Former Time Oil Company
Seattle Terminal

Surface Sediment Quality Evaluation Sampling and Analysis Plan/ Quality Assurance Project Plan

Prepared for

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LIMITATIONS

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List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
Cantera	Cantera Development Group, LLC
cm	Centimeters
Ecology	Washington State Department of Ecology
Fremont	Fremont Analytical, Inc.
LCS	Laboratory control sample
mL	Milliliters
MS	Matrix spike
MSD	Matrix spike duplicate
PCB	Polychlorinated biphenyl
PPE	Personal protective equipment
QA	Quality assurance
QAPP	Quality Assurance Project Plan

Acronym/ Abbreviation	Definition
QC	Quality control
RPD	Relative percent difference
SAP	Sampling and Analysis Plan
SCO	Sediment cleanup objective
SES	Sound Earth Strategies, Inc.
Site	Former Time Oil Company Seattle Terminal located on W. Commodore Way in Seattle, Washington
SMS	Sediment Management Standards
SVOC	Semivolatile organic compound
TOC	Time Oil Company
TPH	Total petroleum hydrocarbons
USEPA	U.S. Environmental Protection Agency

1.0 Introduction

This Surface Sediment Quality Evaluation Sampling and Analysis Plan (SAP)/Quality Assurance Project Plan (QAPP) has been prepared for Cantera Development Group, LLC (Cantera) for the former Time Oil Company (TOC) Seattle Terminal located on W. Commodore Way in Seattle, Washington (the Site). It describes the organization, objectives, and specific quality assurance (QA)/quality control (QC) procedures for planned field and laboratory activities associated with sediment characterization in the vicinity of the Site. The location of the Site is shown on Figure 1.1.

1.1 PURPOSE

The former Site owner, TOC, filed bankruptcy and the Site is currently for sale. Cantera is a prospective purchaser and is currently in a due diligence process to evaluate environmental contamination, with the objective to obtain a Prospective Purchaser Agreement)/Consent Decree from the Washington State Department of Ecology (Ecology). Cantera is not a potentially liable party for the Site. Sediment quality has been identified as a data gap because current sediment data are not available within or in the vicinity of the Site. As part of the due diligence process and to address this data gap, samples are proposed to be collected from surface sediments both adjacent to the Site to evaluate potential Site impacts and to the east of the Site in Salmon Bay, which are intended to represent regional background conditions. The results for the regional background samples will be compared to the samples collected adjacent to the Site to evaluate whether concentrations of contaminants in the Site vicinity are elevated relative to overall conditions in an urban embayment.

1.2 SITE DESCRIPTION AND HISTORY

The Site consists of four separate parcels (commonly identified as the Bulk Terminal Property, ASKO Hydraulic Property, East Waterfront Property, and West Waterfront Property) located on W. Commodore Way. The former TOC Seattle Terminal also included one parcel leased from the Washington State Department of Natural Resources (DNR). W. Commodore Way, a City of Seattle Right-of-Way (ROW), separates the Bulk Terminal and ASKO Hydraulic Properties from the East Waterfront and West Waterfront Properties, which are located adjacent to Salmon Bay. The Site and its surroundings are shown on Figure 1.2.

Three of the four parcels (all but West Waterfront Property) were previously enrolled in Ecology's Voluntary Cleanup Program (VCP), under Facility Site No. 7417688 (East Waterfront Property), Facility Site No. 78837111 (ASKO Hydraulic Property), and Facility Site No 75486194 (Bulk Terminal Property). A comprehensive Site history can be found in the Remedial Investigation reports for these facilities prepared by Sound Earth Strategies, Inc. (SES) and submitted to Ecology in 2014 (SES 2014a, 2014b, and 2014c).

1.3 PROJECT ROLES AND RESPONSIBILITIES

The various management, QA, laboratory, and field responsibilities of key project personnel are defined in this section.

1.3.1 Management Responsibilities

Lynn Grochala, Floyd|Snider, is the Project Manager. She will lead project planning, technical analysis, and Ecology coordination. She will have day-to-day responsibility for project implementation, maintaining QA on the project, and ensuring that the SAP/QAPP objectives are met.

Allison Geiselbrecht, PhD, is the Principal-in-Charge and Site Coordinator for the project and is responsible for overall project implementation and Ecology coordination.

1.3.2 Quality Assurance Responsibilities

Floyd|Snider's data manager, Chell Black, will be responsible for the data validation of all sample results from the analytical laboratories, unless an external validator is used. Data validation responsibilities include reviewing laboratory reports, advising on data corrective action procedures, and performing QA/QC on analytical data reports. If dioxins/furans are detected, EcoChem, Inc., will perform a Level IV, Tier III Data Quality Review (Full Validation) on dioxin/furan data.

Additionally, Chell will enter all of the data into Floyd|Snider's proprietary database, as well as Ecology's Environmental Information Management (EIM) system, and perform data management and queries.

1.3.3 Laboratory Responsibilities

Fremont Analytical, Inc. (Fremont), in Seattle, Washington, will perform analytical services and will be responsible for implementing specific requirements outlined in this SAP/QAPP. The Fremont project manager will be responsible for review and approval of final analytical reports in accordance with the requirements of the SAP/QAPP. Fremont has been accredited by Ecology for the analyses performed in conjunction with this project. Analysis for dioxins/furans will be subcontracted through Fremont to Frontier Analytical Laboratory in El Dorado Hills, California.

1.3.4 Field Responsibilities

Kara Hitchko, Floyd|Snider, will be the Field Manager and responsible for leading and coordinating the day-to-day activities in the field. She will report directly to the Project Manager and will provide overall direction for the field sampling in terms of logistics, personnel assignments, and field operations. She will supervise collection of the field samples and will be responsible for accurate sample positioning; recording sample locations, depths, and identification; ensuring conformance to sampling and handling requirements including field decontamination procedures; performing physical evaluation and logging of the samples; and ensuring chain-of-custody of the sample.

2.0 Sampling and Analysis Plan

Sediment samples will be collected in general accordance with Floyd|Snider's standard guideline for sediment grab sampling, which is included as Appendix A. Field sampling protocols specific to this site investigation are described in the following sections. Sediment samples are proposed to be analyzed for the Washington State Sediment Management Standards (SMS; Ecology 2013) freshwater sediment chemicals and dioxins/furans.

2.1 SEDIMENT SAMPLE COLLECTION

2.1.1 Sample Stations

Nine discrete surface sediment grab samples (identified as TOC-SS-01 through TOC-SS-09 on Figure 2.1) will be collected within the immediate vicinity of the Site. An additional three discrete surface sediment grab samples will be collected within Salmon Bay, approximately 1,000 feet to the east of the Site, to evaluate regional background concentrations. These regional background Salmon Bay samples (identified as SB-SS-01 through SB-SS-03 on Figure 2.1) are located outside potential contaminant source areas such as contaminated sites, outfalls, and the shoreline. Field sampling protocols specific to this field investigation are described in the following sections.

2.1.2 Sample Collection and Location Control

Sediment samples will be collected from the 0- to 10-centimeter (cm) biologically active zone using a vessel-based power grab sampler. This grab sampler is capable of collecting an undisturbed surface sediment sample. All samples will be visually classified and recorded by a field technician in accordance with Floyd|Snider's standard guideline for sediment grab sampling.

Sample stations will be located using a vessel-mounted global positioning system (GPS) receiver. The sampler will be deployed within 3 meters of the target location or as close as possible given access or physical limitations. Accurate positioning will be ensured by positioning the vessel on the target location, lowering the sampler to within 3 meters of its target location, and waiting until the sampler line is quiescent with a minimal angle relative to the vessel. At the time of sampling, actual sample locations will be recorded to the nearest 0.01 second (or nearest 0.1 foot), and the water depth will be measured to the nearest 0.1 foot using a depth sounder or leadline.

Sample collection, processing, transportation, and field decontamination procedures are described in detail in the sediment grab sampling standard guideline provided in Appendix A. These field standard guidelines were developed in general accordance with agency best practices, including guidance in Sediment Cleanup User's Manual II (Ecology 2017). The Floyd|Snider field personnel will be responsible for all sample tracking and chain-of-custody procedures in the field, as well as final sample inventory and sample custody documentation.

2.1.3 Sulfides Subsampling

Sulfides are one of the required analytes under SMS for freshwater sediments. Sulfide sample collection requires special procedures. The samples will be collected for sulfides immediately after accepting a grab sample for use. Sulfides samples will be immediately preserved using 5 milliliters (mL) of zinc acetate. The zinc acetate will be placed in a 2- or 4-ounce sampling jar, and the sample material will be placed in the jar, covered, and shaken vigorously to completely expose the material to the zinc acetate.

The sulfides sample jars will be clearly labeled with the project name, sample identification, type of analysis to be performed, date and time, and initials of the person(s) preparing the sample. The sulfides sampling jars will also indicate that zinc acetate has been added as a preservative. Each sample will be referenced by entry into the logbook.

2.1.4 Sample Identification and Handling

Sediment samples will be identified according to their station number and depth in centimeters. For example, the sample collected from TOC-SS-01 from 0 to 10 cm would be labeled "TOC-SS-01-0-10." The field duplicate sample will be identified by adding a "D" to the station ID. For example, a field duplicable from station TOC-SS-01 would be "TOC-SS-01D-0-10."

