R= Radius (feet), 2 inch = 0.17 feet H = Height of the water column CF = conversion factor = 7.48 gal/ft3	
Purge Method:		Purge Rate:	

Water Quality Parameters

Time (24 hr)	Vol. Purged (L)	Temp (C)	pH	Spec. Cond (uS/cm)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Flow Rate (ml/min)	DTW	Color/ Odor

Acceptance Criteria defined:									
Temp	3%	pH	+/- 1.0 unit	Spec. Cond	3%	DO	10%		
Turbidity	<5 NTU*	ORP	+/- 10 MV	Drawdown	<0.3'*				
Sample Collection:						Duplicate Details:			

*Achievement of turbidity levels of less than 5 NTU, and stable drawdowns of less than 0.3 feet, while desirable, are not mandatory. If after 2 hours of purging indicator field parameters have not stabilized, discontinue purging, collect samples and provide full explanation of attempts to achieve stabilization.

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Low Flow Groundwater Sample Collection Record

Date:	**Well ID:**
Project Name:	**Location:**
Project Number:	**Collector(s):**
Start Time:	**End Time:**

Water Level Data

Total Well Depth:		Water Table Depth:	
Screen Interval:		Tubing Placement Depth:	
Well Volume		**Well Volume (gallons) = 0.041xH(D^2)** D= is in the inside diameter of the well casing, in inches H = Height of the water column (in feet)	
Purge Method:		Purge Rate:	

Water Quality Parameters

Time (24 hr)	Vol. Purged (L)	Temp (C)	pH	Spec. Cond (uS/cm)	DO (mg/L)	ORP (mv)	Turbidity (NTU)	Flow Rate (ml/min)	DTW	Color/ Odor

Acceptance Criteria defined:

Temp	3%	pH	+/- 1.0 unit	Spec. Cond	3%	DO	10%		
Turbidity	<5 NTU*	ORP	+/- 10 MV	Drawdown	<0.3'*				

Sample Collection:		Duplicate Details:	

*Achievement of turbidity levels of less than 5 NTU, and stable drawdowns of less than 0.3 feet, while desirable, are not mandatory. If after 2 hours of purging indicator field parameters have not stabilized, discontinue purging, collect samples and provide full explanation of attempts to achieve stabilization.

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

LAB USE ONLY- Affix Workorder/Login Label Here

Company Name: CRETE Consulting Inc., PC

Street Address:
16300 Christensen Road
Suite 214
Tukwila, WA 98188

Contact/Report To:

Phone #:

E-Mail:

Cc E-Mail:

Customer Project #:

Invoice to:

Project Name:

Invoice E-mail:

Site Collection Info/Facility ID (as applicable):

Purchase Order # (if applicable):

Quote #:

Time Zone Collected: [ ] AK [ ] PT [ ] MT [ ] CT [ ] ET

County / State origin of sample(s):

Data Deliverables:

[ ] Level II [ ] Level III [ ] Level IV

[ ] EQUIS

[ ] Other________________________

Regulatory Program (DW, RCRA, etc.) as applicable:

Reportable [ ] Yes [ ] No

Rush (Pre-approval required):

[ ] Same Day [ ] 1 Day [ ] 2 Day [ ] 3 Day Other ________________

Date Results Requested:

DW PWSID # or WW Permit # as applicable:

Field Filtered (if applicable): [ ] Yes [ ] No

Analysis:

Specify Container Size **

Identify Container Preservative Type***

Analysis Requested

**Container Size: (1) 1L, (2) 500mL, (3) 250mL, (4) 125mL, (5) 100mL, (6) 40mL vial, (7) EnCore, (8) TerraCore, (9) 90mL, (10) Other

*** Preservative Types: (1) None, (2) HNO_3, (3) H_2SO_4, (4) HCl, (5) NaOH, (6) Zn Acetate, (7) $NaHSO_4$, (8) Sod. Thiosulfate, (9) Ascorbic Acid, (10) MeOH, (11) Other

Lab Use Only

Proj. Mgr:

AcctNum / Client ID:

Table #:

Profile / Template:

Prelog / Bottle Ord. ID:

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SS), Oil (OL), Wipe (WP), Tissue (TS), Bioassay (B), Vapor (V), Surface Water (SW), Sediment (SED), Sludge (SL), Caulk (CK), Leachate (LL), Biosolid (BS), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Composite Start		Collected or Composite End		# Cont.	Residual Chlorine												Sample Comment	Preservation non-conformance identified for sample.
			Date	Time	Date	Time		Result	Units												

Additional Instructions:

Collected By:
Printed Name
Signature

Customer Remarks / Special Conditions / Possible Hazards:

# Coolers:	Thermometer ID:	Correction Factor (°C):	Obs. Temp. (°C):	Corrected Temp. (°C):	[ ] On Ice

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Tracking Number:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Delivered by: [ ] In- Person [ ] Courier
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	[ ] FedEX [ ] UPS [ ] Other
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	**Page: of**

Photograph 1: xxxxxxTitlexxxxxx.
View to the xxxdirectionxxx. Date: xxxxx/2024

Photograph 2: xxxxxxTitlexxxxxx.
View to the xxxdirectionxxx. Date: xxxxx/2024

Photograph 3: xxxxxxTitlexxxxxx.
View to the xxxdirectionxxx. Date: xxxxx/2024

Appendix E

Health and Safety Plan

APPENDIX E: HEALTH AND SAFETY PLAN

Maralco Site
Kent, Washington

January 13, 2025

Prepared for:

BRIDGE

Prepared by:

CRETE
CONSULTING, INC.

APPENDIX E: HEALTH AND SAFETY PLAN

Maralco Site
Kent, Washington

January 13, 2025

Prepared by:

Rusty Jones
____
Rusty Jones, Project Geologist

Reviewed by:

Jamie C. Stevens
____
Jamie Stevens, P.E.

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Acronyms and Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
APR	air purifying respirator
Bridge	7730 202nd Street, LLC
CAA	Cleanup Action Areas
CRETE	CRETE Consulting, Inc.
CRZ	contaminant reduction zone
EPA	United States Environmental Protection Agency
HASP	Health and Safety Plan
HEPA	high-efficiency particulate air
IDHL	immediately dangerous to health and life
IAWP	Interim Action Work Plan
JHA	job hazard analysis
kV	kilovolt
MARALCO	Former Maralco Aluminum Property
MSDS	material safety data sheet
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PID	photoionization detector
PPE	personal protective equipment
REL	reasonable exposure limit
SDS	Safety Data Sheet
Site	Maralco Site
SRIWP	Supplemental Remedial Investigation Work Plan
STEL	short-term exposure limit
SSO	Site Safety Officer
SVOC	semi-volatile organic compound
TCE	trichloroethene
TPH	total petroleum hydrocarbons
TLV	threshold limit value
TWA	time weighted average
VOC	volatile organic compound
WAC	Washington Administrative Code

MINIMUM TRAINING REQUIREMENTS

Maralco Site

All workers entering a designated **exclusion zone,** as described below, must have a current 40- or 24-hour training certificate in Hazardous Waste Operations or current 8-hour refresher. All workers on site will be required to have read and signed the Site-Specific Health and Safety Plan and attended a safety orientation. Specific types of site work, hazards, and training requirements are listed in the Job Hazard Assessment in Appendix F of this Plan.

The following table is intended to provide a summary of minimum levels of training for specific workers and job activities on site.

Type of Work Involved	**Minimum Level of Training**
Laborers and Equipment Operators in the Exclusion Zones engaged in disturbance of contaminated media, evaluating potential employee exposures, and otherwise potentially contacting contaminated media where **respiratory protection <u>is or may be</u> required.**	• 40-Hour Hazardous Waste Operations Training and Current 8-Hour Refresher • Project Safety Plan including Health and Safety Orientation • Read/Sign Site-Specific Health and Safety Plan
Laborers and Equipment Operators in the Exclusion Zones engaged in excavation of contaminated soil, evaluating potential employee exposures, and otherwise potentially contacting contaminated soils so long as respiratory protection <u>is not</u> required.	• 24-Hour Hazardous Waste Operations Training and Current 8-Hour Refresher • Project Safety Plan including Health and Safety Orientation • Read/Sign Site-Specific Health and Safety Plan
Workers onsite in clean or support zones for more than 8 hours, such as laborers, repair persons, inspectors, etc. ***Note*: None of these workers are permitted in any portion of the exclusion or contamination reduction zones.**	• Project Safety Plan including Health and Safety Orientation • Read/Sign Site-Specific Health and Safety Plan

1 Introduction

This Health and Safety Plan (HASP) describes the health and safety protocols to be used during activities at the Maralco Site. The Contractors involved in this work will follow their own HASPs. CRETE Consulting, Inc. (CRETE) will oversee remediation investigation activities at the site.

This plan was written by CRETE, who will work with various contractors to perform work on the Site. This HASP is unique to activities to be performed by CRETE staff/field managers/Site Safety Officer (SSO). General site information is summarized in Table 1-1. Background information pertaining to site history and general hazards is listed in Table 1-2.

In addition to the requirements set forth in this HASP, Crete personnel shall comply with the HASPs and related protocols of all onsite Contractors and any health and safety protocols required by Bridge Industrial (Bridge).

1.1 Subcontractor Distribution / Acknowledgment

As required by regulation, the Site Safety Officer (SSO) will make available a copy of this Site-Specific Health and Safety Plan to subcontractors hired by CRETE working in contaminated areas and others who may enter the site. Subcontractors and others will read, sign, and return the attached acknowledgment form (Appendix A) and follow these provisions as minimum requirements. Due to their unique work activities, some subcontractors may need to follow more stringent health and safety measures in accordance with applicable regulations (e.g. heavy equipment operation safety, crane operators, etc.). It is anticipated that subcontractors will manage the hazards specific to their trade and equipment, as detailed in each contractor's Accident Prevention Plan or company Health and Safety Plan.

The SSO shall be responsible for informing all individuals assigned to work on the site, or who visit the site within the exclusion or contaminant reduction zones, of the contents of this HASP and for ensuring that each person signs the Site Safety Plan Acknowledgment Form (Appendix A). By signing the Site Safety Plan Acknowledgment Form, individuals recognize the site health and safety hazards, known or suspected, and will adhere to the protocols required to minimize exposure to such hazards. Subcontractors will also adhere to their own HASPs related to the work they are performing (e.g., safe demolition procedures).

All visitors who enter the work zone are required to sign in and sign out with the Field Manager or SSO (Appendix B).

1.2 Site Health and Safety Meetings

A pre-work meeting addressing site-specific health and safety issues shall be held on the first day of mobilization to the site and prior to the commencement of any work activities. Mandatory attendance is required for all personnel assigned to the particular tasks for which the equipment was mobilized. The intent of these meetings is to discuss the site-specific health and safety issues (such as known or suspected contaminants).

At the conclusion of the meeting, personnel are to sign the Site Safety Plan Acknowledgment Form in Appendix A, indicating their attendance and understanding of the health and safety protocols. As additional personnel are assigned to the site, it is the responsibility of the SSO to ensure that new personnel are briefed on site-specific health and safety information and that they also have signed the Site Safety Plan Acknowledgment Form (Appendix A).

Daily tailgate meetings will be held by the SSO or field staff in charge of the day's activities and attendance will be documented in the tailgate meeting form Appendix C).

1.3 Training Requirements

All personnel assigned to work on this site beyond the support zone must have successfully completed 40 hours of Training for Hazardous Waste Site Work, in accordance with Occupational Safety Health Act (OSHA) 29 CFR 1910.120(e)(3), and must be current with their 8-hour Refresher Training, in accordance with OSHA 29 CFR 1910.120(e)(8).

Personnel managing or supervising work on site must also have successfully completed 8 hours of Manager/Supervisor Training, meeting the requirements of 29 CFR 1910.120(e)(4). Documentation of CRETE staff training is maintained in each company's respective databases. Each contractor must maintain documentation of OSHA training for personnel working on site.

Any exceptions to the training requirements will be explicitly specified either in this HASP or through a HASP amendment.

1.4 Medical Monitoring Requirements

All CRETE personnel assigned to work on this site beyond the support zone must be enrolled in a medical surveillance program meeting the requirements of OSHA 29 CFR 1910.120(f). Personnel must have successfully passed an occupational physical within the past 12 months, be medically cleared to work on hazardous waste sites, and be capable of wearing appropriate personal protective equipment (PPE), including any respiratory protection.

Any exceptions to the medical monitoring requirements will be explicitly specified either in this HASP or through a HASP amendment.

1.5 Fit Testing Requirements

All CRETE personnel assigned to work on this site beyond the support zone must be familiar with the requirements in the OSHA respiratory standard (29 CFR 1910.134). All personnel who are required to wear respiratory protection must have successfully passed a respirator fit test within the past 12 months. Personnel who do not have a current fit test are prohibited from working in areas where any potential exists for exceeding OSHA Permissible Exposure Limits. Documentation of a successful respirator fit test for the appropriate type of respirator needed for this work (half-face) must be maintained by each contractor performing onsite work. The SSO will check that the respirator being worn by personnel is the same size, make, and model as that specified on any respirator fit test records from the past 12-month period.

1.6 Project Staff Responsibilities

The SSO is responsible for overall project administration and for coordinating health and safety protocols and procedures for all onsite CRETE personnel at all times. All applicable United States Environmental Protection Agency (EPA), OSHA, state, and local health and safety requirements shall be followed throughout the course of the project. This HASP covers only CRETE personnel onsite. Any person who observes health and safety problems or infractions should immediately report the problem or infraction to appropriate personnel.

1.7 Access to Employee Exposure and Medical Records

OSHA provides employees and their designated representatives a right-of-access to relevant exposure and medical records (29 CFR 1910.20). The “Notification of Access to Employee Exposure and Medical Records” (Appendix D) is to be made accessible to all employees involved with these field operations.

1.8 Hazard Communication

The SSO will advise all CRETE personnel assigned to this site of the hazards associated with working onsite and of the methods to mitigate those hazards and prevent exposures. This information will be presented to personnel prior to initiation of any field activities. The following information regarding site contaminants or any chemicals brought to the site to conduct the work will be presented to site personnel prior to conducting any field work:

- Material Safety Data Sheets (MSDS)/Safety Data Sheets (SDS) - Appendix E
- Chemical/physical hazards
- Appropriate PPE for protection from exposure
- Labeling

Table 1-1 General Information

Client: Bridge	**Project ID**
Site Name: Maralco Site	
Site Location: 7730 South 202nd Street, Kent WA	
Description of Field Activities: Site inspection, soil/groundwater/surface water sampling, and installation of monitoring wells	
Dates of Field Activities: 2024-2025	
Project Manager: Grant Hainsworth, CRETE	**Project Manager Telephone Number:** 253-797-6323
QA Officer: Jamie Stevens, CRETE	**QA Officer Telephone #** 206-799-2744
Site Safety Officer (SSO): Rusty Jones, CRETE	**Field Manger Telephone #** 832-330-1359
The following requirements have been fulfilled for each employee to work onsite: ☒**Completed OSHA 40-Hour HAZWOPER Training** ☒**Current OSHA 8-Hour HAZWOPER Refresher (within last 12 months)** ☒**Current Medical Surveillance Examination (within last 12 months)** ☒**Current Respirator Fit-test (within last 12 months)** ☒**Current First Aid and CPR Training (within last 2 years)** **Note:** CRETE employees may not enter a site beyond the support zone unless the training/qualifications listed above are current. **The field manager and the SSO meets all the training requirements listed above and records can be provided upon request.**	

Table 1-2 Site Background

<table>
<tr><td colspan="4">Overall Hazard Is:</td></tr>
<tr><td>High: ☐</td><td>Moderate: ☒</td><td>Low: ☐</td><td>Unknown: ☐</td></tr>
<tr><td colspan="4">Facility Description: The site has known extensive surface metals and metal oxide contamination from historic on-site refining and smelting activities. Limited hydrocarbon soil and groundwater impacts from a former UST. Surface soil contamination (arsenic, chromium, et al.) are present from former outdoor and indoor stockpiles. The majority of the stockpiled waste was removed in 2023. Work detailed in this HASP may overlap with construction redevelopment work at the site. Redevelopment includes –site grading, and construction of a new site building and parking areas.</td></tr>
<tr><td colspan="4">Status: Recent construction work included the removal of the large outdoor dross pile and cleaning up and removal of interior dross piles (2023). Grading and soil excavation was completed in the Fall of 2024.</td></tr>
<tr><td colspan="4">Unusual Features (containers, dikes, buildings, power lines, terrain, etc.): none.</td></tr>
<tr><td colspan="4">Site History (worker injury, complaints, regulatory agency action): There are known areas of groundwater and soil contamination above state and federal criteria. Site work is being completed under the oversight from the Washington State Department of Ecology. No worker injury/complaints/violations are known.</td></tr>
<tr><td colspan="4">Potential Waste Types: Soil and groundwater contamination, metal-laden dust.</td></tr>
<tr><td>Liquid: ☒</td><td>Solid: ☒</td><td>Sludge: ☒</td><td>Debris: ☒</td></tr>
<tr><td colspan="4">Hazards posed by site activities (Job Hazard Analysis in Appendix F): Potential exposure to contaminants including petroleum hydrocarbons, VOCs, metals. Free phase petroleum products unlikely to be encountered. Trips, slips, falls, sharp objects and dust inhalation are the main hazards.</td></tr>
<tr><td colspan="4">Unusual Hazards: Thorny vegetation is present, and animal wildlife may be present.</td></tr>
</table>

2 Health & Safety Risk Analysis

This section identifies the specific hazards associated with the remedial investigation work and presents an analysis of documented or potential chemical hazards at the site. Every effort must be made to reduce or eliminate exposure to these hazards. Hazards that cannot be eliminated must be abated by use of engineering controls and/or PPE.

2.1 Description of Site Tasks

This HASP is intended to cover activities in areas where contamination may be encountered at the Project. These activities include:

- Mobilization to the site and driving on the site; coordination with contractors on equipment and supply staging.
- Soil, groundwater and surface water sampling.
- Monitoring well installation
- Archaeological monitoring, as required.

A job hazard assessment that evaluates the hazards associated these tasks is included with this Plan as Appendix F.

2.2 General Site Hazards

2.2.1 Lighting

Work areas must have adequate lighting for employees to see to work and identify hazards (5-foot candles minimum, comparable to a single 75- to 100-watt bulb). Personnel should have flashlights available in all indoor or dimly lighted areas for use in the event of a power failure, or if working outdoors after daylight hours. Applicable OSHA standards for lighting (29 CFR 1910.120(m)) shall apply. **All activities will occur outside and mostly during daylight hours.**

2.2.2 Utilities

All electrical power must have a ground fault circuit interrupter as part of the circuit, including generators. All equipment must be suitable and approved for the class of hazardous atmosphere in which it is being used. Applicable OSHA standards for electric power (29 CFR 1910 Subpart S) shall apply.
No power required tools are needed to complete the scope of work included in this HASP.

Though no expected for this scope of work, if activities require work to be performed in the vicinity of overhead utilities, including power lines, a spotter will be assigned to help operators maneuver equipment in and around the wires.

The following distances will always be maintained around high-tension wires:

- For lines rated 50 kilovolts (kV) or below, minimum clearance between the lines and any part of the crane or load shall be 10 feet.
- For lines rated over 50 kV, minimum clearance between the lines and any part of the crane or load shall be 10 feet plus 0.4 inch for each 1 kV over 50 kV, or twice the length of the line insulator, but never less than 10 feet.
- In transit with no load and boom lowered, the equipment clearance shall be a minimum of 4 feet for voltages less than 50 kV, 10 feet for voltages over 50 kV, up to and including 345 kV, and 16 feet for voltages up to and including 750 kV.

In addition, all utility pole “guy-wire” support cables will be identified, marked, and/or barricaded prior to work. Unintended equipment or vehicle contact with these guy wires may result in utility poles or power lines falling on personnel or equipment.

2.2.3 Heat Stress

Work will be performed in accordance with WAC 296-62-095 with regard to heat stress.
Site personnel may be required to perform their work tasks in ambient temperatures of 70 degrees F or above or while wearing impervious clothing. All personnel must be instructed on the symptoms of the primary heat-related disorders and how to minimize their chances of becoming affected by them. These disorders, their symptoms, and first-aid measures are outlined below:

- **Heat Rash:** Decreased ability to tolerate heat raised red vesicle on affected areas, and clothes that chafe. Maintain good personnel hygiene and use drying powders or lotions.
- **Heat Cramps:** Muscle spasms and pain in the extremities and abdomen. Rest in cool area and drink plenty of fluids. If pain persists, seek medical attention.
- **Heat Exhaustion:** Shallow breathing; pale, cool, moist, clammy skin, profuse sweating, dizziness, lassitude, and fainting. Rest in a cool area and drink plenty of fluids. Get medical attention prior to returning to work.
- **Heat Stroke:** Red, hot, dry skin, no perspiration, nausea, dizziness, confusion, strong rapid pulse, coma. Cool victim immediately with cool or cold water. Seek immediate medical attention.

At a minimum, personnel wearing non-breathable clothing at temperatures greater than 70 degrees F should take a break every one to two hours and drink plenty of fluids. The intake of an average of one quart of fluids per hour is recommended. CRETE is required to provide enough water on site for each employee to drink one quart per hour on site. A cool or shaded rest area should be used.

2.2.4 Cold Stress

Site personnel will be instructed on the signs, symptoms, and the prevention of cold-related disorders prior to performing specific work tasks. The two major effects of cold stress are frostbite and hypothermia.

- Frostbite: Sudden blanching of the skin progressing to skin with a waxy or white appearance, which is firm to the touch, but the tissue beneath the skin, is resilient to the touch.
- Hypothermia: The symptoms of systematic hypothermia are exhibited as follows: (1) shivering, (2) apathy, listlessness, and (sometimes) rapid cooling of the body to less than 90F, (3) unconsciousness, glassy stare, slow pulse, and slow respiratory rate, (4) freezing of the extremities, and (5) death.

Personnel will monitor themselves and other team members for signs of frostbite and hypothermia. If temperatures fall below 20°F, thermal clothing may be required. Field activities will be curtailed if equivalent wind chill temperatures are less than 0°F, unless operations are of an emergency nature.

2.2.5 Noise

When the noise level of any operation exceeds the 8-hour Time Weighted Average (TWA) of 85 decibels (dB), a hearing protection program meeting the requirements of 29 CFR 1910.95 will be implemented. Noise generation at the site will primarily be created by heavy power equipment (excavators), haul truck, generators, and power equipment attachments (e.g. jack-hammer on excavators during concrete demolition) used by the subcontractors to complete remedial actions and site redevelopment.

2.2.6 Fire Prevention

Operations involving the potential for fire hazards shall be conducted in a manner that minimizes the risk. Non-sparking tools and fire extinguishers shall be used or available as required. Sources of ignition shall be removed. When necessary, explosion-proof instruments and/or bonding and grounding will be used to prevent explosion and/or fire. All power equipment will be required to have inspected, current fire extinguishers.

2.2.7 Severe Weather and Lightning

The SSO will monitor local media resources to identify possible severe weather situations at the project site. Site work may be delayed, postponed, or cancelled due to severe weather based on the SSO's discretion. In the event of a weather emergency, the site will be evacuated in accordance with Section 7 of this document.

Lightning can strike up to a distance of 10 miles, but thunder can only be heard at a distance of 8 miles. Therefore, if site personnel working outdoors hear thunder and/or see lightning, work will be stopped and personnel will move to an indoor location. If indoor facilities are not available, personnel will move inside of passenger vehicles such as cars and pickups. During a thunderstorm with thunder/lightning, avoid trees/poles, standing water, high areas, and metal structures (fences, scaffolding, etc.). Work will resume 30 minutes following the final observance of thunder and/or lightning.

2.2.8 Heavy Equipment

Heavy equipment to be used on this project includes excavators and supporting equipment which will be used by subcontractors which may be needed to clear access or support drilling needs. CRETE employees will not be operating any heavy equipment but will be working in the vicinity of this equipment to complete oversite and sampling during environmental oversight. Equipment must be maintained in good working condition and operated in a safe manner. Heavy equipment operators must be trained in the operation and handling of the applicable piece of equipment. Equipment must have audible alarms, rollover protection, seat belts, and be equipped with a fire extinguisher. Subcontractors shall not use equipment that they judge to be unsafe due to deterioration, missing parts, or obvious defects. Visual safety inspections shall be conducted daily and documented inspections shall be conducted monthly.

2.2.9 Slips, Trips, and Falls

Slips, trips, and falls are a major concern while working on any site and account for a large number of occupational accidents. Personnel must be aware of their surroundings while moving about the site. Pathways and work areas must be kept free of debris and supplies to prevent unsafe walking and working conditions. Changes in elevation such as ruts, holes, broken pavement, or berms should be marked, if possible. When water is used during any of the work tasks, care must be taken to avoid creating muddy or slippery conditions. If slippery conditions are unavoidable, barriers and warning signs must be used to warn of these dangers.

2.3 Chemical Hazards

Data summarized in the Supplement Remedial Investigation Work Plan (SRIWP) indicates that the chemicals listed in Table 2-1 exist at the site in soils and water. The following chemicals have been identified based on at least one detection over a site screening levels:

- Metals (aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, selenium, thallium, nickel, silver, vanadium, and zinc)
- Non-Metals (petroleum hydocarbons, cyanide, chloride, fluoride, Benzene, Toluene, Xylenes, Carcinogenic Polycyclic Aromatic Hydrocarbons, and other semi volatile organic compounds).

Contamination at the site is associated with the dross waste generated and handled on the Site and an underground storage tank.

Detailed hazard information for selected chemicals is available through MSDS/SDS in Appendix E, for any chemicals brought on site by CRETE employees. Workers will use appropriate PPE if exposure to a known or suspected contaminated medium is likely.

2.3.1 Chemicals Potentially Used

In addition to the site contaminants, chemical products will be purchased for use at the site. These chemicals may include decontamination materials such as isopropyl alcohol, n-hexane, and soaps (e.g., Alconox). Other materials may be purchased as needed. MSDS/SDS required by OSHA will be obtained for chemical products used at the site. Copies of the MSDS/SDS will be maintained at the site for worker review.

2.3.2 Sample Preservatives

Preservatives including hydrochloric acid and nitric acid may be encountered during sampling activities. Safe and proper handling techniques are to be used when collecting samples. Individuals should work upwind from the open sample keeping the bottle away from the breathing zone (approximately one arm's length) to minimize potential exposure. Personnel should be aware of any changes in wind direction that may also affect potential for exposure to vapors. Gloves and safety glasses will always be worn when collecting samples. Sample vessel seals should be immediately replaced after sample is gathered.

Should any sample preservatives come in contact with skin, the exposed area should be thoroughly irrigated with fresh water immediately.

2.3.3 Hazardous Chemicals Present in Materials

Metals

The major route of exposure to metals is via inhalation of dusts, mists, and fumes or through ingestion of dust or contaminated foods. Numerous metals may be inhaled via cigarette smoke. Avoid smoking or eating onsite or prior to doffing PPE. Many of the metal compounds may be encountered as metal oxides at the site. Like all metal compounds, the level of harm depends upon the dose, duration, and work being done.

Aluminum has been linked to declining performance in neuropsychological tests (attention, learning, memory). Elevated aluminum content has been found in the brains of persons with Alzheimer's disease. It remains unclear whether this is a cause or an effect of the disease. There is conflicting evidence on carcinogenicity. (NIH website) Aluminum dross has been associated with the site. It is expected that all dross will be removed from the site at the time of this field work, however, dross is discussed briefly in the event it remains on the site. Dross may react slowly with water to produce methane, ammonia, and hydrogen.