Samples will be placed into jars provided by the analytical laboratory, preserved according to the requirements of the applicable analytical method, and transported to the analytical laboratory under chain-of-custody procedures. Sufficient volume for analysis, including laboratory QA analyses, will be collected from each station in accordance with the laboratory and analytical method requirements. Sample containers and preservation requirements are presented in Table 2.1.

2.1.5 Disposal of Investigation-Derived Waste

Investigation-derived waste is likely to include excess sediment from grab sampling and disposable materials used during field work (e.g., disposable personal protective equipment [PPE], plastic sheeting, paper towels). Excess sediment from grab sample collection will be returned to the water at the station where it was collected if there is no visible sign of contamination (i.e., oily sheen, droplets). To minimize turbidity, the excess sediment will not be released at the water surface; instead, the grab will be dropped to just above sediment surface for release of excess sediments. If oil or sheen is observed, excess sediment will be collected in buckets aboard the sampling vessel and taken upland to a secure area of the Site for temporarily storage in watertight drum(s) pending the receipt of analytical results and offsite disposal coordination. A spill kit will also be available on the vessel. All disposable sampling materials and PPE used in sample processing will be placed in heavy-duty garbage bags or other appropriate containers and disposed of as solid waste in the municipal collection system.

2.1.6 Health and Safety

All field investigation activities described in this SAP will be conducted in accordance with applicable regulations and the site-specific health and safety plan provided in Appendix B.

2.1.7 Recordkeeping

A complete record of all field activities will be maintained. Recordkeeping will include daily entries into the field logbook and field sample collection forms. All onsite activities, sampling personnel, work hours, health and safety entries, and any modifications to the details and procedures identified in this SAP will be recorded in the field logbook. All entries will be made in indelible ink.

Sample collection forms will be completed for each sediment sampling station. Sample collection forms are provided in Appendix A. Sample station coordinates will be recorded for each sample attempt. Sample collection forms will also record information regarding the date and time of each sampling attempt; weather at the time of sampling; and sample collection details, including penetration of the sampler, sample acceptance criteria, physical characteristics of the sediment, and sample laboratory analyses.

2.1.8 Project Schedule and Reporting

The field investigation described in this SAP is anticipated to be conducted in August 2018. After the field investigation, receipt of analytical data, and data validation, the results of the investigation will be used to evaluate whether additional data collection is warranted. The results of this investigation and determination of additional data gaps will be presented in a Remedial Investigation/Feasibility Study Work Plan to be prepared by Floyd|Snider.

3.0 Quality Assurance Project Plan

This section describes the analytical program to be conducted for each sample, and well as the laboratory QA objectives and QC procedures required to be met to achieve technically sound and useable data. Analytical methods will be selected to ensure that reporting limits are less than the applicable SMS sediment cleanup objectives (SCOs) or cleanup screening levels for freshwater sediments. Data QA objectives will be consistent with those presented in SMS.

3.1 CHEMICAL LABORATORY ANALYSES PROGRAM

Sediment samples will be submitted to Fremont. All samples will be analyzed for the SMS freshwater sediment chemicals and dioxins/furans using the laboratory methodologies below.

- Grain size by ASTM D422
- Total solids by SM 2450 modified
- Total organic carbon by U.S. Environmental Protection Agency (USEPA) Method 9060A
- Ammonia by SM 4500-NH3
- Total sulfides by SM 4500-S2-D
- SMS metals by USEPA Method 6020A and USEPA Method 7471B (mercury only)
- Butyltin species by USEPA 8270D-SIM
- Semivolatile organic compounds (SVOCs) by USEPA 8270D
- Organochlorine pesticides by USEPA Method 8081B
- Aroclor polychlorinated biphenyls (PCBs) by USEPA Method 8082A
- Dioxins/furans by USEPA Method 1613B
- Total petroleum hydrocarbons (diesel-range and residual) by NWTPH-Dx

The laboratory method reporting limits will be less than or equal to the SMS freshwater SCO criteria unless elevated by sample dilution, matrix interference, or other sample-specific analytical difficulties. The dioxin/furan method reporting limit will be as low as technically achievable by the laboratory. To achieve the reporting limits, some modifications to the methods may be necessary. If any modifications are required that deviate from this QAPP, the laboratory will notify Floyd|Snider immediately. Laboratory analysis methods and method detection and reporting limits are presented in Table 3.1.

3.1.1 Quality Control Samples

QC samples will include one field duplicate and laboratory QC samples. The field duplicate will be collected to assess the consistency of field sample collection. One field duplicate per 20 samples

(i.e., one duplicate sample) will be collected for this event. The field duplicate will be analyzed for chemicals listed in Section 3.1.

Laboratory QC samples will be analyzed to ensure that laboratory analyses results in a usable dataset. Laboratory control samples (LCSs) will be run according to the analysis method and include laboratory duplicates to assess precision, matrix spikes (MSs)/matrix spike duplicates (MSDs) to determine matrix effects, LCSs to assess accuracy, surrogate spikes, and method blanks to determine potential laboratory contamination. Surrogates will be required for every organic compound sample, including MS samples, blanks, LCSs, and standard reference materials. MSs/MSDs will be required for SVOCs and PCBs for every 20 samples received. MSDs and laboratory duplicates are analyzed for samples requiring metals analyses. Matrix triplicates are analyzed for conventional parameters.

3.2 LABORATORY DATA QUALITY OBJECTIVES

Laboratory analytical results will be evaluated against QA objectives by reviewing results for analysis of method blanks, MSs, duplicate samples, LCSs, and performance evaluation samples and reviewing equipment calibrations and interference checks as specified by the specific analytical methods. Specific data QA criteria for each analysis method are presented in Table 3.2.

3.2.1 Precision

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, precision is a quantitative measure of the variability of a group of measurements compared to their average values. Analytical precision is measured by MS/MSD samples for organic analyses and by laboratory duplicate samples for inorganic analyses.

Analytical precision measurements will be carried out on project-specific samples at a minimum laboratory duplicate frequency of one per laboratory analysis group or 1 in 20 samples, whichever is more frequent per matrix analyzed, as practical. Laboratory precision will be evaluated against quantitative relative percent difference (RPD) performance criteria.

Field precision will be evaluated by the collection of blind field duplicates at a minimum frequency of one per laboratory analysis group or 1 in 20 samples. Currently, no performance criteria have been established for field duplicates. Field duplicate precision will therefore be screened against an RPD of 75 percent for all samples. However, data will not be qualified based solely on field duplicate precision.

Precision measurements can be affected by the nearness of a chemical concentration to the method detection limit, where the percent error (expressed as RPD) increases. The equation used to express precision is as follows:

$$RPD = \frac{(C_1 - C_2) \times 100\%}{(C_1 + C_2)/2}$$

Where:

C_1 = Larger of the two observed values
C_2 = Smaller of the two observed values

3.2.2 Accuracy

Accuracy is an expression of the degree to which a measured or computed value represents the true value. Analytical accuracy may be assessed by analyzing "spiked" samples with known standards (surrogates, LCSs, and/or MS samples) and measuring the percent recovery. Accuracy measurements on MS samples will be carried out at a minimum frequency of 1 in 20 samples per matrix analyzed. Because MSs/MSDs measure the effects of potential matrix interferences of a specific matrix, the laboratory will perform MSs/MSDs only on samples from this investigation and not from other projects. Surrogate recoveries will be determined for every sample analyzed for organic compounds.

Laboratory accuracy will be evaluated against quantitative LCS, MS, and surrogate spike recoveries using limits for each applicable analyte. Accuracy can be expressed as a percentage of the true or reference value, or as a percent recovery in those analyses where reference materials are not available and spiked samples are analyzed. The equation used to express accuracy is as follows:

$$\%R = 100\% \times (S - U)/C_{sa}$$

Where:

%R = Percent recovery
S = Measured concentration in the spiked aliquot
U = Measured concentration in the unspiked aliquot
C_{sa} = Actual concentration of spike added

3.2.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. Care will be taken in the design of the sampling program to ensure that sample locations are properly selected, sufficient numbers of samples are collected to accurately reflect conditions at the location(s), and samples are representative of the sampling location(s). A sufficient volume of sample will be collected at each sampling location to minimize bias or errors associated with sample particle size and heterogeneity.

3.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one dataset can be compared to another. In order to ensure that results are comparable, samples will be analyzed using standard USEPA methods and protocols. Calibration and reference standards will be traceable to certified standards, and standard data reporting formats will be used. Data will also be reviewed to verify that precision and accuracy criteria were achieved and, if not, that data were appropriately qualified.

3.2.5 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:

$$C = \frac{\text{(Number of acceptable data points)} \times 100}{\text{(Total number of data points)}}$$

The data quality objective for completeness for all components of this project is 95 percent. Data that were qualified as estimated because the QC criteria were not met will be considered valid for the purpose of assessing completeness. Data that were qualified as rejected will not be considered valid for the purpose of assessing completeness.

3.3 DATA REDUCTION AND REPORTING

The laboratory will be responsible for internal checks on data reporting and will correct errors identified during the QA review. Close contact will be maintained with the laboratories to resolve any QC problems in a timely manner. The analytical laboratories will be required, where applicable, to report the following:

- **Project Narrative.** This summary, in the form of a cover letter, will discuss problems, if any, encountered during any aspect of analysis. This summary should discuss, but not be limited to, QC, sample shipment, sample storage, and analytical difficulties. Any problems encountered (actual or perceived) and their resolutions will be documented in as much detail as necessary.
- **Sample IDs.** Records will be produced that clearly match all blind duplicate QA samples with laboratory sample IDs.
- **Chain-of-Custody Records.** Legible copies of the custody forms will be provided as part of the data package. This documentation will include the time of receipt and condition of each sample received by the laboratory. Additional internal tracking of sample custody by the laboratory will also be documented.

- **Sample Results.** The data package will summarize the results for each sample analyzed. The summary will include the following information when applicable:
  - Field sample identification code and the corresponding laboratory identification code:
    - Sample matrix
    - Date of sample extraction
    - Date and time of analysis
    - Weight and/or volume used for analysis
    - Final dilution volumes or concentration factor for the sample
    - Percent moisture in solid samples
    - Identification of the instrument used for analysis
    - Method reporting and quantitation limits
  - Analytical results reported with reporting units identified
  - All data qualifiers and their definitions
  - Electronic data deliverables
- **Quality Assurance/Quality Control Summaries.** This section will contain the results of all QA/QC procedures. Each QA/QC sample analysis will be documented with the same information required for the sample results (refer to above). No recovery or blank corrections will be made by the laboratory. The required summaries are listed below; additional information may be requested.
  - **Method Blank Analysis.** The method blank analyses associated with each sample and the concentration of all compounds of interest identified in these blanks will be reported.
  - **Surrogate Spike Recovery.** All surrogate spike recovery data for organic compounds will be reported. The name and concentration of all compounds added, percent recoveries, and range of recoveries will be listed.
  - **Matrix Spike Recovery.** All MS recovery data for metals and organic compounds will be reported. The name and concentration of all compounds added, percent recoveries, and range of recoveries will be listed. The RPD for all duplicate analyses will be reported.
  - **Matrix Duplicate.** The RPD for all matrix duplicate analyses will be reported.
  - **Blind Duplicates.** Blind duplicates will be reported in the same format as any other sample. RPDs will be calculated for duplicate samples and evaluated as part of the data quality review.

3.4 DATA VALIDATION

Once data are received from the laboratory, a number of QC procedures will be followed to provide an accurate evaluation of the data quality. Specific procedures will be followed to assess data precision, accuracy, and completeness.

A data quality review of the analytical data will follow USEPA National Functional Guidelines in accordance with the QAPP limits (USEPA 2016a and 2016b). All chemical data will be reviewed with regard to the following:

- Chain of custody/documentation
- Sample preservation and holding times
- Instrument performance (calibration, tuning, sensitivity)
- Method blanks
- Method reporting limits
- Surrogate recoveries
- MS/MSD recoveries
- LCS recoveries
- Laboratory and field duplicate RPD

A Level II summary validation will be performed on all data except dioxins/furans. A Level IV full validation will be performed for dioxin/furan data, when dioxins/furans are detected at concentrations greater than the laboratory reporting limit. A description of the data validation will be included as part of the data summary, which will be submitted as part of the Site Remedial Investigation/Feasibility Study Work Plan.

4.0 References

Sound Earth Strategies, Inc. (SES). 2014a. *Remedial Investigation Report, ASKO Hydraulic Property*. Prepared for TOC Holdings Co. 23 May.

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Washington State Department of Ecology (Ecology). 2. 2013. *Sediment Management Standards, Chapter 173-204 Washington Administrative Code.* Publication No. 13-09-055. September.

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Surface Sediment Quality Evaluation Sampling and Analysis Plan/ Quality Assurance Project Plan

Tables

Table 2.1
Analytical Requirements, Methods, Preservation, Bottle Type, and Holding Times

Parameter	Method	Bottle Type	Preservative	Holding Time
Grain size	ASTM D422	One 32-oz WMG	None, cool to <6 °C	None
Total solids	SM 2540 (Mod)	One 4-oz WMG	None, cool to <6 °C	28 days
Total organic carbon	USEPA 9060A	One 4-oz WMG	None, cool to <6 °C	28 days
Ammonia	SM 4500-NH3	One 4-oz WMG	None, cool to <6 °C	28 days
Total sulfides	SM 4500-S2-D	One 2-4-oz WMG	Zn Acetate, cool to <6 °C	7 days
Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Se, Ag, Zn)	USEPA 6020A/USEPA 7471B	One 4-oz WMG	None, cool to <4 °C	Metals: 6 months Mercury: 28 days
Butyltins	USEPA 8270D-SIM	One 4-oz WMG	None, cool to <4 °C	14 days to extract, then 40 days to analyze
Semivolatile organic compounds	USEPA 8270D	One 4-oz WMG	None, cool to <4 °C	14 days to extract, then 40 days to analyze
Pesticides	USEPA 8081B	One 4-oz WMG	None, cool to <4 °C	14 days to extract, then 40 days to analyze
PCB Aroclors	USEPA 8082A	One 4-oz WMG	None, cool to <4 °C	None
Dioxins/furans	USEPA 1613B	One 4-oz amber WMG	None, cool to <4 °C	1 year
Total petroleum hydrocarbons	NWTPH-Dx	One 4-oz WMG	None, cool to <4 °C	14 days to extract, then 40 days to analyze

Abbreviations:

°C	Degrees Celsius	Ni	Nickel
Ag	Silver	oz	Ounce
As	Arsenic	Pb	Lead
Cd	Cadmium	Se	Selenium
Cr	Chromium	WMG	Wide-mouth glass jar
Cu	Copper	Zn	Zinc
Hg	Mercury		

Table 3.1
Parameters for Analysis, Methods, and Target Quantitation Limits

Chemical	Unit[1]	Freshwater SMS Criteria[2]		Analytical Method	Method Reporting Limit
		SCO	CSL		
Conventionals					
Grain size	%	--	--	ASTM D422	NA
Total solids	%	--	--	SM 2540 (Mod)	0.5
Total organic carbon	%	--	--	USEPA 9060A	0.075
Ammonia	mg/kg	230	300	SM 4500-NH3	1
Sulfides	mg/kg	39	61	SM 4500-S2-D	1
Metals					
Arsenic	mg/kg	14	120	USEPA 6020A	0.25
Cadmium	mg/kg	2.1	5.4	USEPA 6020A	0.2
Chromium	mg/kg	72	88	USEPA 6020A	0.1
Copper	mg/kg	400	1,200	USEPA 6020A	0.2
Lead	mg/kg	360	>1,300	USEPA 6020A	0.2
Mercury	mg/kg	0.66	0.8	USEPA 7471B	0.25
Nickel	mg/kg	26	110	USEPA 6020A	0.5
Selenium	mg/kg	11	>20	USEPA 6020A	0.5
Silver	mg/kg	0.57	1.7	USEPA 6020A	0.1
Zinc	mg/kg	3,200	>4,200	USEPA 6020A	0.5
Organometallic Compounds					
Dibutyltin	µg/kg	910	130,000	USEPA 8270D-SIM	5.78
Monobutyltin	µg/kg	540	>4,800	USEPA 8270D-SIM	4.08
Tetrabutyltin	µg/kg	97	>97	USEPA 8270D-SIM	5.00
Tributyltin	µg/kg	47	320	USEPA 8270D-SIM	3.89
Polycyclic Aromatic Hydrocarbons (PAHs)					
2-Methylnaphthalene	µg/kg	--	--	USEPA 8270D	40
Acenaphthene	µg/kg	--	--	USEPA 8270D	40
Acenaphthylene	µg/kg	--	--	USEPA 8270D	40
Anthracene	µg/kg	--	--	USEPA 8270D	40
Benzo(a)anthracene	µg/kg	--	--	USEPA 8270D	40
Benzo(a)pyrene	µg/kg	--	--	USEPA 8270D	40
Benzo(g,h,i)perylene	µg/kg	--	--	USEPA 8270D	40
Chrysene	µg/kg	--	--	USEPA 8270D	40
Dibenzo(a,h)anthracene	µg/kg	--	--	USEPA 8270D	40
Fluoranthene	µg/kg	--	--	USEPA 8270D	40
Fluorene	µg/kg	--	--	USEPA 8270D	40
Indeno(1,2,3-c,d)pyrene	µg/kg	--	--	USEPA 8270D	40
Naphthalene	µg/kg	--	--	USEPA 8270D	40
Phenanthrene	µg/kg	--	--	USEPA 8270D	40
Pyrene	µg/kg	--	--	USEPA 8270D	40
Total benzofluoranthenes	µg/kg	--	--	USEPA 8270D	40
Total PAHs	µg/kg	17,000	30,000	--	--
Semivolatile Organic Compounds					
4-Methylphenol	µg/kg	260	2,000	USEPA 8270D	100
Benzoic Acid	µg/kg	2,900	3,800	USEPA 8270D	500
Bis(2-ethylhexyl)phthalate	µg/kg	500	22,000	USEPA 8270D	100
Carbazole	µg/kg	900	1,100	USEPA 8270D	75
Dibenzofuran	µg/kg	200	680	USEPA 8270D	75
Di-n-butyl phthalate	µg/kg	380	1,000	USEPA 8270D	100
Di-n-octyl phthalate	µg/kg	39	>1,100	USEPA 8270D	100 (MDL = 10.7)
Phenol	µg/kg	120	210	USEPA 8270D	100 (LOQ = 40.0)
Pesticides					
Beta-Hexachlorocyclohexane	µg/kg	7.2	11	USEPA 8081B	1.70
Dieldrin	µg/kg	4.9	9.3	USEPA 8081B	3.30
Total DDDs	µg/kg	310	860	USEPA 8081B	3.30
Total DDEs	µg/kg	21	33	USEPA 8081B	3.30
Total DDTs	µg/kg	100	8,100	USEPA 8081B	3.30
Endrin ketone	µg/kg	8.5	>8.5	USEPA 8081B	3.30
Polychlorinated Biphenyls (PCBs)					
PCB-aroclor 1016	µg/kg	--	--	USEPA 8082A	10
PCB-aroclor 1221	µg/kg	--	--	USEPA 8082A	10
PCB-aroclor 1232	µg/kg	--	--	USEPA 8082A	10
PCB-aroclor 1242	µg/kg	--	--	USEPA 8082A	10
PCB-aroclor 1248	µg/kg	--	--	USEPA 8082A	10
PCB-aroclor 1254	µg/kg	--	--	USEPA 8082A	10