The OSHA PEL-TWA for aluminum dust is 10 mg/m3 and the NIOSH REL-TWA is 10 mg/m3.

Antimony powder is a strong reducing agent and may react violently or explosively with water. Antimony is spontaneously flammable in fluorine, chlorine, and bromine.
The OSHA PEL-TWA and NIOSH REL-TWA for antimony is 0.5 mg/m3 and the NIOSH IDLH is 50 mg/m3.

Arsenic-containing dust exposure causes irritation of the upper respiratory tract, decreased production of red and white blood cells, abnormal heart rhythm, damage to blood vessels, and darkening of the skin and small corns or warts. Ingestion of arsenic-laden dust from swallowing inhaled dust or ingesting contaminated soil may also cause gastrointestinal effects including nausea and vomiting.
The OSHA PEL-TWA for arsenic dust is 0.01 mg/m3 and NIOSH REL-15min is 0.002 mg/m3.

Workers in industries where beryllium is present may be exposed to beryllium by inhaling or contacting beryllium in the air or on surfaces. Inhaling or contacting beryllium can cause an immune response that results in an individual becoming sensitized to beryllium. Individuals with beryllium sensitization are at risk for developing a debilitating disease of the lungs called chronic beryllium disease (CBD) if they inhale airborne beryllium after becoming sensitized. Beryllium-exposed workers may also develop other adverse health effects such as acute beryllium disease, and lung cancer. Beryllium compounds may be present at the site and are generally white, crystalline or powdered material and are generally soluble in water.
The OSHA PEL-TWA for beryllium is 0.2 ug/m3 and the OSHA-STEL is 2.0 ug/m3.

Cadmium can be associated with carcinogenesis, primarily in the lung, but also in the prostate, kidneys, breast, urinary bladder, nasopharynx, pancreas, and hematopoietic system. The liver and kidneys are extremely sensitive to cadmium’s toxic effects due to the ability of these tissues to synthesize metallothioneins, which are Cd-inducible proteins that protect the cell by tightly binding the toxic cadmium ions. (NIH website).
The OSHA PEL for cadmium dust is 0.05 mg/m3.

Acute inhaling exposure to chromium concentration and chromic-acid causes upper respiratory tract irritation and occasional asthmatic symptom and dermal exposure causes deep, sharply defined ulcers that are slow to heal. Chromates are also irritating to the skin and mucous membranes. Chronic exposure has been associated with an increased incidence of lung cancer. Chromium accumulates mainly in the liver, spleen, soft tissue, and bone. In the blood, most chromium is bound to plasma proteins, particularly transferrin. Chromium is excreted mainly in the urine.
The OSHA PEL-TWA for chromium dust is 1 mg/m3 and NIOSH REL-TWA is 0.5 mg/m3.

Cobalt is a hard, gray metal that occurs naturally. It can harm the eyes, skin, heart, and lungs. Exposure to cobalt may cause cancer. Workers may be harmed from exposure to cobalt and cobalt-containing products. The level of harm depends upon the dose, duration, and work being done.
The OSHA PEL-TWA for cobalt dust and fume is 0.1 mg/m3 and the NIOSH REL-TWA is 0.05 mg/m3.

Copper compounds can irritate the eyes, nose, throat and can damage the eyes skin, lungs, liver, kidneys. It may increase risk of anemia and Wilson’s Disease.
The OSHA PEL-TWA and NIOSH REL-TWA for copper fume is 0.1 mg/m3. The OSHA PEL-TWA and NIOSH REL-TWA for copper compounds is 1 mg/m3.

Nickel exposure may cause irritation to the skin and eyes, harm the lungs, stomach, and kidneys, and may lead to cancer. Chronic nickel exposure has been connected with increased risk of lung cancer, cardiovascular disease, neurological deficits, developmental deficits in childhood, and high blood pressure.
The OSHA PEL-TWA for nickel dust is 0.05 mg/m3 and NIOSH REL-TWA is 0.015 mg/m3.

Lead can affect almost every organ and system in your body. Children bodies absorb more lead than adults do and their brains and nervous systems are more sensitive to the damaging effects of lead, including behavior and learning problems, lower IQ, and hearing problems. Lead can also cause slowed growth and anemia in children. Lead in adults, including pregnant women, can cause hypertension and increased blood pressure. Lead can also cause kidney and reproductive problems in both men and women. In pregnant women, lead can be passed to the unborn baby. In rare cases, lead can cause seizures, coma, and even death.
The OSHA PEL for lead dust is 0.05 mg/m3 and the NIOSH REL-TWA is 0.05 mg/m3.

Zinc would most likely be found in the form of zinc oxide. Primary exposure is inhalation and may produce shills, muscle ache, nausea, fever dry throat, cough, weakness and exhaustion, headache, blurred vision.
The OSHA PEL-TWA and NIOSH REL-TWA for zinc oxide dust and fume is 5 mg/m3 and the NIOSH REL-STEL is 10 mg/m3.

Benzene (present in site soils)

Benzene exposure can occur by inhalation, percutaneous absorption, ingestion, and skin and eye contact. Like other aliphatic and aromatic hydrocarbons, acute overexposure to benzene can cause central nervous system depression. Headache, dizziness, nausea, convulsions, coma, and death can result from elevated exposures. In some cases, acute exposure has resulted in death due to ventricular fibrillation. The principal chronic hazard associated with benzene exposures is its ability to cause changes in blood cells, including anemia and cell abnormalities. Benzene has been demonstrated to cause leukemia in epidemiological studies, and it is recognized as a human carcinogen by the National Institute for Occupational Safety and Health (NIOSH) and other agencies. The Environmental Protection Agency (EPA) currently classifies benzene as a Class A, or confirmed, human carcinogen. **No appreciable concentrations of Benzene Compounds have been identified at the Site.**

Polycyclic Aromatic Hydrocarbons and other Semi Volatile Organic Compounds

Epidemiological evidence suggests that workers exposed to these compounds are at increased risk of cancer at many organ sites, including lungs, kidney and skin. The major route of exposure to these compounds on this project is through inhalation of or skin contact with contaminated soils. **No appreciable concentrations of Polycyclic Aromatic**

Hydrocarbons and other Semi Volatile Organic Compounds have been identified at the Site.

Table 2-1 Chemical Hazards

Contaminant	Unit	PEL[a]	TLV[b]	REL[c]	STEL[d]	IDLH[e]	Odor Threshold	IP[f] (in eV)
Diesel (as mist)	mg/m^3	5	5	5	10	Ca	None Reported	NA
Benzene	ppm	1	0.1	0.1	1	500	34-119	9.24
Arsenic (as an indicator of other metals)	mg/m^3	0.01	0.01	0.002	NA	5 Ca	None Reported	NA
Toluene	ppm	200	50	100	150	500	0.16-37	8.82
Ethylbenzene	ppm	100	100	100	125	800	0.092-0.06	8.76
Xylene	ppm	100	100	100	150	900	20	8.44 - 8.56
Benzo(a)pyrene	mg/m^3	0.2 (soluble aerosol, as coal tar pitches		0.1	10 (mineral mist)	Ca	None Reported	NA

Note:
[a] OSHA Permissible Exposure Limit (PEL) (8-hour time weighted average [TWA])
[b] American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) (8-hour TWA)
[c] National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL) (8-hour TWA)
[d] Short-Term Exposure Limit (15-minute TWA that should not be exceeded at any time during the work day)
[e] Immediately Dangerous to Life & Health
[f] Ionization Potential
C = Ceiling Limit (Concentration that should not be exceeded during any part of the working exposure)
CA = Carcinogenic
mg/m^3: milligrams per cubic meter

2.4 Biological Hazards

Project personnel should be provided with the information and training necessary to avoid accidental injury or illness that can result from exposure to biological hazards. This includes ensuring that the site is carefully assessed when personnel are on site so that the hazards associated with biological entities are recognized and eliminated or controlled. Potential biological hazards associated with the project site include animals, such as raccoons and rats; stinging insects, such as bees and yellow jackets; and plants, such as blackberries.

Biological hazards may also include human waste, discarded needle/needle sticks, drug paraphernalia, and exposure to harmful chemicals. Human waste can contain harmful bacteria and viruses that can cause disease. Needle sticks can also transmit diseases, including HIV and hepatitis C. Exposure to toxic chemicals can cause respiratory problems, skin irritation, and other health problems. If these types of hazards are encountered, the location of these items should be secured and the area should be cleaned up by a subcontractor. CRETE employees are not to pick up biological hazards.

3 Personal Protective Equipment

PPE is required for all field work. The level of PPE required varies by the type and duration of potential exposures. The EPA terminology for protective equipment (Levels A, B, C, and D) provides guidance on typical work levels and required PPE. Additional training is required for Levels A and B; CRETE personnel are not permitted to use Level A or Level B at the Site. A guide to the type of chemical protective clothing and respirator cartridges to be used for chemicals commonly encountered during remedial investigations is provided in Table 3-1, and requirements for Level C or Level D PPE are described below.

Respiratory protective equipment shall be NIOSH-approved and use shall conform to OSHA 29 CFR 1910.134.

Table 3-1 PPE Selection Guide

Chemical Hazard	Glove Material	Coverall Material	Boot Material	Respirator Cartridge
Acids • Hydrochloric • Sulfuric	Butyl rubber	Saranex or Butyl rubber apron	Butyl rubber	Acid vapor
Coal Tar • Polyisocyanate • Naphtha	Nitrile rubber	Polycoated Tyvek	Nitrile rubber	Organic vapor
Creosote	Butyl rubber	Polycoated Tyvek	Butyl rubber	Organic vapor
Dry Particulates • Metals • Asbestos	Nitrile rubber	Tyvek	Tyvek	HEPA
Fuel Hydrocarbons • Gasoline • Diesel	Nitrile rubber	Polycoated Tyvek	Nitrile rubber	Organic vapor
Halogens, Aliphatic • Carbon tetrachloride • Ethylene dichloride	Teflon	Polycoated Tyvek	Nitrile rubber	Organic vapor
Halogens, Vinylic • Vinyl chloride	Nitrile rubber	Polycoated Tyvek	Nitrile rubber	Organic vapor

Forsberg, K. and Mansdorf, S.Z., 1997. Quick Selection Guide to Chemical Protective Clothing, Third Edition. John Wiley & Sons, Inc.

3.1 Level C

Level C protection shall be used when:

- Substance(s) require the same level of skin protection as Level B, but a lesser level of respiratory protection.
- The types of air contaminants have been identified, concentrations have been measured, and respirator decision logic indicates that air purifying respirators (APRs) are sufficient to remove the contaminants.

- The substance has adequate warning properties (odor threshold is below occupational exposure limits) and all criteria for the selection of APR have been met.

Level 3 is not expected at this site based on the scope of work and known chemicals remaining, however, field personal may elect to wear Level C and if so the following PPE shall be utilized.

Table 3-2 Level C PPE to be Utilized

(Check Appropriate PPE)

☒	Half-face APR (OSHA/NIOSH-approved)
☐	Full-face APR (OSHA/NIOSH-approved)
☒	Type of Cartridges to be Used: AG/OV/P100
☐	Chemical-resistant clothing <u>check appropriate garments</u> (one-piece coverall; hooded one- or two-piece; chemical splash suit; chemical-resistant hood and apron; disposable chemical coveralls [i.e., Tyvek]) ☐ One-piece coverall ☐ Hooded one- or-two piece chemical splash suit ☐ Chemical-resistant hood and apron ☐ Disposable chemical-resistant coveralls **Fabric Type:**
☒	Disposable inner gloves (surgical)
☐	Disposable chemical-resistant outer gloves **Material Type:**
☐	Chemical-resistant boots with safety toe and steel shank or disposable boot covers for safety toe/work boots **Material Type:**
☒	Work boots with steel toe
☐	Sleeves to be duct-taped over gloves and pants to be duct-taped over boots
☐	Safety goggles
☒	Safety glasses
☒	Hard hat
☐	Hard hat with face shield
☒	Hearing protectors (**REQUIRED** if site noise levels are greater than 85 dB based on an 8-hour TWA). **Type:** foam or rubber ear plugs
☐	**Modifications:** Nitrile gloves when sampling, face mask (Covid)

3.2 Level D

Level D protection will be used when:

- The atmosphere contains no known hazard.
- Work functions preclude splashes, immersions, or the potential for unexpected inhalation of, or contact with, hazardous concentrations of chemicals.
- Atmospheric concentrations of contaminants are less than the Threshold Limit Value (TLV).

Table 3-3 Level D PPE (Minimum Work Uniform Permitted)

(Check Appropriate PPE)

☒	Full-legged pants, safety vest
☒	Work boots with safety toe
☒	Work gloves
☐	Safety goggles
☒	Safety glasses
☒	Hearing protectors (**REQUIRED** if site noise levels are greater than 85 dB based on an 8-hour TWA)
☒	Hard hat
☐	Hard hat with face shield
☐	**Modifications:** Nitrile gloves when sampling, face mask (Covid)

Table 3-4 Activity vs. Level of Protection

Activity	Level of PPE	Special Requirements
Remediation investigation activities	Level D or Level C	

4 Air Monitoring

According to 29 CFR 1910.120(h) and Washington Administrative Code (WAC), air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection required for personnel working on site. Personnel air monitoring was completed during the IAWP Phase 1, which included the construction oversight of removal and disposal of the 35,000 tons of waste material including black dross, washed oxides, bag house dust, and soil mixed with this waste. During that field effort, no action levels were exceeded. Based on the scope of work included in this HASP, which includes minimal soil disturbance no air monitoring will be triggered. Installation of monitoring wells will disturb soils, but the work will be focused and will not stir up material, creating dust or other potential air monitoring concerns.

Visual observations of the site are required to determine the effectiveness of engineering controls, to reevaluate levels of protection, and determine if site conditions have changed. Activities shall generate no visual dust, if visual dust is generated, work shall stop and means and methods will be addressed and modified to reduce dust generation. Modifications may include wetting material, modifying excavation rates, or modification of excavation equipment.

4.1 Respirator Cartridge Change Out

In the event of the use of respiratory protection, a workers choice, cartridges will be replaced daily during field work. For organic cartridges, these conditions may dictate that the cartridges be replaced more frequently:

- If the organic chemical’s boiling point is <70°F and the concentration is greater than 200 ppm, contact the SSO to discuss cartridge replacement and options for respiratory protection.
- If physical work rate exceeds a moderate level, replace cartridges every 4 hours of work.
- If relative humidity exceeds 85%, replace cartridges every 4 hours of work.

5 Work Zones

Site control will be maintained by establishing clearly identified work zones. These will include exclusion zones, contamination reduction zones, support zones, and other work areas on site where the potential for airborne or contact exposure to hazardous substances is minimal.

To ensure effective work zone procedures, the amount of equipment and number of personnel permitted to enter contaminated areas must be minimized. Do not kneel on contaminated ground, stir up unnecessary dust, or perform any practice that increases the probability of hand-to-mouth transfer of contaminated materials. Use plastic drop cloths and equipment covers, where possible. The following general safety procedures shall always be implemented:

- Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces. Walk around (not through) puddles and discolored surfaces. Do not kneel or set equipment on the ground. Stay away from waste drums unless it is necessary to sample or handle the drums. Protect equipment from contamination by bagging.
- Eating, drinking, and/or smoking are only permitted in designated areas in the support zone.
- Beards and/or other facial hair that interferes with respirator fit will preclude admission to the exclusion zone.
- All equipment must be decontaminated or properly discarded upon exit from the exclusion zone as determined by the SSO.
- All personnel exiting the exclusion zone must go through the decontamination procedures as described in this HASP.
- PPE as described in this HASP will be required for all field personnel working on site.
- Contact lenses may be worn on the site provided safety glasses or goggles are also worn. Any exceptions to wearing of contact lenses will be specified in this HASP or through a HASP amendment.

6 Decontamination

In general, everything that enters the exclusion zone must either be decontaminated or properly discarded upon exit from the exclusion zone. All personnel, including any visitors, must enter and exit the exclusion zone through the CRZ.

Contaminated equipment and heavy equipment will be decontaminated and inspected by the equipment operator/contractor). Material that is generated by decontamination procedures will be discharged through the water treatment system, or drummed for offsite disposal is at tail-end of project completion.

6.1 Personnel Decontamination

Personnel may become contaminated in a number of ways including, not limited to:

- Contacting vapors, gases, mists, or particulates in the air
- Being splashed by materials during sampling
- Walking through puddles or on contaminated soil
- Using contaminated instruments or equipment.

Even with safeguards, personnel contamination may occur. Harmful materials can be transferred into the clean area, exposing unprotected personnel. In removing contaminated clothing, personnel may contact contaminants on clothing or inhale them. To prevent such occurrences, decontamination procedures must be developed and established before anyone enters the site and must continue throughout site operations.

Personnel decontamination procedures will be based on the contaminants of concern and the level of protection being worn by site personnel.

6.2 Sampling Equipment

Sampling devices, when used onsite, require special cleaning procedures (Table 6-1).

6.3 Disposal of Contaminated Materials

All materials and equipment used for decontamination must be disposed of properly (Table 6-1).

6.4 Emergency Decontamination

Personnel with medical problems or injuries may also require decontamination. There is the possibility that the decontamination may aggravate or cause more serious health effects. If prompt lifesaving, first aid, and medical treatment are required, decontamination procedures will be omitted. In either case, a member of the site management team will accompany contaminated personnel to the medical facility to advise on matters involving decontamination.

6.5 Sanitizing of Personal Protective Equipment

Respirators, reusable protective clothing, and other personal articles not only must be decontaminated before being reused, but also sanitized. The insides of masks and clothing become soiled due to exhalation, body oils, and perspiration. Manufacturer's instructions should be used to sanitize the respirator masks. If practical, reusable protective clothing should be machine-washed after a thorough decontamination; otherwise, it must be cleaned by hand.

Table 6-1 Decontamination Procedures

☐	**Level C:** Segregated equipment drop, boot cover and glove wash, boot cover and glove rinse, boot cover removal, outer glove removal, suit/safety boot wash, suit/safety boot rinse, (canister or mask change), safety boot removal, splash suit removal, inner glove wash, face piece removal, inner glove removal, inner clothing removal, field wash, re-dress. **Modifications**:
☒	**Level D:** Segregated equipment drop, boot and glove wash, boot and glove rinse, or dispose of gloves. PPE shall not be shared. Each personnel to have their own, dedicated PPE (boots, safety glasses, respirators, etc.) **Modifications:** Change gloves between samples, or when soiled during non-sampling activities.
☒	**Heavy Equipment:** Decontamination: The surfaces of all heavy equipment that come into contact with soils will be cleaned prior to removal from site with power-washer or heavy brooms. The SSO is responsible for assuring decontamination activities.

7 Emergency Response/Contingency Plan

It is essential that site personnel be prepared in the event of an emergency. Emergencies can take many forms: illnesses, injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in weather. Table 7-1 outlines the contact information for emergencies. The first two numbers should be called in the order listed for all emergencies requiring immediate assistance. The other numbers are specific to emergency type (e.g., spill, poisoning). The Project Manager and the client contact are to be notified of the incident after the emergency situation is addressed.

Table 7-1 Emergency Contacts/Telephone Numbers

1. Fire, Police, Ambulance	911 or
Capable of Transporting Contaminated Personnel?	**Yes:** ☒ **No:** ☐
2. Site Security	NONE
Hospital:	**Valley Medical Center in Renton, WA** **ER Tele: 425-690-1000**
Chemical Trauma Capabilities?	**Yes:** ☒ **No:** ☐
Decontamination Capabilities?	**Yes:** ☒ **No:** ☐
Directions from Site to Hospital:	Go east on S 202nd St, turn left (north) onto 80th Ave S, then follow as 80th Ave turns right (east) into S 200th St. Continue for 0.5-miles. Turn left (north) onto 84th Ave S (aka E Valley Hwy) and continue 1.7-miles. Turn right (east) onto S 180th St and go 0.3-miles, then turn left (north) onto Talbot Rd. Hospital and ER is the left (west). Follow signs to ER.
Note: See map for route to hospital at the end of this section. ***The route to the hospital was verified by:*** Rusty Jones Distance from the Site to the hospital is: 2.6 miles. The approximate driving time is: 9 minutes.	
Poison Control Center:	(800) 732-6985
Electric Company: No power is provided to the site	
Gas Company: Puget Sound Energy (PSE)	(888) 225-5773 or 911
Water Company: No water is provided to the site	
Airport: SeaTac	(206) 433-5217
National Response Center (for spill reporting)	(800) 424-8802
Washington Emergency Management Division (for spill reporting)	(800) 258-5990 or (800) OILS-911
Center for Disease Control	(404) 639-3311 (24-hour)
ATF (explosion information)	(202) 927-8210
Chemtrec	(800) 424-9300

CRETE Consulting Office and Project Managers	Grant Hainsworth (253) 797-6323 Jamie Stevens (206) 799-2744
CRETE Consulting Personnel Medical Consultant	UW Valley Medical Center Occupation Health and Safety
Client Contact	Kyle Siekawitch (509) 969-5667

7.1 Emergency Response Plan

7.1.1 Pre-Emergency Planning

The SSO is responsible for emergency contingency planning and as such, is responsible for:

- Posting emergency telephone numbers and route to the hospital in the field
- Conducting a weekly inventory of site emergency equipment, spill response and supplies
- Familiarizing themselves with emergency procedures for personnel injury or suspected overexposures, fires, explosions or releases
- Identifying the names of all personnel on site who are certified in CPR and first aid
- Briefing new employees on the emergency response plan before they perform fieldwork.

7.1.2 Emergency Equipment and Supplies

The following emergency equipment and supplies will be available on site during days with field sampling:

- Fire extinguishers;
- Industrial first aid kit; and
- Eye wash.

7.1.3 Emergency Recognition and Prevention

Prevention of emergencies will be aided by the effective implementation of the health and safety procedures specified in this Site-Specific Health and Safety Plan. The following hazards which could lead to emergency situations have been identified as being potentially present during the course of field activities:

- Traumatic injury from heavy equipment accidents, rusty or sharp demolition debris, and/or falling into holes or trenches; and
- Exposure to harmful chemical dusts and vapors.

7.1.4 Emergency Medical Treatment and First Aid

- Prevent further injury, perform appropriate decontamination and notify the SSO.
- Depending upon the type and severity of the injury, the SSO will call 911 for an ambulance.
- Notify CRETE personnel.
- Prepare an incident report.

7.1.5 Emergency Decontamination

Personnel will be decontaminated to the extent feasible but life saving and first aid procedures take priority over decontamination efforts. Workers shall grossly decontaminate the injured person.

7.1.6 Evacuation Routes and Procedures

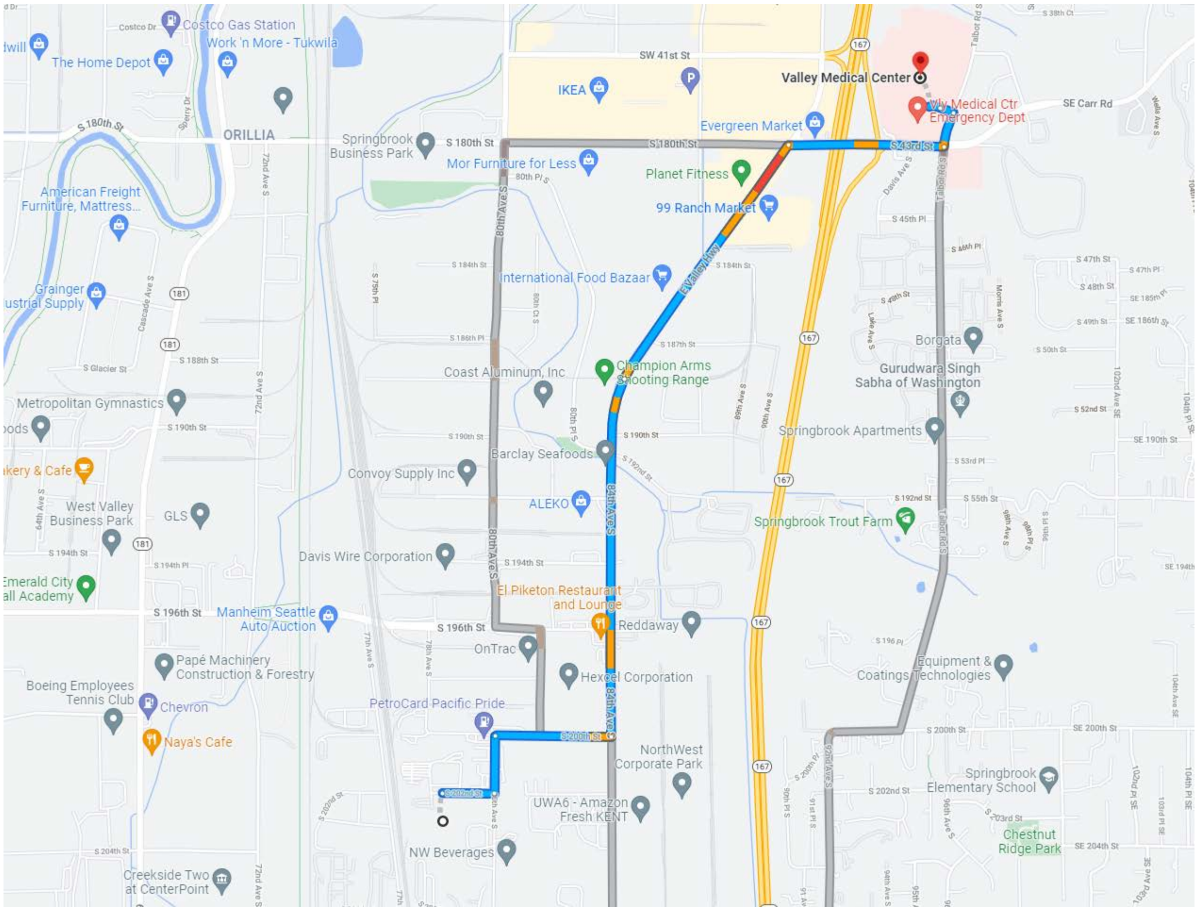
In case of emergencies, evacuation routes will be designated. Personnel will exit the site and assemble at the designated point in the support zone. The SSO will account for personnel at the on-site assembly point and notify local emergency responders. The SSO will assess the need for site evacuation based on the degree of hazard posed to personnel in the support zone.

Evacuation routes will be determined on a site-by-site basis. Elements that will be considered in the selection of the route include: wind direction, obstructions, topography, and type of emergency. Assembly Points will be determined, as needed.

7.1.7 Critique of Response and Follow-up

The Project Manager or their designee will evaluate the effectiveness of the emergency response and recommend procedures for improving emergency response to the Project CIH. Follow-up activities include notification of the CRETE Project Manager within 24 hours of the injury, investigation of cause and implementation of measures to prevent reoccurrence.

Figure 7-1 Route to Hospital



Valley Medical center in Renton. Site to Hospital

Hospital Address: 400 S 43rd St, Renton, WA 98055

Main Telephone: 425-228-3450

ER Telephone: 425-690-1000

Appendix A

Site Safety Plan Acknowledgment Form

Site Safety Plan
Acknowledgment Form

have been informed, understand, and will abide by all the procedures and protocols set forth in this Site Health and Safety Plan for the MARALCO site.