Table 3.1
Parameters for Analysis, Methods, and Target Quantitation Limits

Chemical	Unit[1]	Freshwater SMS Criteria[2]		Analytical Method	Method Reporting Limit
		SCO	CSL		
PCBs (cont.)					
PCB-aroclor 1260	µg/kg	--	--	USEPA 8082A	10
PCB-aroclor 1268	µg/kg	--	--	USEPA 8082A	10
Total PCB Aroclors	µg/kg	110	2,500	--	--
Dioxins/Furans					
2,3,7,8-TCDD	ng/kg	--	--	USEPA 1613B	0.5
1,2,3,7,8-PeCDD	ng/kg	--	--	USEPA 1613B	2.5
1,2,3,4,7,8-HxCDD	ng/kg	--	--	USEPA 1613B	2.5
1,2,3,6,7,8-HxCDD	ng/kg	--	--	USEPA 1613B	2.5
1,2,3,7,8,9-HxCDD	ng/kg	--	--	USEPA 1613B	2.5
1,2,3,4,6,7,8-HpCDD	ng/kg	--	--	USEPA 1613B	2.5
Total OCDD	ng/kg	--	--	USEPA 1613B	5
2,3,7,8-TCDF	ng/kg	--	--	USEPA 1613B	0.5
1,2,3,7,8-PeCDF	ng/kg	--	--	USEPA 1613B	2.5
2,3,4,7,8-PeCDF	ng/kg	--	--	USEPA 1613B	2.5
1,2,3,4,7,8-HxCDF	ng/kg	--	--	USEPA 1613B	2.5
2,3,4,6,7,8-HxCDF	ng/kg	--	--	USEPA 1613B	2.5
1,2,3,7,8,9-HxCDF	ng/kg	--	--	USEPA 1613B	2.5
1,2,3,4,6,7,8-HpCDF	ng/kg	--	--	USEPA 1613B	2.5
1,2,3,6,7,8-HxCDF	ng/kg	--	--	USEPA 1613B	2.5
1,2,3,4,7,8,9-HpCDF	ng/kg	--	--	USEPA 1613B	2.5
Total OCDF	ng/kg	--	--	USEPA 1613B	5
Summed dioxin/furan TEQ[5]	ng/kg	--	--	--	--
Total Petroleum Hydrocarbons (TPHs)					
TPH (diesel)	mg/kg	340	510	NWTPH-Dx	20
TPH (residual)	mg/kg	3,600	4,400	NWTPH-Dx	50

Notes:

-- Not applicable.
1 Dry weight.
2 Freshwater SCO and CSL chemical criteria, Sediment Management Standards (WAC 173-204-563).
5 Calculated using the World Health Organization re-evaluation of Toxic Equivalency Factors for dioxins performed in 2005 (Van den Berg et al. 2006), as presented in Table 6-3 of the DMMP User's Manual (USACE 2008).

Abbreviations:

CSL Cleanup Screening Level
DDD Dichlorodiphenyldichloroethane
DDE Dichlorodiphenyldichloroethylene
DDT Dichlorodiphenyltrichloroethane
DMMP Dredged Material Management Program
HpCDD Heptachlorodibenzo-p-dioxin
HpCDF Heptachlorodibenzofuran
HxCDD Hexachlorodibenzo-p-dioxin
HxCDF Hexachlorodibenzofuran
LOQ Limit of quantitation
MDL Method detection limit
µg/kg Micrograms per kilogram
mg/kg Milligrams per kilogram
ng/kg Nanograms per kilogram
OCDD Octachlorodibenzodioxin
OCDF Octachlorodibenzofuran
PeCDD Pentachlorodibenzo-p-dioxin
PeCDF Pentachlorodibenzofuran
SCO Sediment Cleanup Objective
SMS Sediment Management Standards
TCDD Tetrachlorodibenzo-p-dioxin
TCDF Tetrachlorodibenzofuran
TEQ Toxic equivalent

Table 3.2
Data Quality Assurance Criteria

Parameter	Precision	Accuracy[1]	Completeness	Reference
Grain size	NA	NA	95%	ASTM D422
Total solids	± 20% RPD	NA	95%	SM 2540 (Mod)
Total organic carbon	± 30% RPD	59.1–139% R	95%	USEPA 9060A
Ammonia	± 30% RPD	85–115% R	95%	SM 4500-NH3
Total sulfides	± 20% RPD	75–125% R	95%	SM 4500-S2-D
Metals (As, Cd, Cr, Cu, Pb, Ni, Se, Ag, Zn)	± 20% RPD	80–120% R	95%	USEPA 6020A
Mercury	± 20% RPD	80–120% R	95%	USEPA 7471B
Butyltins	± 30% RPD	60–130% R	95%	USEPA 8270D-SIM
Semivolatile organic compounds	± 50% RPD	Range	95%	USEPA 8270D
Pesticides	± 30% RPD	Range	95%	USEPA 8081B
PCB Aroclors	± 30% RPD	Range	95%	USEPA 8082A
Dioxins/furans	± 25% RPD	63–160% R	95%	USEPA 1613B
Total petroleum hydrocarbons	± 30% RPD	65–135% R	95%	NWTPH-Dx

Note:

1 Range is analyte specific and provided by Fremont Analytical, Inc., in Seattle, Washington.

Abbreviations:

Ag Silver
As Arsenic
Cd Cadmium
Cr Chromium
Cu Copper
NA Not applicable
Ni Nickel
PCB Polychlorinated biphenyl
Pb Lead
R Recovery
RPD Relative Percent Difference
Se Selenium
Zn Zinc

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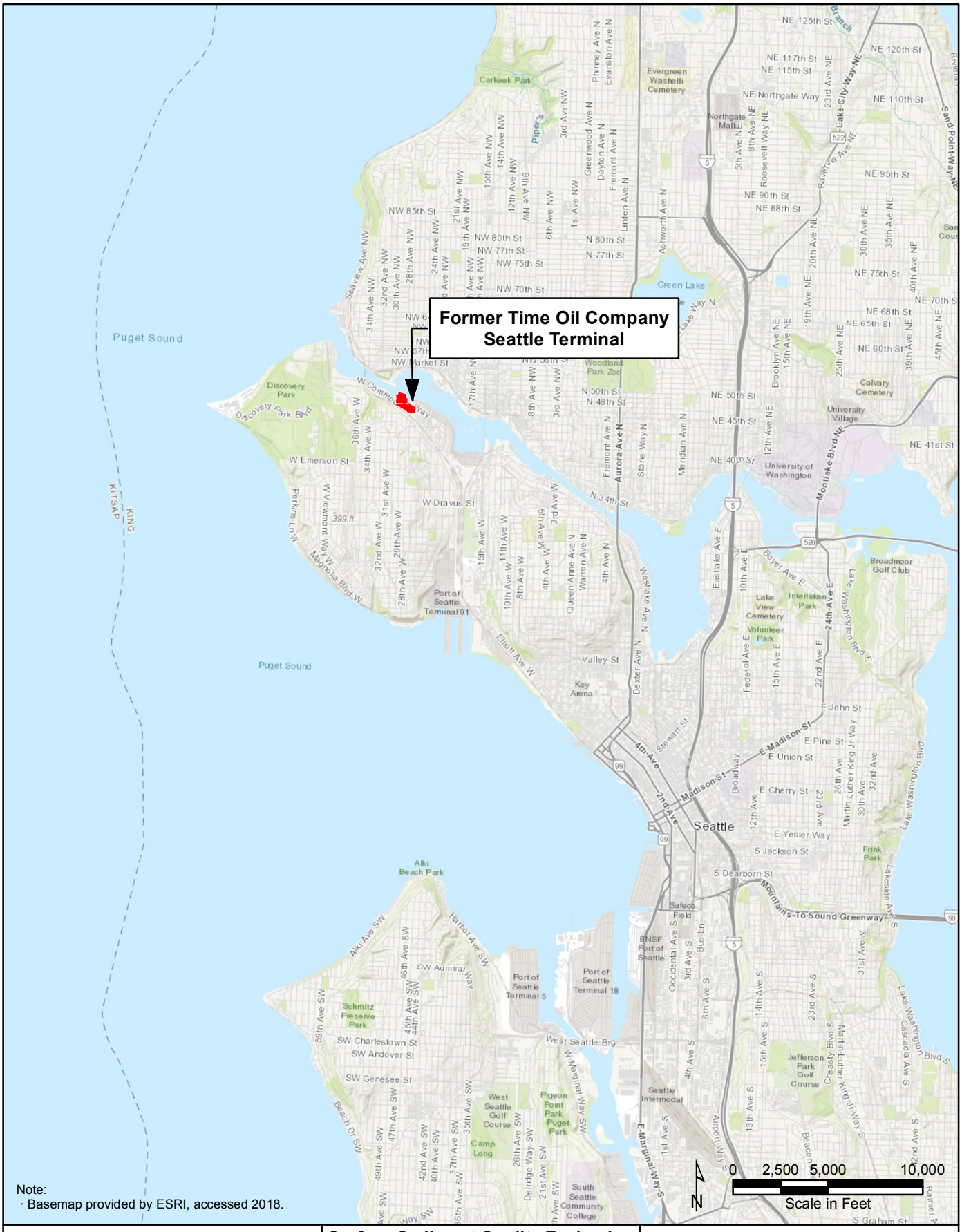
Figures