Name (Print)	Signature	Affiliation	Date

Appendix B

Visitor Sign-In Log

Visitor Sign-In Log

Client:______________________________ **Project Name**:______________________________

Location:______________________________ **Field Activity:**______________________________

Project Mgr.:______________________________ **Field Manager**:______________________________

Date	Name	Affiliation	Purpose of Visit	Site EHS Training		Do you have Level D PPE?		Time In	Time Out
				Yes	No	Yes	No		

Visitor Sign-In Log

Client:______________________________ **Project Name**:______________________________

Location:______________________________ **Field Activity:**______________________________

Project Mgr.:______________________________ **Field Manager**:______________________________

Date	Name	Affiliation	Purpose of Visit	Site EHS Training		Do you have Level D PPE?		Time In	Time Out
				Yes	No	Yes	No		

Visitor Sign-In Log

Client:______________________________________ **Project Name**:__________________________________

Location:______________________________________ **Field Activity:**__________________________________

Project Mgr.:___________________________________ **Field Manager**:__________________________________

Date	Name	Affiliation	Purpose of Visit	Site EHS Training		Do you have Level D PPE?		Time In	Time Out
				Yes	No	Yes	No		

Appendix C

Site Safety/Tailgate Meeting Form

Our behavior-based safety process is the key to our success!

Site Safety/Tailgate Meeting Form

Project Name:______________________ **Location**:___________________________
Date:________________________________ **Time**:________________________________
Project Number:____________________ **Instructor**:____________________________

Safety Topics Presented

JHA:____
____
____
____

Lessons Learned:____
____
____

General Safety Topics:____
____
____

Name	Attendee's Signature

Our behavior-based safety process is the key to our success!

Site Safety/Tailgate Meeting Form

Project Name:______________________ **Location**:___________________________
Date:______________________________ **Time**:________________________________
Project Number:____________________ **Instructor**:__________________________

Safety Topics Presented

JHA:____
____
____
____

Lessons Learned:____
____
____

General Safety Topics:____
____
____

Name	Attendee's Signature

Our behavior-based safety process is the key to our success!

Site Safety/Tailgate Meeting Form

Project Name:______________________ **Location**:__________________________
Date:________________________________ **Time**:______________________________
Project Number:____________________ **Instructor**:_________________________

Safety Topics Presented

JHA:____

____

____

____

Lessons Learned:____

____

____

General Safety Topics:____

____

____

Name	Attendee's Signature

Appendix D
Notification of Access to Employee Exposure and Medical Records

Notice

To All Employees: This Notice Is to Provide Information for Compliance with 29 CFR Part 1910 Subpart C - General Safety and Health Provisions - Paragraph 1910.1020, Access to Employee Exposure and Medical Records.

(i) The existence, location, and availability of any records covered by this section is as follows:

CRETE Consulting, Inc.

16300 Christensen Rd, Ste 214,
Tukwila WA 98188
PH: (253) 797-6323

Attn: Grant Hainsworth

Grant.hainsworth@creteconsulting.com

(ii) The person responsible for maintaining and providing access to these records is CRETE's Environmental Health and Safety Manager.

(iii) Each employee has the right to access these records.

Appendix E

Material Safety Data Sheets

Safety Data Sheets

MATERIAL SAFETY DATA SHEET

LIQUINOX®

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, Australian WorkSafe, Japanese Industrial Standard JIS Z 7250:2000, and European Union REACH Regulations

ALCONOX

SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	**LIQUINOX®**
CHEMICAL FAMILY NAME:	Detergent.
PRODUCT USE:	Critical-cleaning detergent for laboratory, healthcare and industrial applications
U.N. NUMBER:	Not Applicable
U.N. DANGEROUS GOODS CLASS:	Non-Regulated Material
SUPPLIER/MANUFACTURER'S NAME:	Alconox, Inc.
ADDRESS:	30 Glenn St., Suite 309, White Plains, NY 10603. USA
EMERGENCY PHONE:	**TOLL-FREE in USA/Canada** 800-255-3924
	International calls 813-248-0585
BUSINESS PHONE:	914-948-4040
DATE OF PREPARATION:	May 2011
DATE OF LAST REVISION:	February 2008

SECTION 2 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This product is a pale yellow liquid no odor. Exposure can be irritating to eyes, respiratory system and skin. It is a non-flammable liquid. The Environmental effects of this product have not been investigated.

US DOT SYMBOLS	CANADA (WHMIS) SYMBOLS	EUROPEAN and (GHS) Hazard Symbols
Non-Regulated	Not Controlled	None

Signal Word: **Caution!**

EU LABELING AND CLASSIFICATION:

Classification of the substance or mixture according to Regulation (EC) No1272/2008 Annex 1
EC# 231-791-2 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 268-356-1 This substance is not classified in the Annex I of Directive 67/548/EEC
CAS# 84133-50-6 Not Listed in EU Chemical Inventory
EC# 232-483-0 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 215-090-9 This substance is not classified in the Annex I of Directive 67/548/EEC
EC# 241-543-5 This substance is not classified in the Annex I of Directive 67/548/EEC

GHS Hazard Classification(s):
None

Hazard Statement(s):
None

Precautionary Statement(s):
P264: Wash hands thoroughly after handling
P271: Use only in well ventilated area.

Hazard Symbol(s):
Not Classified

Risk Phrases:
None

Safety Phrases:
S24/25: Avoid contact with skin and eyes

HEALTH HAZARDS OR RISKS FROM EXPOSURE:

ACUTE: Exposure to this product may cause irritation of the eyes, respiratory system and skin. Ingestion may cause gastrointestinal irritation including pain, vomiting or diarrhea.

CHRONIC: This product contains an ingredient which may be corrosive.

TARGET ORGANS: ACUTE: Eye, respiratory System, Skin CHRONIC: None Known

SECTION 3 - COMPOSITION and INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS:	CAS #	EINECS #	ICSC #	WT %	HAZARD CLASSIFICATION; RISK PHRASES
Water	7732-18-5	231-791-2	Not Listed	40 – 60%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	268-356-1	Not Listed	10 – 20%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Alcohol Ethoxylate	84133-50-6	Not Listed	Not Listed	1 – 5%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Coconut Diethanolamide	8051-30-7	232-483-0	Not Listed	1 – 5%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Xylene Sulfonate	1300-72-7	215-090-9	1514	2 – 7%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Tripotassium EDTA	17572-97-3	241-543-5	Not Listed	1 - 5%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Balance of other ingredients are non-hazardous or less than 1% in concentration (or 0.1% for carcinogens, reproductive toxins, or respiratory sensitizers).					

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR, EU Directives and the Japanese Industrial Standard *JIS Z 7250: 2000*.

SECTION 4 - FIRST-AID MEASURES

Contaminated individuals of chemical exposure must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with contaminated individual.

EYE CONTACT: If product enters the eyes, open eyes while under gentle running water for at least 15 minutes. Seek medical attention if irritation persists.

SKIN CONTACT: Wash skin thoroughly after handling. Seek medical attention if irritation develops and persists. Remove contaminated clothing. Launder before re-use.

INHALATION: If breathing becomes difficult, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if breathing dificulty continues.

INGESTION: If product is swallowed, call physician or poison control center for most current information. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. Seek medical advice. Take a copy of the label and/or MSDS with the victim to the health professional.

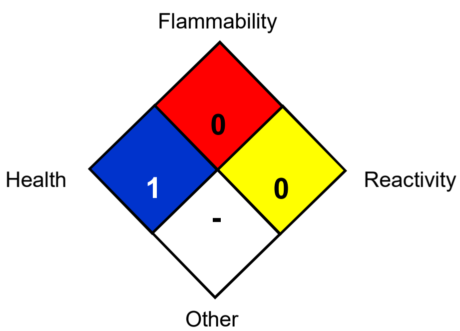
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin, or eye problems may be aggravated by prolonged contact.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and reduce over-exposure.

SECTION 5 - FIRE-FIGHTING MEASURES

FLASH POINT:	Not Flammable
AUTOIGNITION TEMPERATURE:	Not Applicable
FLAMMABLE LIMITS (in air by volume, %):	Lower (LEL): NA Upper (UEL): NA
FIRE EXTINGUISHING MATERIALS:	As appropriate for surrounding fire. Carbon dioxide, foam, dry chemical, halon, or water spray.
UNUSUAL FIRE AND EXPLOSION HAZARDS:	This product is non-flammable, however containers may rupture if exposed to heat or fire.
Explosion Sensitivity to Mechanical Impact:	Not Sensitive.
Explosion Sensitivity to Static Discharge:	Not Sensitive
SPECIAL FIRE-FIGHTING PROCEDURES:	Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

NFPA RATING SYSTEM



HMIS RATING SYSTEM

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
HEALTH HAZARD (BLUE)			1
FLAMMABILITY HAZARD (RED)			0
PHYSICAL HAZARD (YELLOW)			0
PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	See Sect 8		See Sect 8
For Routine Industrial Use and Handling Applications			

Hazard Scale: 0 = Minimal **1** = Slight **2** = Moderate **3** = Serious **4** = Severe * = Chronic hazard

SECTION 6 - ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Personnel should be trained for spill response operations.

SPILLS: Contain spill if safe to do so. Prevent entry into drains, sewers, and other waterways. Soak up with an absorbent material and place in an appropriate container for disposal. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations).

SECTION 7 - HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing dusts generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: Containers of this product must be properly labeled. Store containers in a cool, dry location. Keep container tightly closed when not in use. Store away from strong acids or oxidizers.

SECTION 8 - EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/GUIDELINES:

Chemical Name	CAS#	ACGIH TWA	OSHA TWA	SWA
Water	7732-18-5	Not Listed	Not Listed	Not Listed
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	Not Listed	Not Listed	Not Listed
Alcohol Ethoxylate	84133-50-6	Not Listed	Not Listed	Not Listed
Coconut Diethanolamide	8051-30-7	Not Listed	Not Listed	Not Listed
Sodium Xylene Sulfonate	1300-72-7	Not Listed	Not Listed	Not Listed
Tripotassium EDTA	17572-97-3	Not Listed	Not Listed	Not Listed

Currently, International exposure limits are not established for the components of this product. Please check with competent authority in each country for the most recent limits in place.

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below. Use local exhaust ventilation to control airborne dust. Ensure eyewash/safety shower stations are available near areas where this product is used.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below guidelines listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EU member states.

EYE PROTECTION: Safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: Use chemical resistant gloves to prevent skin contact.. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate to prevent contact (e.g. lab coat, overalls). If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards.

SECTION 9 - PHYSICAL and CHEMICAL PROPERTIES

PHYSICAL STATE:	Liquid
APPEARANCE & ODOR:	Pale yellow liquid with no odor.
ODOR THRESHOLD (PPM):	Not Available
VAPOR PRESSURE (mmHg):	17 @ 20°C (68°F)
VAPOR DENSITY (AIR=1):	>1
BY WEIGHT:	Not Available
EVAPORATION RATE (nBuAc = 1):	<1
BOILING POINT (C°):	100°C (212°F)
FREEZING POINT (C°):	Not Available
pH:	8.5
SPECIFIC GRAVITY 20°C: (WATER =1)	1.083
SOLUBILITY IN WATER (%)	Complete
COEFFICIENT OF WATER/OIL DIST.:	Not Available
VOC:	None
CHEMICAL FAMILY:	Detergent

SECTION 10 - STABILITY and REACTIVITY

STABILITY: Product is stable
DECOMPOSITION PRODUCTS: When heated to decomposition this product produces Oxides of carbon (COx), and Hydrocarbons
MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids and strong oxidizing agents.
HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID: Contact with incompatible materials.

SECTION 11 - TOXICOLOGICAL INFORMATION

TOXICITY DATA: Toxicity data is not available for mixture:

SUSPECTED CANCER AGENT: None of the ingredients are found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies.
IRRITANCY OF PRODUCT: Contact with this product can be irritating to exposed skin, eyes and respiratory system.
SENSITIZATION OF PRODUCT: This product is not considered a sensitizer.
REPRODUCTIVE TOXICITY INFORMATION: No information concerning the effects of this product and its components on the human reproductive system.

SECTION 12 - ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.
ENVIRONMENTAL STABILITY: No Data available at this time.
EFFECT OF MATERIAL ON PLANTS or ANIMALS: No evidence is currently available on this product's effects on plants or animals.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on this product's effects on aquatic life.

SECTION 13 - DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan.

SECTION 14 - TRANSPORTATION INFORMATION

US DOT; IATA; IMO; ADR:
THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.
PROPER SHIPPING NAME: Non-Regulated Material
HAZARD CLASS NUMBER and DESCRIPTION: Not Applicable
UN IDENTIFICATION NUMBER: Not Applicable
PACKING GROUP: Not Applicable.
DOT LABEL(S) REQUIRED: Not Applicable
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): Not Applicable
MARINE POLLUTANT: None of the ingredients are classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B)

U.S. DEPARTMENT OF TRANSPORTATION (DOT) SHIPPING REGULATIONS:
This product is not classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.
TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:
This product is not classified as Dangerous Goods, per regulations of Transport Canada.
INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA):
This product is not classified as Dangerous Goods, by rules of IATA:
INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION:
This product is not classified as Dangerous Goods by the International Maritime Organization.
EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):
This product is not classified by the United Nations Economic Commission for Europe to be dangerous goods.

SECTION 15 - REGULATORY INFORMATION

UNITED STATES REGULATIONS
SARA REPORTING REQUIREMENTS: This product is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows: None
TSCA: All components in this product are listed on the US Toxic Substances Control Act (TSCA) inventory of chemicals.
SARA 311/312:

Acute Health: Yes	Chronic Health: No	Fire: No	Reactivity: No

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): None
CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): None of the ingredients are on the California Proposition 65 lists.