Note:
· Basemap provided by ESRI, accessed 2018.

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Seattle Terminal
Seattle, Washington

Figure 1.1
Vicinity Map

I:\GIS\Projects\Cantera-TOC\MXD\Sediment SAP\Figure 1.1 Vicinity Map.mxd
7/16/2018

Notes:
· Parcel boundaries obtained from King County Geographic Information Systems Center, 2011.
· Orthoimagery obtained from Nearmap, 2018.

Abbreviation:
DNR = Washington State Department of Natural Resources

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Figure 1.2
Site Vicinity Map

I:\GIS\Projects\Cantera-TOC\MXD\Sediment SAP\Figure 1.2 Site Vicinity Map.mxd
7/16/2018

Legend

- Proposed Site Vicinity Surface Sediment Sample Location
- Proposed Background Surface Sediment Sample Location
- Property Boundary for the Seattle Terminal Properties

TOC-SS-07
TOC-SS-08
TOC-SS-09
DNR AQUATIC LEASE LAND PROPERTY
TOC-SS-05
TOC-SS-04
TOC-SS-06
TOC-SS-02
TOC-SS-03
TOC-SS-01
WEST WATERFRONT PROPERTY
EAST WATERFRONT PROPERTY
Salmon Bay
SB-SS-01
SB-SS-02
SB-SS-03
W. Commodore Way
27th Ave W
ASKO HYDRAULIC PROPERTY
BULK TERMINAL PROPERTY
BNSF Railway
Gilman Ave W
W Fort St
26th Ave W

Notes:
· Parcel boundaries obtained from King County Geographic Information Systems Center, 2011.
· Orthoimagery obtained from Nearmap, 2018.

Abbreviation:
DNR = Washington State Department of Natural Resources

N

0 100 200 400
Scale in Feet

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Figure 2.1
Surface Sediment Sample Locations

I:\GIS\Projects\Cantera-TOC\MXD\Sediment SAP\Figure 2.1 Surface Sediment Sample Locations.mxd
7/16/2018

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Appendix A
Standard Guideline for Sediment Grab Sample Collection and Surface Sediment Sample Collection Form

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Two Union Square
601 Union Street, Suite 600
Seattle, WA 98101
tel: 206.292.2078 fax: 206.682.7867

F|S STANDARD GUIDELINE

Sediment Grab Sample Collection

DATE/LAST UPDATE: May 2015

These procedures should be considered standard guidelines and are intended to provide useful guidance when in the field, but are not intended to be step by step procedures, as some steps may not be applicable to all projects.

All field staff should be sufficiently trained in the standard guidelines for the sampling method they intend to use and should review and understand these procedures prior to going into the field. It is the responsibility of the field staff to review the standard guidelines with the field manager or project manager and identify any deviations from these guidelines prior to field work. When possible, the project-specific Sampling and Analysis Plan should contain any expected deviations and should be referenced in conjunction with these standard guidelines.

1.0 Scope and Purpose

These sediment grab standard guidelines should be used by the field staff performing sediment grab sampling via a grab type sampler (e.g., van Veen, Power Grab) or a diver-collected hand core (i.e., cookie cutter) sampler for sediment sampling in freshwater or marine environments. The van Veen grab and diver-collected hand core samplers are two of the most commonly used to collect surface sediment. Power Grab samplers are often used when requiring collection of sediment deeper than 10 cm (4 in.) or in areas with debris.

It is important that the field staff completing the sediment sample collection discusses the sediment logging needs for a particular investigation with the project geologist, the project manager, or whoever will ultimately be responsible for interpreting the findings of the field investigation. This discussion is in addition to field training and general knowledge about sediment logging and sampling, and should happen prior to entering the field, with additional follow-up before finalizing the field forms, after the investigation is complete.

2.0 Equipment and Supplies

Logging Equipment and Tools:

- Tape measure (at least 1 foot long)
- Lead line (if not provided by vessel operator)
- Soil/sediment logging kit containing:
  - Small and Large Ziploc bags
  - Note cards
  - Field guide for soil and stratigraphic analysis
  - Optional items from kit including: Munsell color chart, sieves, white and grayscale color cards for photographs
- Large stainless steel bowls for homogenizing
- Large stainless steel spoons or mixer (as an alternative, disposal spoons or spatulas can be used)
- Small stainless steel spoon
- Trash bags
- Decontamination equipment including:
  - Pump sprayer for tap water or site water
  - Spray bottles filled with alconox (or other soap) solution
  - Distilled or deionized water
  - Scrub brushes
  - Paper towels
  - 5-gallon buckets
- Siphoning hose (usually on board vessel)
- Camera
- Hand-held global positioning system (GPS; if GPS not on board vessel)
- Coolers, sample jars, labels, chain-of-custody forms, ice

Paperwork:

- Work Plan and/or Sampling and Analysis Plan/Quality Assurance Project Plan (SAP/QAPP)
- Key figures/coordinate table with sampling locations
- Tide prediction tables
- Health and Safety Plan (HASP)

- Sediment grab sampling forms, printed in Rite in the Rain paper, and optional bound field notebook
- Permanent markers and pencils

Personal Equipment:

- Steel-toed boots
- Hard hat
- Life vest
- Safety glasses
- Nitrile gloves
- Rain gear
- Work gloves
- First aid kit

3.0 Standard Procedures

3.1 PREPARATION

First, meet with the project manager to identify key information and goals of the sediment sampling investigation. These may include fill/capping/dredging history, known or suspected sources of contamination and potential field indications of these contaminants, and identification of specific units, if applicable.

Next, review the work plan and existing materials such as surface sediment grab forms or sediment core logs from previous investigations to familiarize yourself with the site geology. If site-specific information about geology is not available, or in addition to site-specific information, a geologic map of the area from a reputable source such as the U.S. Geological Survey (USGS) may also be reviewed.

3.2 COLLECTING SEDIMENT SAMPLES

Sediment grab samples will be processed on board the sampling vessel or shoreline (if diver assisted). All working surfaces and instruments will be thoroughly cleaned and decontaminated between sample locations.

1. Before starting, record the following information on each field form:
    a. Sample Method (i.e., Van Veen Surface Grab, Power Grab, or Diver Cookie Cutter) and Sample Type/Depth (e.g., 0 to 10 cm).
    b. Your name, date, project, weather, subcontractor (if applicable), sample location ID name and approximate descriptive location (if possible or applicable).

2. Have the boat operator maneuver the sampling vessel to the proposed sample location. Locations will be, in most situations, pre-determined in northings and eastings (to the nearest US survey foot) referenced to the appropriate state plane system for the site, using the vessel mounted Digital Global Positioning System (DGPS) receiver referenced to North American Datum of 1983 (NAD 83). If collecting a cookie cutter sample, the diver will need to get on location. If there is no vessel mounted DGPS available, a handheld portable GPS may be used.
3. Record the time, depth to mudline below water surface, actual sample location coordinates (get from vessel operator), and estimated tide elevation (can be determined in the office prior to sampling) on the field form as the sample is collected.
4. Once the sampler or cookie cutter has been retrieved, examine the sample for the following sediment acceptance criteria and include on field form:
    a. Sampler jaw or bottom lid (if cookie cutter) is closed.
    b. The sample does not contain foreign objects.
    c. The sampler is not overfilled so that the sediment surface presses against the top of the sampler.
    d. Leakage has not occurred, as indicated by overlying water on the sediment surface (not relevant with cookie cutter).
    e. Sample disturbance has not occurred, as indicated by limited turbidity in the overlying water (not relevant with cookie cutter).
    f. Winnowing has not occurred, as indicated by a relatively flat undisturbed surface (not relevant with cookie cutter).
    g. A penetration depth of at least 1 inch greater than desired sample depth has been achieved for grabs, and at least the depth of the desired sample for cookie cutter sampling. If after four attempts, the penetration depth has not been achieved, accept the sample as is.
5. If sample acceptance criteria are not achieved, the sample will be rejected and the location resampled after rinsing the sampler. If the proposed sample location cannot be achieved (within ±10 feet, or within a distance specified in the sampling plan), notify the Floyd|Snider Project Manager to determine an appropriate alternate location.
6. Siphon off any standing water from the surface of the sediment using a hose primed with site water. Care should be taken not to disturb the integrity of the sediment surface (not relevant with cookie cutter).
7. If using the cookie cutter, position the cookie cutter over a large stainless steel bowl and carefully slide out the bottom lid of the sampler so the sediment falls into the bowl.