CANADIAN REGULATIONS:

CANADIAN DSL/NDSL INVENTORY STATUS: All of the components of this product are on the DSL Inventory

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: No component of this product is on the CEPA First Priorities Substance Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: This product is categorized as a Not Controlled Product, as per the Controlled Product Regulations

EUROPEAN ECONOMIC COMMUNITY INFORMATION:

EU LABELING AND CLASSIFICATION:

Classification of the mixture according to Regulation (EC) No1272/2008. See section 2 for details.

AUSTRALIAN INFORMATION FOR PRODUCT:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: All components of this product are listed on the AICS.

STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS: Not applicable.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS: The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:

Asia-Pac:	Listed
Australian Inventory of Chemical Substances (AICS):	Listed
Korean Existing Chemicals List (ECL):	Listed
Japanese Existing National Inventory of Chemical Substances (ENCS):	Listed
Philippines Inventory if Chemicals and Chemical Substances (PICCS):	Listed
Swiss Giftliste List of Toxic Substances:	Listed
U.S. TSCA:	Listed

SECTION 16 - OTHER INFORMATION

PREPARED BY: Paul Eigbrett Global Safety Management, 10006 Cross Creek Blvd. Suite 440, Tampa, FL 33647

Disclaimer: To the best of Alconox, Inc. knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness is not guaranteed and no warranties of any type either express or implied are provided. The information contained herein relates only to this specific product.

ANNEX:

IDENTIFIED USES OF LIQUINOX® AND DIRECTIONS FOR USE

Used to clean: Healthcare instruments, laboratory ware, vacuum equipment, tissue culture ware, personal protective equipment, sampling apparatus, catheters, tubing, disk drives, clean rooms, medical devices, optical parts, electronic components, pharmaceutical apparatus, cosmetics manufacturing equipment, metal castings, forgings and stampings, industrial parts, pipes, tanks and reactors. Authorized by USDA for use in federally inspected meat and poultry plants. Passes inhibitory residue test for water analysis. Used for phosphate sensitive analysis ware. FDAcertified. Used to remove: Soil, grit, grime, slime, grease, oils, blood, tissue, particulates, deposits, chemical and solvents.

Surfaces cleaned: Corrosion inhibited formulation recommended for glass, metal, stainless steel, porcelain, ceramic, plastic, cement and fiberglass. Can be used on soft metals such as copper, aluminum, zinc and magnesium if rinsed promptly. Used for art restoration. Corrosion testing may be advisable.

Cleaning method: Soak, brush, sponge, cloth, ultrasonic, flow through clean-inplace. Will foam—not for spray or machine use.

Directions: Make a fresh 1% solution (2 1/2 Tbsp. per gal., 1 1/4 oz. per gal. or 10 ml per liter) in cold, warm or hot water. If available, use warm water. Use cold water for blood stains. For difficult soils, raise water temperature and use more detergent. Clean by soak, circulate, wipe or ultrasonic method. Not for spray machines, will foam. RINSE THOROUGHLY—preferably with running water. For critical cleaning, do final or all rinsing in distilled, deionized or purified water. For food contact surfaces, rinse with potable water. Used on a wide range of glass, ceramic, plastic and metal surfaces. Corrosion testing may be advisable.

Material Safety Data Sheet: **Simple Green® All-Purpose Cleaner and Simple Green® Scrubbing Pad**
Version No. 13005-12B   Date of Issue: February 2012   *ANSI-Z400.1-2003 Format*

Section 1: PRODUCT & COMPANY IDENTIFICATION

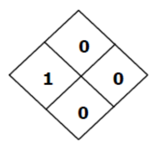
Product Name: Simple Green® All-Purpose Cleaner
Additional Names: Simple Green® Concentrated Cleaner Degreaser Deodorizer
Simple Green® Scrubbing Pad (Fluid in pad only)

Manufacturer's Part Number: **Please refer to page 4*

Company: Sunshine Makers, Inc.
15922 Pacific Coast Highway
Huntington Beach, CA 92649 USA
Telephone: 800-228-0709 ● 562-795-6000   Fax: 562-592-3830
Emergency Phone: Chem-Tel 24-Hour Emergency Service: 800-255-3924

Section 2: HAZARDS IDENTIFICATION

__Emergency Overview:__ **CAUTION. Irritant. This is a Green colored liquid with a sassafras added odor. Scrubbing pad is a green fibrous rectangle infused with Simple Green Cleaner.**



__NFPA/HMIS Rating:__
Health = 1 = slight
Fire, Reactivity, and Special = 0 = minimal

__**Potential Health Effects**__
Eye Contact: Mildly irritating.
Skin Contact: No adverse effects expected under typical use conditions. Prolonged exposure may cause dryness. Chemically sensitive individuals may experience mild irritation.
Ingestion: May cause stomach or intestinal irritation if swallowed.
Inhalation: No adverse effects expected under typical use conditions. Adequate ventilation should be present for prolonged usage in small enclosed areas.

Section 3: COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS Number	Percent Range
Water	7732-18-5	≥ 78%
2-butoxyethanol	111-76-2	≤ 5%
Ethoxylated Alcohol	68439-46-3	≤ 5%
Tetrapotassium Pyrophosphate	7320-34-5	≤ 5%
Sodium Citrate	68-04-2	≤ 5%
Fragrance	Proprietary Mixture	≤ 1%
Colorant	Proprietary Mixture	≤ 1%

Section 4: FIRST AID MEASURES

If Inhaled: If adverse effect occurs, move to fresh air.
If on skin: If adverse effect occurs, rinse skin with water.
If in eyes: Flush with plenty of water. After 5 minutes of flushing, remove contact lenses, if present. Continue flushing for at least 10 more minutes. If irritation persists seek medical attention.
If ingested: Drink plenty of water to dilute.

Section 5: FIRE FIGHTING MEASURES

This formula is stable, non-flammable, and will not burn. No special procedures necessary

Flammability: Non-flammable
Flash Point: Non-flammable

Suitable Extinguishing Media: Use Dry chemical, CO_2, water spray or "alcohol" foam.
Extinguishing Media to Avoid High volume jet water.
Special Exposure Hazards: In event of fire created carbon oxides, oxides of phosphorus may be formed.
Special Protective Equipment: Wear positive pressure self-contained breathing apparatus; Wear full protective clothing.

Section 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions: See section 8 – personal protection.

Environmental Precautions: Do not allow into open waterways and ground water systems.

Method for Clean Up: Dilute with water and rinse into sanitary sewer system or soak up with inert absorbent material.

Section 7: HANDLING AND STORAGE

Handling: Keep container tightly closed. Ensure adequate ventilation. Keep out of reach of children.

Storage: Keep in cool dry area.

Section 8: EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Limit Values:

	OSHA PEL	ACGIH TLV
2-butoxyethanol	TWA 50 ppm (240 mg/m^3)	20 ppm (97 mg/m^3)
Tetrapotassium Pyrophosphate		5 mg/m^3

Exposure Controls:
Eye Contact: Use protective glasses if splashing or spray-back is likely.
Respiratory: Use in well ventilated areas.
Skin Contact: Prolonged exposure or dermal sensitive individuals should use protective gloves.

Section 9: PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Green Liquid	**Vapor Pressure:**	18 mmHg @20°C; 23.5 mmHg @26°C
Odor:	Added Sassafras odor	**Density:**	8.5 lb/gal;
Specific Gravity:	1.010 ± 0.010	**Water Solubility:**	100%
pH:	9.5 ± 0.5	**VOC composite Partial Pressure:**	TBD
Boiling Point:	~210°F (98 °C)	**VOC:**	CARB Method 310 3.8%
Freezing Point:	~ 32°F (0 °C)		SCAQMD Method 313 2.8%
Nutrient Content:	Phosphorous: 0.28% Chloride: ~110 ppm	Sulfur: ~180 ppm Fluorine: ~90 ppm	

Section 10: STABILITY AND REACTIVITY

Stability:	Stable
Materials to Avoid:	None known
Hazardous Decomposition Products:	Normal products of combustion - CO, CO2; Oxides of Phosphorous may occur.

Section 11: TOXICOLOGICAL INFORMATION

Acute Toxicity:	Oral LD_{50} (rat)	> 5 g/kg body weight
	Dermal LD_{50} (rabbit)	> 5 g/kg body weight

Toxicity calculated from ingredients using OECD SERIES ON TESTING AND ASSESSMENT Number 33

Carcinogens: No ingredients are listed by OSHA, IARC, or NTP as known or suspected carcinogens.

Section 12: ECOLOGICAL INFORMATION

Hazard to wild mammals:	Low, based on toxicology profile
Hazard to avian species:	Low, based on toxicology profile
Hazard to aquatic organisms:	Low, based on toxicology profile
Chemical Fate Information:	Readily Biodegradable per OECD 301D, Closed Bottle Test

Section 13: DISPOSAL CONSIDERATIONS

Appropriate Method for Disposal:

Unused Product:	*Dilute with water to use concentration and dispose by sanitary sewer.
Used Product:	*This product can enter into clarifiers and oil/water separators. Used product may be hazardous depending on the cleaning application and resulting contaminants.
Empty Containers:	*Triple-rinse with water and offer for recycling if available in your area. Otherwise, dispose as non-hazardous waste.

*Dispose of used or unused product, and empty containers in accordance with the local, State, Provincial, and Federal regulations for your location. Never dispose of used degreasing rinsates into lakes, streams, and open bodies of water or storm drains.

Section 14: TRANSPORT INFORMATION

U.S. Department of Transportation (DOT) / Canadian TDG: Not Regulated

IMO / IDMG:	Not classified as Dangerous
ICAO/ IATA:	Not classified as Dangerous
ADR/RID:	Not classified as Dangerous

U.N. Number	Not Required	Proper Shipping Name:	Detergent Solution
Hazard Class:	Non-Hazardous	Marine Pollutant:	No

Section 15: REGULATORY INFORMATION

All components are listed on: EINECS, TSCA, DSL and AICS Inventory.
No components listed under: Clean Air Act Section 112; Clean Water Act 307 & 311

SARA Title III: 2-butoxyethanol is subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 as Category N230 – Certain Glycol Ethers.

RCRA Status: Not a hazardous waste CERCLA Status : No components listed

State Right To Know Lists

2-butoxyethanol	Illinois, Massachusetts, New Jersey, Pennsylvania, Rhode Island

WHMIS Classification – Category D, subcategory 2B, eye irritant

Name	Toxic Substances List – Schedule 1 – CEPA (Canadian Environmental Protection Act)	NPRI Inventory
2-butoxyethanol	Yes	No

This product has been classified according to the hazard criteria of the CPR and the MSDS contains all the information required by Canada's Controlled Products Regulation.

Section 16: OTHER INFORMATION

Questions about the information found on this MSDS should be directed to:
SUNSHINE MAKERS, INC. – TECHNICAL DEPARTMENT
15922 Pacific Coast Hwy. Huntington Beach, CA 92649
Phone: 800/228-0709 [8am-5pm Pacific time, Mon-Fri] *Fax:* 562/592-3830 *Email:* infoweb@simplegreen.com

CAGE CODE 1Z575
GSA/FSS - CONTRACT NO. GS-07F-0065J
Scrubbing Pad GSA/BPA - CONTRACT NO. GS-07F-BSIMP
National Stock Numbers & Industrial Part Numbers:

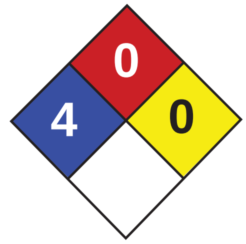
	Part Number	NSN	Size
Simple Green	13012	7930-01-342-5315	24 oz spray (12/case)
	13005	7930-01-306-8369	1 Gallon (6/case)
	13006	7930-01-342-5316	5 Gallon
	13016	7930-01-342-5317	15 Gallon
	13008	7930-01-342-4145	55 Gallon
	13103	N/A	2oz samples
	13225	N/A	2.5 Gallon
	13275	N/A	275 Gallon tote
	48049	N/A	1 Gallon Conc. w/ 32oz dilution
Scrubbing Pad	10224	7930-01-346-9148	Each (24/case)

Retail Numbers:

Part Number	Size
13002	16 oz Trigger (12/case)
13005	1 Gallon (6/case)
13013	24 oz Trigger (12/case)
13014	67 oz / 2 L (6/case)
13033	32 oz Trigger (12/case)
80007	Tier display holding 13005 (36/Tier)

part number is for both industrial and retail

****International Part Numbers May Differ.**



Health	3
Fire	0
Reactivity	0
Personal Protection	

Material Safety Data Sheet
Nitric acid, 65% MSDS

Section 1: Chemical Product and Company Identification

Product Name: Nitric acid, 65%

Catalog Codes: SLN2161

CAS#: Mixture.

RTECS: Not applicable.

TSCA: TSCA 8(b) inventory: Water; Nitric acid, fuming

CI#: Not applicable.

Synonym: Nitric Acid, 65%

Chemical Name: Not applicable.

Chemical Formula: Not applicable.

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Water	7732-18-5	35
Nitric acid, fuming	7697-37-2	65

Toxicological Data on Ingredients: Nitric acid, fuming: VAPOR (LC50): Acute: 244 ppm 0.5 hours [Rat]. 344 ppm 0.5 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (irritant, corrosive), of ingestion, . Slightly hazardous in case of inhalation (lung sensitizer). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to lungs, mucous membranes, upper respiratory

tract, skin, eyes, teeth. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used.Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: of combustible materials

Explosion Hazards in Presence of Various Substances:
Explosive in presence of reducing materials, of organic materials, of metals, of alkalis. Non-explosive in presence of open flames and sparks, of shocks.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards:
Flammable in presence of cellulose or other combustible materials. Phosphine, hydrogen sulfide, selenide all ignite when fuming nitric acid is dripped into gas. (Nitric Acid, fuming)

Special Remarks on Explosion Hazards:
Reacts exlposively with metallic powders, carbides, cyanides, sulfides, alkalies and turpentine. Can react explosively with many reducing agents. Arsine, phosphine, tetraborane all oxidized explosively in presence of nitric acid. Cesium and rubidium

acetylides explode in contact with nitric acid. Explosive reaction with Nitric Acid + Nitrobenzene + water. Detonation with Nitric Acid + 4-Methylcyclohexane. (Nitric acid, fuming)

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.

Large Spill:
Corrosive liquid. Oxidizing material. Poisonous liquid. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep container dry. Keep away from heat. Keep away from sources of ignition. Keep away from combustible material.. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as reducing agents, combustible materials, organic materials, metals, acids, alkalis, moisture. May corrode metallic surfaces. Store in a metallic or coated fiberboard drum using a strong polyethylene inner package.

Storage:
Keep container tightly closed. Keep container in a cool, well-ventilated area. Separate from acids, alkalies, reducing agents and combustibles. See NFPA 43A, Code for the Storage of Liquid and Solid Oxidizers. Do not store above 23°C (73.4°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Face shield. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves. Boots.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 2 STEL: 4 (ppm) from ACGIH (TLV) [United States] TWA: 2 STEL: 4 from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Acrid. Disagreeable and choking. (Strong.)

Taste: Not available.

Molecular Weight: Not applicable.

Color: Colorless to light yellow.

pH (1% soln/water): Acidic.

Boiling Point: 121°C (249.8°F)

Melting Point: -41.6°C (-42.9°F)

Critical Temperature: Not available.

Specific Gravity: 1.408 (Water = 1)

Vapor Pressure: 6 kPa (@ 20°C)

Vapor Density: 2.5 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.29 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:
Easily soluble in cold water, hot water. Soluble in diethyl ether.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances:
Highly reactive with alkalis. Reactive with reducing agents, combustible materials, organic materials, metals, acids.

Corrosivity:
Extremely corrosive in presence of aluminum, of copper. Non-corrosive in presence of glass, of stainless steel(304), of stainless steel(316), of brass.

Special Remarks on Reactivity:
A strong oxidizer. Reacts violently with alcohol, organic material, turpene, charcoal. Violent reaction with Nitric acid + Acetone and Sulfuric acid. Nitric Acid will react with water or steam to produce heat and toxic, corrosive and flammable vapors. (Nitric acid, fuming)

Special Remarks on Corrosivity:
In presence of traces of oxides, it attacks all base metals except aluminum and special chromium steels. It will attack some forms of plastics, rubber, and coatings. No corrosive effect on bronze. No corrosivity data for zinc, and steel

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
LD50: Not available. LC50: Not available.

Chronic Effects on Humans:

Contains material which may cause damage to the following organs: lungs, mucous membranes, upper respiratory tract, skin, eyes, teeth.

Other Toxic Effects on Humans:
Extremely hazardous in case of inhalation (lung corrosive). Very hazardous in case of skin contact (corrosive, irritant, permeator), of eye contact (corrosive), of ingestion, .

Special Remarks on Toxicity to Animals: LDL - Lowest Published Lethal Dose [Human] - Route: Oral; Dose: 430 mg/kg (Nitric acid, fuming)

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects (effects on newborn and fetotoxicity) based on animal data. (Nitric acid, fuming)

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Severely irritates skin. Causes skin burns and may cause deep and penetrating ulcers of the skin with a characteristic yellow to brownish discoloration. May be fatal if absorbed through skin. Eyes: Severely irritates eyes. Causes eye burns. May cause irreversible eye injury. Ingestion: May be fatal if swallowed. Causes serious gastrointestinal tract irritation or burns with nausea, vomiting, severe abdominal pain, and possible "coffee grounds" appearance of the vomitus . May cause perforation of the digestive tract. Inhalation: May be fatal if inhaled. Vapor is extremely hazardous. Vapor may cause nitrous gas poisoning. Effects may be delayed. May cause irritation of the mucous membranes and respiratory tract with burning pain in the nose and throat, coughing, sneezing, wheezing, shortness of breath and pulmonary edema. Other symptoms may include nausea, and vomiting. Chronic Potential Health Effects: Repeated inhalation may produce changes in pulmonary function and/or chronic bronchitis. It may also affect behavior (headache, dizziness, drowsiness, muscle contaction or spasticity, weakness, loss of coordinaton, mental confusion), and urinary system (kidney faillure, decreased urinary output after several hours of

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Class 8: Corrosive material

Identification: : Nitric acid UNNA: 2031 PG: II

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
New York release reporting list: Nitric acid, fuming Rhode Island RTK hazardous substances: Nitric acid, fuming Pennsylvania RTK: Nitric acid, fuming Florida: Nitric acid, fuming Minnesota: Nitric acid, fuming Massachusetts RTK: Nitric acid, fuming

New Jersey: Nitric acid, fuming TSCA 8(b) inventory: Water; Nitric acid, fuming SARA 302/304/311/312 extremely hazardous substances: Nitric acid, fuming SARA 313 toxic chemical notification and release reporting: Nitric acid, fuming 65% CERCLA: Hazardous substances.: Nitric acid, fuming: 1000 lbs. (453.6 kg);

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):
R8- Contact with combustible material may cause fire. R35- Causes severe burns. S23- Do not breathe gas/fumes/vapour/spray [***] S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S36- Wear suitable protective clothing. S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 0

Reactivity: 0

Personal Protection:

National Fire Protection Association (U.S.A.):

Health: 4

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Full suit. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Face shield.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 10:59 AM

Last Updated: 11/01/2010 12:00 PM

MSDS Number: **I8840** * * * * * *Effective Date:* ***08/27/04*** * * * * * *Supercedes:* ***05/07/03***

MSDS *Material Safety Data Sheet*

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ISOPROPYL ALCOHOL (90 - 100%)

1. Product Identification

Synonyms: 2-Propanol; sec-propyl alcohol; isopropanol; sec-propanol; dimethylcarbinol
CAS No.: 67-63-0
Molecular Weight: 60.10
Chemical Formula: (CH3)2 CHOH
Product Codes:
J.T. Baker: 0562, 5082, 9037, 9080, U298
Mallinckrodt: 0562, 3027, 3031, 3032, 3035, 3037, 3043, 4359, 6569, H604, H982, V555, V566, V681

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Isopropyl Alcohol	67-63-0	90 - 100%	Yes
Water	7732-18-5	0 - 10%	No

3. Hazards Identification

Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors irritates the respiratory tract. Exposure to high concentrations has a narcotic effect, producing symptoms of dizziness, drowsiness, headache, staggering, unconsciousness and possibly death.
Ingestion:
Can cause drowsiness, unconsciousness, and death. Gastrointestinal pain, cramps, nausea, vomiting, and diarrhea may also result. The single lethal dose for a human adult = about 250 mls (8 ounces).
Skin Contact:
May cause irritation with redness and pain. May be absorbed through the skin with possible systemic effects.
Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure:
Chronic exposure may cause skin effects.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or impaired liver, kidney, or pulmonary function may be more susceptible to the effects of this agent.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:

Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Call a physician if irritation develops.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 12C (54F) CC
Autoignition temperature: 399C (750F)
Flammable limits in air % by volume:
lel: 2.0; uel: 12.7
Listed fire data is for Pure Isopropyl Alcohol.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Small quantities of peroxides can form on prolonged storage. Exposure to light and/or air significantly increases the rate of peroxide formation. If evaporated to a residue, the mixture of peroxides and isopropanol may explode when exposed to heat or shock.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Isopropyl Alcohol (2-Propanol):
-OSHA Permissible Exposure Limit (PEL):
400 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
200 ppm (TWA), 400 ppm (STEL), A4 - not classifiable as a human carcinogen.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with organic vapor cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene and nitrile rubber are recommended materials.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Rubbing alcohol.
Solubility:
Miscible in water.
Specific Gravity:
0.79 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):

100
Boiling Point:
82C (180F)
Melting Point:
-89C (-128F)
Vapor Density (Air=1):
2.1
Vapor Pressure (mm Hg):
44 @ 25C (77F)
Evaporation Rate (BuAc=1):
2.83

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Heat and sunlight can contribute to instability.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Heat, flame, strong oxidizers, acetaldehyde, acids, chlorine, ethylene oxide, hydrogen-palladium combination, hydrogen peroxide-sulfuric acid combination, potassium tert-butoxide, hypochlorous acid, isocyanates, nitroform, phosgene, aluminum, oleum and perchloric acid.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 5045 mg/kg; skin rabbit LD50: 12.8 gm/kg; inhalation rat LC50: 16,000 ppm/8-hour; investigated as a tumorigen, mutagen, reproductive effector.

```
--------\Cancer Lists\------------------------------------------------------
                                           ---NTP Carcinogen---
Ingredient                                 Known    Anticipated    IARC Category
------------------------------------       -----    -----------    -------------
Isopropyl Alcohol (67-63-0)                 No          No              3
Water (7732-18-5)                           No          No            None
```

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. When released into water, this material may biodegrade to a moderate extent. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.
Environmental Toxicity:
The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ISOPROPANOL
Hazard Class: 3
UN/NA: UN1219
Packing Group: II
Information reported for product/size: 200L

International (Water, I.M.O.)

Proper Shipping Name: ISOPROPANOL
Hazard Class: 3
UN/NA: UN1219
Packing Group: II
Information reported for product/size: 200L