8. Take a digital photograph of the sediment surface prior to removal from the sampler (not relevant with cookie cutter). Write the sample location ID and grab replicate or run number (e.g., Run #1) with a large felt-tip marker on a sheet of paper, or index card (or similar) and photograph next to, but not touching, the sediment sample.
9. Visually classify the surface (and subsurface, if collecting) sediment characteristics according to the American Society for Testing and Materials (ASTM) standards using the Unified Soil Classification System (USCS). Refer to the Floyd|Snider Soil Logging Standard Guideline for additional details regarding logging and classification. In addition to the visual classification, qualitative descriptive parameters, including biota (e.g., worms, crabs, and seaweed), debris (e.g., shells, wood, concrete, and glass), staining, sheen, and other observations (including olfactory if relevant) should also be recorded.
10. Collect the surface sediment sample over the desired surface sediment sampling depth (e.g., 0 to 10 cm) using a clean, stainless steel spoon and place the sample material into a clean stainless steel bowl. If collecting a subsurface sediment sample as well, then collect sediment for this sample over the desired sampling depth (e.g., 10 to 20 cm) using a clean, stainless steel spoon and place this sample material in a separate clean stainless steel bowl. To prevent possible cross-contamination, do not collect sediments that are in direct contact with the margins of the sampler.
11. Take a digital photograph of each sediment interval collected while in the bowl. Write the sample location name, grab replicate number, and sample depth interval with a large felt-tip marker on a sheet of paper or index card (or similar) and photograph next to, but not touching, the sediment sample.
12. Homogenize until the sediment appears uniform in color and texture and distribute to appropriate sample containers and ensure that sample labels are completely filled out and affixed to the containers. If collecting sample volume for volatile organic carbons (VOCs), collect prior to homogenizing. If there isn't enough sediment volume to fill sample containers, repeat Steps 1 through 11 at a new location within 5 to 10 feet of current location and label as subsequent Run # or Grab #.
13. Clean the exterior of all sample containers and store them in a cooled ice chest away from the immediate work area. The cooled ice chest should be maintained at 4 degrees Celsius (°C).
14. Thoroughly rinse the interior of the sampler until all loose sediment has been washed off, and decontaminate the sampler by following the procedures provided in Section 4.0.
15. Ensure that sediment descriptions and supporting field form entries are complete.
16. Complete filling out chain-of-custody and transport samples to analytical laboratory under standard chain-of-custody procedures.

4.0 Decontamination

All reusable equipment that comes into contact with sediment should be decontaminated as follows prior to moving to the next sampling location.

Stainless steel bowls and spoons, sediment samplers, and any other tools used for sampling must be decontaminated between grab sample locations. Equipment decontamination will consist of a preliminary water rinse using water from the site to remove sediment particles, followed by scrubbing with brushes and an alconox (or other soap)/clean water solution and a final rinse with distilled or deionized water.

5.0 Investigation-Derived Waste

Unless otherwise specified in the project work plan, waste sediment and decontamination water and rinse water generated during sediment grab sample activities may be returned to the site by disposing of material overboard the vessel, as close to the sample location as possible. If using an uplands processing area, waste sediment should be containerized in 55-gallon drums approved by the Washington State Department of Transportation pending profiling and disposal. Each container holding investigation-derived waste (IDW) will be sealed and labeled as to its contents (e.g., “sediments”), the dates on which the wastes were placed in the container, the owner’s name and contact information for the field person who generated the waste, and the site name.

IDW contained within drums will be characterized relative to applicable waste criteria using data from the sampling locations whenever possible. Material that is designated for off-site disposal will be transported to an off-site facility permitted to accept the waste. Manifests will be used, as appropriate for disposal.

Disposable sampling materials and incidental trash such as paper towels and personal protective equipment (PPE) used in sample processing will be placed in heavy duty garbage bags or other appropriate containers and disposed of as solid waste in the municipal collection system (i.e. site dumpster).

6.0 Field Documentation

All observations should be recorded on the surface sediment sample collection form (attached) and/or in a bound field notebook. Field staff should make an effort to record as much detail as possible.

Enclosure: Surface Sediment Sample Collection Form

SURFACE SEDIMENT SAMPLE COLLECTION FORM

Date/Time Collected: _____

Weather: _____

Field Personnel: _____

Sample Type:

☐ 1. Surface Sample (0-10 cm)

Sample ID/Design. _____

Sample Method (Van Veen Surface Grab/Diver Core-Cookie Cutter)

Datum (Horizontal/Vertical) _____

Leadline Water Dept: _____ (A)

Predicted Tide Elevation _____ (B)

Mudline Elevation _____ (B-A)

Actual Tide Elevation _____

Run # or Composite Pt	Time	Latitude (Northing)	Longitude (Easting	Sample Criteria (Surface Grab Only)					Accept Sample Y/N	Comments (Include depth of sample)
				1	2	3	4	5		

Acceptance criteria: 1 Overlying water is present, 2 Water has low turbidity, 3 Sampler is not over filled, 4 Sample surface is flat, 5 Desired sample depth is reached

Decon Procedure (Alconox Wash, DI water rinse, other):_____

Sediment Sample Description

Sediment Sample Description (density, moisture, color, minor constituents, major constituents, other observations - *see field ref cards):

Sample containers filled (number and type):

Laboratory analysis:

Diver Comments (if applicable) etc:

Former Time Oil Company
Seattle Terminal

Surface Sediment Quality Evaluation Sampling and Analysis Plan/ Quality Assurance Project Plan

Appendix B
Health and Safety Plan

Table of Contents

List of Figures

List of Attachments

List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
°F	Degrees Fahrenheit
Ecology	Washington State Department of Ecology
HASP	Health and Safety Plan
HAZWOP	Hazardous Waste Operations
HSO/SS	Health and Safety Officer/Site Supervisor
PFD	Personal flotation device
PM	Project Manager
PPE	Personal protective equipment
Site	Former Time Oil Company Seattle Terminal located on W. Commodore Way in Seattle, Washington
SSO	Site Safety Officer
TOC	Time Oil Company
TWA	Time-weighted average
WAC	Washington Administrative Code

1.0 Plan Objectives and Applicability

This Health and Safety Plan (HASP) has been written to comply with the standards prescribed by the Occupational Safety and Health Administration (OSHA) and the Washington Industrial Safety and Health Act (WISHA).

The purpose of this HASP is to establish protection standards and mandatory safe practices and procedures for all personnel involved with sediment sample collection from sediment grabs at the former Time Oil Company (TOC) Seattle Terminal located on W. Commodore Way in Seattle, Washington (the Site). This HASP assigns responsibilities, establishes standard operating procedures, and provides for contingencies that may occur during field work activities. This plan consists of site descriptions, a summary of work activities, an identification and evaluation of chemical and physical hazards, monitoring procedures, personnel responsibilities, a description of site zones, decontamination and disposal practices, emergency procedures, and administrative requirements.

The provisions and procedures outlined by this HASP apply to all onsite Floyd|Snider personnel providing assistance with field sampling. Contractors, subcontractors, other oversight personnel, and all other persons involved with the field work activities described herein are required to develop and comply with their own HASP, or comply with this HASP and their own job-specific safety protocols. All Floyd|Snider staff conducting field activities are required to read this HASP and indicate that they understand its contents by signing the Health and Safety Officer/Site Supervisor's (HSO/SS's) copy of this plan.

It should be noted that this HASP is based on information that was available as of the date indicated on the title page. It is possible that additional hazards that are not specifically addressed by this HASP may exist at the work site or may be created as a result of onsite activities. It is the firm belief of Floyd|Snider that active participation in health and safety procedures and acute awareness of onsite conditions by all workers is crucial to the health and safety of everyone involved. Should project personnel identify a site condition that is not addressed by this HASP and have any questions or concerns about site conditions, they should immediately notify the HSO/SS and an addendum will be provided to this HASP.

The HSO/SS has field responsibility for ensuring that the provisions outlined herein adequately protect worker health and safety and that the procedures outlined by this HASP are properly implemented. In this capacity, the HSO/SS will conduct regular site inspections to ensure that this HASP remains current with potentially changing site conditions. The HSO/SS has the authority to make health and safety decisions that may not be specifically outlined in this HASP, should site conditions warrant such actions. In the event that the HSO/SS leaves the project site while work is in progress, an alternate Site Safety Officer (SSO) will be designated. Personnel responsibilities are further described in Section 4.0.

This HASP has been reviewed by the Project Manager (PM) and the HSO/SS prior to commencement of work activities. All Floyd|Snider personnel shall review the plan and be familiar with onsite health and safety procedures. A copy of the HASP will be on site at all times.

2.0 Background

The former Site owner, TOC, filed bankruptcy and the Site is currently for sale. The Cantera Development Group, LLC (Cantera) is a prospective purchaser and is currently in a due diligence process to evaluate environmental contamination, with the objective to obtain a Prospective Purchaser Agreement/Consent Decree from the Washington State Department of Ecology (Ecology). Sediment quality has been identified as a data gap because current sediment data are not available within or in the vicinity of the Site.

The Site consists of four separate parcels (commonly identified as the Bulk Terminal Property, ASKO Hydraulic Property, East Waterfront Property and West Waterfront Property) located on W. Commodore Way. The Site also included one parcel leased from the Washington State Department of Natural Resources. W. Commodore Way, a City of Seattle Right-of-Way, separates the Bulk Terminal and ASKO Hydraulic Properties from the East Waterfront and West Waterfront Properties, which are located adjacent to Salmon Bay.

This HASP focuses on field sampling activities to evaluate sediment quality via collection of in-water sediment grab samples. Grab samples will be collected from a sampling vessel from surface sediments both adjacent to the Site to evaluate potential Site impacts and to the east of the Site in Salmon Bay, which are intended to represent regional background conditions.

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3.0 Emergency Contacts and Information

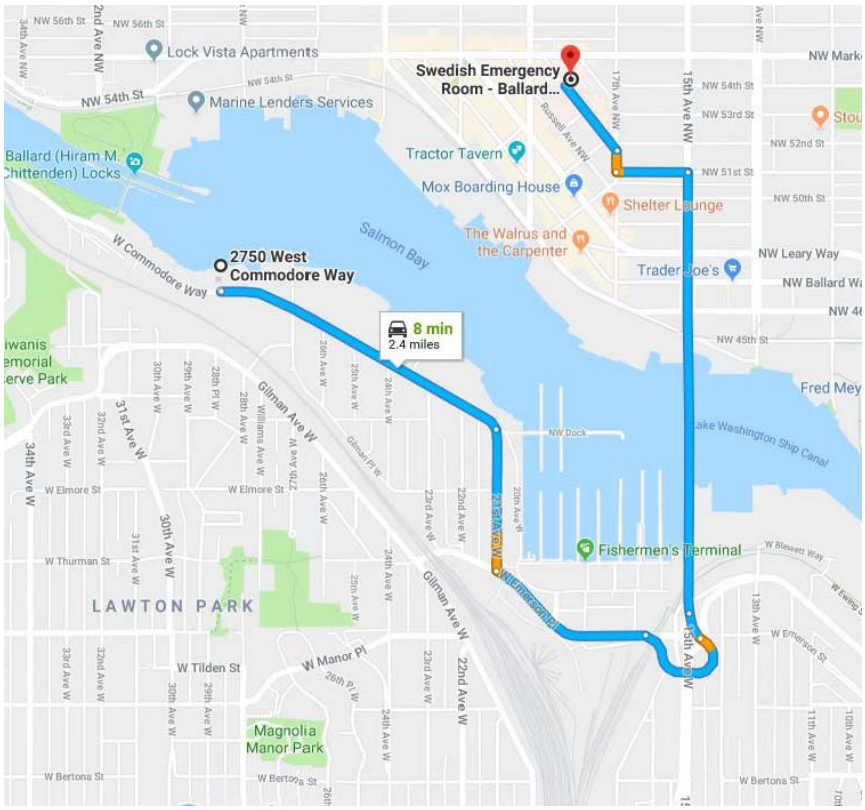
3.1 DIAL 911

In the event of any emergency, dial 911 to reach fire, police, and first aid.

3.2 HOSPITAL AND POISON CONTROL

Nearest Hospital Location and Telephone: Refer to Figure B.1 below for map and directions to the hospital.	Swedish Emergency Room - Ballard 5350 Tallman Ave NW Seattle, WA 98107 (206)781-6341
Washington Poison Control Center:	(800) 222-1222

Figure B.1
Hospital Directions



- Head EAST on W COMMODORE WAY.
- Turn LEFT onto W EMERSON PLACE.
- Turn RIGHT onto W NICKERSON STREET.

- Continue STRAIGHT onto 15th AVENUE W/BALLARD BRIDGE.
- Turn LEFT onto NW 51st STREET.
- Turn RIGHT onto 17th AVENUE NW.
- TURN LEFT onto TALLMAN AVE NW.
- Turn RIGHT into SWEDISH EMERGENCY ROOM - BALLARD.

3.3 PROVIDE INFORMATION TO EMERGENCY PERSONNEL

All Floyd|Snider project personnel should be prepared to give the following information:

Information to Give to Emergency Personnel	
Site Location for Emergency Personnel: 24th Avenue Landing, Ballard	**24th Avenue Landing Public Pier** Emergency personnel should be routed to the public use pier 24th Avenue Landing on the south end of 24th Avenue NW.
Number That You are Calling from:	Look on the phone you are calling from.
Type of Accident or Type(s) of Injuries:	Describe accident and/or incident and number of personnel needing assistance.

3.4 FLOYD|SNIDER EMERGENCY CONTACTS

After contacting emergency response crews as necessary, contact the Floyd|Snider PM or a Principal to report the emergency.

Floyd|Snider Emergency Contacts:

Contact	**Office Phone Number**	**Cell Phone Number**
Lynn Grochala, PM	(206) 292-2078	(603) 491-3952
Allison Geiselbrecht, Principal		(206) 722-2460
Kara Hitchko, HSO/SS		(206) 795-0523

4.0 Primary Responsibilities and Requirements

4.1 PROJECT MANAGER

The PM will have overall responsibility for the completion of the project, including the implementation and review of this HASP. The PM will review health and safety issues as needed and as consulted and will have authority to allocate resources and personnel to safely accomplish the field work.

The PM will direct all project personnel involved in field sample collection at the Site. If the project scope changes, the PM will notify the HSO/SS so that the appropriate addendum will be included in the HASP. The PM will ensure that all Floyd|Snider personnel on site have received the required training, are familiar with the HASP, and understand the procedures to follow should an accident and/or incident occur on site.

4.2 HEALTH AND SAFETY OFFICER AND SITE SUPERVISOR

The HSO/SS will approve this HASP and any amendments thereof and will ultimately be responsible for full implementation of all elements of the HASP.

The HSO/SS will advise the PM and project personnel on all potential health and safety issues of the field investigation activities to be conducted at the Site. The HSO/SS will specify required exposure monitoring to assess site health and safety conditions, modify the site HASP based on field assessment of health and safety accidents and/or incidents, and recommend corrective action if needed. The HSO/SS will report all accidents and/or incidents to the PM. If the HSO/SS observes unsafe working conditions by Floyd|Snider personnel or any contractor personnel, the HSO/SS will suspend all work until the hazard has been addressed.

4.3 SITE SAFETY OFFICER

The SSO may be a person dedicated to this task, to assist the HSO/SS during field work activities. The SSO will ensure that all personnel have appropriate personal protective equipment (PPE) on site and that PPE is properly used. The SSO will assist the HSO/SS in field observation of Floyd|Snider personnel safety. If a health or safety hazard is observed, the SSO shall suspend all work activity. The SSO will conduct onsite safety meetings daily before work commences. All health and safety equipment will be calibrated daily and records kept in the daily field logbook. The SSO may perform exposure monitoring if needed and will ensure that equipment is properly maintained.

The SSO will conduct daily safety meetings prior to the start of work to brief personnel on potential hazards and safe work practices and will track safety incidents and near-misses. An example tailgate safety meeting form and incident/near-miss tracking form is provided as Attachment B.1 to this HASP.

4.4 FLOYD|SNIDER PROJECT PERSONNEL

All Floyd|Snider project personnel involved in field work activities will take precautions to prevent accidents and/or incidents from occurring to themselves and others in the work areas. Employees will report all accidents and/or incidents or other unsafe working conditions to the HSO/SS or SSO immediately. Employees will inform the HSO/SS or SSO of any physical conditions that could impact their ability to perform field work.

4.5 TRAINING REQUIREMENTS

All Floyd|Snider project personnel must comply with applicable regulations specified in the Washington Administrative Code (WAC) Chapter 296-843, Hazardous Waste Operations (HAZWOP), administered by the Washington State Department of Labor and Industries. Project personnel will be 40-hour HAZWOP trained and maintain their training with an annual 8-hour refresher. Personnel with limited tasks and minimal exposure potential will be required to have 24-hour training and a site hazard briefing and be escorted by a trained employee. Personnel with defined tasks that do not include potential contact with disturbed site soils or waste, groundwater, or exposures to visible dust (e.g., surveying) are not required to have any level of hazardous waste training beyond a site emergency briefing and hazard orientation by the HSO/SS. Floyd|Snider project personnel will fulfill the medical surveillance program requirements.