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
```

Ingredient	TSCA	EC	Japan	Australia
Isopropyl Alcohol (67-63-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Isopropyl Alcohol (67-63-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Isopropyl Alcohol (67-63-0)	No	No	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Isopropyl Alcohol (67-63-0)	No	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2[S]2
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor or mist.
Avoid contact with eyes, skin and clothing.
Label First Aid:
If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 16.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

CAMEO Chemicals

Print

Chemical Datasheet

ALUMINUM DROSS

Chemical Identifiers

CAS Number	UN/NA Number	DOT Hazard Label	USCG CHRIS Code
none	3170	Dangerous When Wet	none

NIOSH Pocket Guide	International Chem Safety Card
none	none

NFPA 704

data unavailable

General Description

Gray to black granules with an odor of ammonia. Contains some aluminum, but consists principally of byproducts obtained during the refinement of aluminum. Contact with solid or with vapors arising from the solid can irritate the eyes severely.

Hazards

Reactivity Alerts

none

Air & Water Reactions

Reacts slowly with water to produce methane, ammonia, and hydrogen.

Fire Hazard

Excerpt from ERG Guide 138 [Substances - Water-Reactive (Emitting Flammable Gases)]:

Produce flammable gases on contact with water. May ignite on contact with water or moist air. Some react vigorously or explosively on contact with water. May be ignited by heat, sparks or flames. May re-ignite after fire is extinguished. Some are transported in highly flammable liquids. Runoff may create fire or explosion hazard. (ERG, 2016)

Health Hazard

Excerpt from ERG Guide 138 [Substances - Water-Reactive (Emitting Flammable Gases)]:

Inhalation or contact with vapors, substance or decomposition products may cause severe injury or death. May produce corrosive solutions on contact with water. Fire will produce irritating, corrosive and/or toxic gases. Runoff from fire control may cause pollution. (ERG, 2016)

Reactivity Profile

ALUMINUM DROSS contains some aluminum, but consists principally of byproducts obtained during the refinement of aluminum.

Belongs to the Following Reactive Group(s)

- Metals, Elemental and Powder, Active

Potentially Incompatible Absorbents

No information available.

Response Recommendations

Isolation and Evacuation

Excerpt from ERG Guide 138 [Substances - Water-Reactive (Emitting Flammable Gases)]:

As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

SPILL: Increase, in the downwind direction, as necessary, the isolation distance shown above.

FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2016)

Firefighting

Excerpt from ERG Guide 138 [Substances - Water-Reactive (Emitting Flammable Gases)]:

DO NOT USE WATER OR FOAM.

SMALL FIRE: Dry chemical, soda ash, lime or sand.

LARGE FIRE: DRY sand, dry chemical, soda ash or lime or withdraw from area and let fire burn. Move containers from fire area if you can do it without risk.

FIRE INVOLVING METALS OR POWDERS (ALUMINUM, LITHIUM, MAGNESIUM, ETC.): Use dry chemical, DRY sand, sodium chloride powder, graphite powder or Met-L-X® powder; in addition, for Lithium you may use Lith-X® powder or copper powder. Also, see ERG Guide 170.

FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Do not get water inside containers. Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. (ERG, 2016)

Non-Fire Response

Excerpt from ERG Guide 138 [Substances - Water-Reactive (Emitting Flammable Gases)]:

ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch or walk through spilled material. Stop leak if you can do it without risk. Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material. DO NOT GET WATER on spilled substance or inside containers.

SMALL SPILL: Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain. Dike for later disposal; do not apply water unless directed to do so.

POWDER SPILL: Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry. DO NOT CLEAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A SPECIALIST. (ERG, 2016)

Protective Clothing

Excerpt from GUIDE 138 [Substances - Water-Reactive (Emitting Flammable Gases)]:

Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing that is specifically recommended by the manufacturer. It may provide little or no thermal protection. Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill situations where direct contact with the substance is possible. (ERG, 2016)

DuPont Tychem® Suit Fabrics

No information available.

First Aid

Excerpt from ERG Guide 138 [Substances - Water-Reactive (Emitting Flammable Gases)]:

Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves. Move victim to fresh air. Call 911 or emergency medical service. Give artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, wipe from skin immediately; flush skin or eyes with running water for at least 20 minutes. Keep victim calm and warm. (ERG, 2016)

Physical Properties

Chemical Formula: data unavailable

Flash Point: data unavailable

Lower Explosive Limit (LEL): data unavailable

Upper Explosive Limit (UEL): data unavailable

Autoignition Temperature: data unavailable

Melting Point: data unavailable

Vapor Pressure: data unavailable

Vapor Density (Relative to Air): data unavailable

Specific Gravity: data unavailable

Boiling Point: data unavailable

Molecular Weight: data unavailable

Water Solubility: data unavailable

Ionization Potential: data unavailable

IDLH: data unavailable

AEGLs (Acute Exposure Guideline Levels)

No AEGL information available.

ERPGs (Emergency Response Planning Guidelines)

No ERPG information available.

PACs (Protective Action Criteria)

No PAC information available.

Regulatory Information

EPA Consolidated List of Lists

No regulatory information available.

DHS Chemical Facility Anti-Terrorism Standards (CFATS)

No regulatory information available.

OSHA Process Safety Management (PSM) Standard List

No regulatory information available.

Alternate Chemical Names

- ALUMINUM DROSS
- ALUMINUM REMELTING BY-PRODUCTS
- ALUMINUM SMELTING BY-PRODUCTS

Print

CAMEO Chemicals

Chemical Datasheet

ANTIMONY POWDER

POISON 6

Chemical Identifiers

CAS Number	UN/NA Number	DOT Hazard Label	USCG CHRIS Code
7440-36-0	2871	Poison	none

NIOSH Pocket Guide	International Chem Safety Card
Antimony	ANTIMONY

NFPA 704

data unavailable

General Description

A silvery or gray solid in the form of dust. Denser than water and insoluble in water. Toxic by inhalation and by ingestion. May burn and emit toxic fumes if heated or exposed to flames. Used to make electric storage batteries and semiconductors.

Hazards

Reactivity Alerts

- Strong Reducing Agent

Air & Water Reactions

Insoluble in water.

Fire Hazard

Excerpt from ERG Guide 170 [Metals (Powders, Dusts, Shavings, Borings, Turnings, or Cuttings, etc.)]:

May react violently or explosively on contact with water. Some are transported in flammable liquids. May be ignited by friction, heat, sparks or flames. Some of these materials will burn with intense heat. Dusts or fumes may form explosive mixtures in air. Containers may explode when heated. May re-ignite after fire is extinguished. (ERG, 2016)

Health Hazard

Excerpt from ERG Guide 170 [Metals (Powders, Dusts, Shavings, Borings, Turnings, or Cuttings, etc.)]:

Oxides from metallic fires are a severe health hazard. Inhalation or contact with substance or decomposition products may cause severe injury or death. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control or dilution water may cause pollution. (ERG, 2016)

Reactivity Profile

ANTIMONY is spontaneously flammable in fluorine, chlorine, and bromine. With iodine, the reaction produces heat, which can cause flame or even an explosion if the quantities are great enough [Mellor 9:379 1946-47]. Even at 10° C. bromine trifluoride reacts with antimony incandescently. Bromine trifluoride reacts similarly with arsenic, boron, bromine, iodine, phosphorus, and sulfur [Mellor 2:113 1946-47]. Bromoazide explodes on contact with antimony, arsenic, phosphorus, silver foil, or sodium. It is very shock sensitive. Explosions of chloric acid have been due to the formation of unstable compounds with antimony, bismuth, ammonia, and organic matter [Chem. Abst. 46:2805e 1952]. The reaction of finely divided antimony and nitric acid can be violent [Pascal 10:504 1931-34]. Powdered antimony mixed with potassium nitrate explodes when heated [Mellor 9:282 1946-47]. When antimony or arsenic and solid potassium permanganate are ground together, the metals ignite [Mellor 12:322 1946-47]. Sodium peroxide oxidizes antimony, arsenic, copper, potassium, tin, and zinc with incandescence [Mellor 2:490-93 1946-47].

Belongs to the Following Reactive Group(s)

- Metals, Elemental and Powder, Active

Potentially Incompatible Absorbents

No information available.

Response Recommendations

Isolation and Evacuation

Excerpt from ERG Guide 170 [Metals (Powders, Dusts, Shavings, Borings, Turnings, or Cuttings, etc.)]:

As an immediate precautionary measure, isolate spill or leak area in all directions for at least 50 meters (150 feet) for liquids and at least 25 meters (75 feet) for solids.

LARGE SPILL: Consider initial downwind evacuation for at least 50 meters (160 feet).

FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. (ERG, 2016)

Firefighting

Excerpt from ERG Guide 170 [Metals (Powders, Dusts, Shavings, Borings, Turnings, or Cuttings, etc.)]:

DO NOT USE WATER, FOAM OR CO2. Dousing metallic fires with water will generate hydrogen gas, an extremely dangerous explosion hazard, particularly if fire is in a confined environment (i.e., building, cargo hold, etc.). Use DRY sand, graphite powder, dry sodium chloride-based extinguishers, G-1® or Met-L-X® powder. Confining and smothering metal fires is preferable rather than applying water. Move containers from fire area if you can do it without risk.

FIRE INVOLVING TANKS OR CAR/TRAILER LOADS: If impossible to extinguish, protect surroundings and allow fire to burn itself out. (ERG, 2016)

Non-Fire Response

Excerpt from ERG Guide 170 [Metals (Powders, Dusts, Shavings, Borings, Turnings, or Cuttings, etc.)]:

ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. (ERG, 2016)

Protective Clothing

Skin: Wear appropriate personal protective clothing to prevent skin contact.

Eyes: Wear appropriate eye protection to prevent eye contact.

Wash skin: The worker should immediately wash the skin when it becomes contaminated.

Remove: Work clothing that becomes wet or significantly contaminated should be removed and replaced.

Change: Workers whose clothing may have become contaminated should change into uncontaminated clothing before leaving the work premise. (NIOSH, 2016)

DuPont Tychem® Suit Fabrics

No information available.

First Aid

EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop.

SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment.

INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing.

INGESTION: Some heavy metals are VERY TOXIC POISONS, especially if their salts are very soluble in water (e.g., lead, chromium, mercury, bismuth, osmium, and arsenic). IMMEDIATELY call a hospital or poison control center and locate activated charcoal, egg whites, or milk in case the medical advisor recommends administering one of them. Also locate Ipecac syrup or a glass of salt water in case the medical advisor recommends inducing vomiting. Usually, this is NOT RECOMMENDED outside of a physician's care. If advice from a physician is not readily available and the victim is conscious and not convulsing, give the victim a glass of activated charcoal slurry in water or, if this is not available, a glass of milk, or beaten egg whites and IMMEDIATELY transport victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, assure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)

Physical Properties

Chemical Formula: Sb

Flash Point: data unavailable

Lower Explosive Limit (LEL): data unavailable

Upper Explosive Limit (UEL): data unavailable

Autoignition Temperature: data unavailable

Melting Point: 1167.3 ° F (NTP, 1992)

Vapor Pressure: 1 mm Hg at 1627 ° F (NTP, 1992)

Vapor Density (Relative to Air): data unavailable

Specific Gravity: 6.684 at 77 ° F (NTP, 1992)

Boiling Point: 3182 ° F at 760 mm Hg (NTP, 1992)

Molecular Weight: 121.75 (NTP, 1992)

Water Solubility: Insoluble (NIOSH, 2016)

Ionization Potential: data unavailable

IDLH: 50 mg/m3 (as Sb) (NIOSH, 2016)

AEGLs (Acute Exposure Guideline Levels)

No AEGL information available.

ERPGs (Emergency Response Planning Guidelines)

No ERPG information available.

PACs (Protective Action Criteria)

Chemical	PAC-1	PAC-2	PAC-3
Antimony (7440-36-0)	1.5 mg/m3	13 mg/m3	80 mg/m3

(DOE, 2016)

Regulatory Information

EPA Consolidated List of Lists

Regulatory Name	CAS Number/ 313 Category Code	EPCRA 302 EHS TPQ	EPCRA 304 EHS RQ	CERCLA RQ	EPCRA 313 TRI	RCRA Code	CAA 112(r) RMP TQ
Antimony	7440-36-0			5000 pounds	313		
Antimony Compounds	N010			&	313		

& indicates that no RQ is assigned to this generic or broad class, although the class is a CERCLA hazardous substance. See 50 Federal Register 13456 (April 4, 1985).

(EPA List of Lists, 2015)

DHS Chemical Facility Anti-Terrorism Standards (CFATS)

No regulatory information available.

OSHA Process Safety Management (PSM) Standard List

No regulatory information available.

Alternate Chemical Names

- ANTIMONY
- ANTIMONY BLACK
- ANTIMONY ELEMENT
- ANTIMONY METAL
- ANTIMONY POWDER
- ANTIMONY, REGULUS
- C.I. 77050
- STIBIUM

Appendix F

Job Hazard Analysis Forms

CRETE CONSULTING, INC.

Job Hazard Analysis

JHA Type: ☒ Investigation ☐ O&M ☐Office ☐ Construction	☒ New ☐ Revised	Date: 2/15/2022
Office: Tukwila Client: Bridge Location: Former Maralco Aluminum Property, 7730 South 202nd Street, Kent, WA		
Work Type: Remedial Investigation	Work Activity: Site Inspection, Investigation, Sampling	

Personal Protective Equipment (PPE): Minimum PPE is Level D including: Hard hat, safety glasses or goggles, steel-toed boots, high visibility safety vest, hearing protection as needed, and gloves as needed (type dependent on job-specific requirements).

Additional PPE may be required in any site-specific Health & Safety Plan (HASP) available. Also refer to the HASP for air monitoring and emergency procedures.

Development Team	Position/Title	Reviewed By	Position/Title	Date
Rusty Jones	Project Geologist	Jamie Stevens	Senior Engineer	2/15/22

❶ Job Steps	❷ Potential Hazard	❸ Critical Actions
1. All Onsite Activities	Slips/Trips/Falls Heat/Cold Stress Biological Hazards	• Keep all areas free of excess materials and debris and clear all walking paths. • Monitor onsite workers for signs of heat/cold stress and ensure that necessary breaks are taken. • Use insect repellant and check areas for signs of snakes, spiders, poisonous plants, ticks and mosquitoes • Maintain a clear line of sight.
2. Utility Locate	Explosion, electrocution, injury, death or property damage	• Contact public utility locate and have utilities marked out around the site. • Oversee a private onsite utility locate. • Review locations against construction drawings and known utilities • If necessary, clear upper eight feet of intended drilling location with an air/knife/vacuum truck
3. Equipment Inspections	Leaks, defective or damaged parts, slip/trip/fall hazards, fuel/oil spills, fire hazards, pinch points	• Conduct thorough inspections of all equipment at the beginning of each day and throughout the day, as appropriate. • Check for leaking hoses or fittings, loose connections, functional controls, functional emergency shutoff and damaged equipment • Identify pinch points • Check that a spill kit is available for use on site in the event of a spill or that secondary containment is provided. • Clear working areas of all unnecessary equipment.

4. Equipment Set Up	Flying debris, pinch points	• Identify pinch points • Use a spotter to locate drill rig • Delineate work area with delineators or equivalent • Establish a support zone and set up sampling equipment outside of drill rig work zone • Use designated hand signals to approach drill crew • Engage outriggers • Lower drill rig derrick prior to moving the rig
5. Concrete Coring (if necessary)	Sharp objects, rotating parts, electric tools and power equipment, hot objects	• Buddy system lifting heavy objects (drill press). • Drill in marked, approved (utility and rebar cleared) areas only. • Anchor/bolt/clamp drill machine to ground or other secure objects to prevent movement while in use. • Keep hands and feet away from the rotating drill bit at all times. Avoid loose fitting clothes around powered machine. • Use water or non-toxic, approved coolant to cool drill bits, parts, and coring surface, vacuuming/recovering the coolant during and after use. • Wear hearing protection as needed in proximity to loud equipment.
6. Drilling Operation	Flying debris, pinch points, back strain, cross-contamination, struck by drill rig derrick, chemical exposure, clothing caught in rotating equipment, hearing loss	• Keep hands and feet away from the drill stem while in motion • Wear all appropriate PPE (incl. hearing protection) • Decontamination all equipment prior to use. • Avoid lifting heavy equipment and use the buddy system for heavy objects • Assure that the drill rig derrick is secured • Make sure all guards are in place while drilling operations are underway. • Do not wear loose fitting clothes or jewelry
7. Collecting Soil and/or Samples	Pinch points, back strain, knee strain, chemical exposure	• Identify pinch points • Wear all appropriate PPE • Place soil core samples on an elevated surface (portable table) to avoid bending. • Keep hands clear while core samples are removed from the drill stem • Sample containers may be glass and can break if handled roughly. Look into coolers before reaching into coolers in case broken glass. • Sample jars may contain acid preservatives. Wear nitrile gloves and safety glasses and check containers lids frequently.

8. Monitoring Well Construction	Back strain, pinch points, chemical exposure, hearing loss	• Identify pinch points • Wear all appropriate PPE • Use proper lifting technique and avoid lifting more than one bag of sand or bentonite at a time • Avoid bending while pouring sand pack or bentonite seal • Keep hands and feet clear as drill stem is raised out of the borehole
9. Well Box Construction	Back strain, knee strain, vehicle hazards	• Delineate work area with delineators or equivalent so you can be seen when vehicles or equipment are being moved. • Avoid lifting heavy objects without assistance • Avoid bending while laying the concrete • Wear knee pads when kneeling.
10. Backfilling Soil Borings	Back strain	• When soil borings are not completed as monitoring wells, borings must be backfilled with bentonite. • Avoid lifting more than one bag of bentonite at a time • Take breaks as necessary.
11. Equipment Decontamination	Cross-contamination, chemical exposure, back strain	• Use Alconox or Liquinox to decontaminate all equipment with potential to contact soil or groundwater • Ask for help when moving heavy or awkward equipment. • Wear all appropriate PPE
12. Debris and Waste Management	Spills, chemical exposure, regulatory infractions, back strain, pinch points	• Ensure that all soil cuttings, decontamination water and purge water are properly contained and labeled • Use a drum dolly or lift to move any drums onsite. • Clear a path before moving drums • Prepare a bill of lading for all waste to be moved from site.
13. Demobilization	Chemical exposure, back strain, pinch points	• Avoid lifting heavy or awkward objects without help. • Wear all appropriate PPE • Ensure that all equipment has been decontamination prior to repacking. • Ensure that all equipment is securely put away and tied down.