At least one person on site during field work will have current CPR/First Aid certification. All field personnel will have a minimum of 3 days of hazardous materials field experience under the direction of a skilled supervisor.

Additional site-specific training that covers onsite hazards; PPE requirements, use, and limitations; decontamination procedures; and emergency response information as outlined in this HASP will be given by the HSO/SS before onsite work activities begin.

5.0 Hazard Evaluation and Risk Analysis

In general, there are three broad hazard categories that may be encountered during site work: chemical exposure hazards, fire/explosion hazards, and physical hazards. Sections 5.1 through 5.3 discuss the specific hazards that fall within each of these broad categories.

5.1 CHEMICAL EXPOSURE HAZARDS

This section describes potential chemical hazards associated with sediment sampling. Prior sampling conducted in the vicinity of the Site in the mid-1990s identified some chemicals exceeding their Sediment Management Standards (SMS) criteria for freshwater organism toxicity including metals (arsenic, mercury), polycyclic aromatic hydrocarbons, and pentachlorophenol. Dioxins/furans and diesel- and heavy-oil range hydrocarbons have never been analyzed in sediments but could be present because they may be associated with previous Site activities.

Chemical Hazard	DOSH Permissible Exposure Limits (8-hour TWA/STEL)	Highest Historic Concentration within the Site	Routes of Exposure	Potential Toxic Effects
Arsenic	0.01 mg/m^3 in air	180 mg/kg	Inhalation, skin absorption, ingestion, skin/eye contact	Ulceration of nasal septum; dermatitis; gastrointestinal disturbance; respiratory irritation; hyper-pigmentation of skin; skin and lung cancer
Mercury	0.1 mg/m^3 (skin)	2.7 mg/kg	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes, nose, skin; coughing, chest pain, central and peripheral nervous system impacts
Polycyclic aromatic hydrocarbons	0.2 mg/m^3 / 0.6 mg/m^3 (as coal tar pitch volatiles)	28.6 mg/kg	Inhalation, skin absorption, ingestion, skin/eye contact	Dermatitis, bronchitis, lung, skin, and stomach cancer

Chemical Hazard	DOSH Permissible Exposure Limits (8-hour TWA/STEL)	Highest Historic Concentration within the Site	Routes of Exposure	Potential Toxic Effects
Pentachlorophenol	0.5 mg/m^3 / 1.5 mg/m^3 (skin)	1.2 mg/kg	Inhalation, skin absorption, ingestion, skin/eye contact	Irritation to eyes, nose, throat; sneezing, coughing, weakness; weight loss; sweating; headache; dizziness; nausea; chest pain; fever; dermatitis
Dioxins/furans	None established	Not analyzed	Inhalation, skin absorption, ingestion, skin/eye contact	Eye irritation, allergic dermatitis, chloracne; gastrointestinal distress; liver, kidney damage; breast and other cancers
Diesel-range and heavy oil-range hydrocarbons	None established	Not analyzed	Inhalation, skin/eye contact	Irritation to eyes, pulmonary function, central nervous system

Abbreviations:
DOSH Division of Occupational Safety and Health
mg/kg Milligrams per kilogram
mg/m^3 Milligrams per cubic meter
STEL Short-term exposure limit
TWA Time-weighted average

This information covers potential toxic effects that might occur if relatively significant acute and/or chronic exposure were to happen. This information does not mean that such effects will occur from the planned site activities. Potential routes of exposure include inhalation, dermal contact, ingestion, and eye contact. The primary exposure route of concern during site work is ingestion, although such exposure is considered unlikely and highly preventable. The types of planned work activities and use of monitoring procedures and protective measures will limit potential exposures at this Site. The use of appropriate PPE and decontamination practices will assist in controlling exposure through all pathways.

5.2 FIRE AND EXPLOSION HAZARDS

Flammable and combustible liquid hazards may occur from fuel used for the sampling vessel. When onsite storage is necessary, such material will be stored in containers approved by the Washington State Department of Transportation in a location not exposed to strike hazards and provided with secondary containment. A minimum 2A:20B fire extinguisher will be located within 25 feet of the storage location and where refueling occurs. Any subcontractors bringing flammable and combustible liquid hazards to the project site are responsible for providing appropriate material for containment and spill response, which should be addressed in their respective HASP. Transferring of flammable liquids (e.g., gasoline) will occur only after making positive metal-to-metal connection between the containers, which may be achieved by using a bonding strap. Storage of ignition and combustible materials will be kept away from fueling operations.

5.3 PHYSICAL HAZARDS

When working in or around any hazardous or potentially hazardous substances or situations, all site personnel should plan all activities before starting any task. Site personnel shall identify health and safety hazards involved with the work planned and consult with the HSO/SS as to how the task can be performed in the safest manner, and if personnel have any reasons for concern or uncertainty.

All field personnel will adhere to general safety rules including wearing appropriate PPE—hard hats, steel-toed boots, high-visibility vests, safety glasses, gloves, and hearing protection, as appropriate. Eating, drinking, and/or use of tobacco or cosmetics will be restricted in all work areas. Personnel will prevent splashing of liquids containing chemicals and minimize dust emissions.

The following table summarizes a variety of physical hazards that may be encountered during work activities. For convenience, these hazards have been categorized into several general groupings with recommended preventative measures.

Hazard	Cause	Prevention
Head strike	Falling and/or sharp objects, bumping hazards	Hard hats will be worn by all personnel at all times when overhead hazards exist.
Foot/ankle twist, crush, slip/trip/fall	Sharp objects, dropped objects, uneven and/or slippery surfaces	Steel-toed boots must be worn at all times on site while heavy equipment is present. Pay attention to footing on uneven or wet terrain and do not run. Keep work areas organized and free from unmarked trip hazards.

Hazard	Cause	Prevention
Hand cuts, splinters, and chemical contact	Hands or fingers pinched or crushed, chemical hazards; cut or splinters from handling sharp/rough objects and tools	Nitrile safety gloves will be worn to protect the hands from dust and chemicals. Leather or cotton outer gloves will be used when handling sharp-edged rough materials or equipment. Refer to preventive measures for mechanical hazards below.
Eye damage from flying materials, or splash hazards	Sharp objects, poor lighting, exposure due to flying debris or splashes	Safety glasses will be worn at all times on site. If a pressure washer is used to decontaminate heavy equipment, a face shield will be worn over safety glasses or goggles. Care will be taken during decontamination procedures to avoid splashing or dropping equipment into decontamination water.
Electrical hazards	Electrical cord hazards	Make sure that no damage to extension cords occurs. If an extension cord is used, make sure it is the proper size for the load that is being served and rated SJOW or STOW (an "-A" extension is acceptable for either) and inspected prior to use for defects. The plug connection on each end should be of good integrity. Insulation must be intact and extend to the plugs at either end of the cord. All portable power tools will be inspected for defects before use and must be either double-insulated or grounded with a ground-fault circuit interrupter (GFCI).
Mechanical hazards	Heavy equipment such as sediment grab sampler and boom	Ensure the use of competent operators, regular maintenance, daily mechanical checks, and proper guards. Subcontractors will supply their own HASP. All project personnel will make eye contact with operator and obtain a clear OK before approaching or working within swing radius of heavy equipment, staying clear of swing radius.
Water hazards	Carelessness during in-water work, entry into unsafe areas of sampling vessel	When collecting samples from a vessel, wear a personal flotation device (PFD) at all times in addition to the standard level D PPE and move carefully to avoid slips and falls. Do not enter prohibited areas of the vessel.

Hazard	Cause	Prevention
Noise damage to hearing	Machinery creating more than 85 decibels TWA, less than 115 decibels continuous noise, or peak at less than 140 decibels	Wear earplugs or protective ear covers when a conversational level of speech is difficult to hear at a distance of 3 feet; when in doubt, a sound level meter may be used on site to document noise exposure.
Strains from improper lifting	Injury due to improper lifting techniques, overreaching/ overextending, lifting overly heavy objects	Use proper lifting techniques and mechanical devices where appropriate. The proper lifting procedure first involves testing the weight of the load by tipping it. If in doubt, ask for help. Do not attempt to lift a heavy load alone. Take a good stance and plant your feet firmly with legs apart, one foot farther back than the other. Make sure you stand on a level area with no slick spots or loose gravel. Use as much of your hands as possible, not just your fingers. Keep your back straight, almost vertical. Bend at the hips, holding load close to your body. Keep the weight of your body over your feet for good balance. Use large leg muscles to lift. Push up with one foot positioned in the rear as you start to lift. Avoid quick, jerky movements and twisting motions. Turn the forward foot and point it in the direction of the eventual movement. Never try to lift more than you are accustomed to lifting.
Cold stress	Cold temperatures and related exposure	Workers will ensure appropriate clothing, stay dry, and take breaks in a heated environment when working in cold temperatures. Further detail on cold stress is provided in Section 5.3.1.
Heat exposure	High temperatures exacerbated by PPE, dehydration	Workers will ensure adequate hydration, shade, and breaks when temperatures are elevated. Further detail on heat stress is provided in Section 5.3.2.
Accidents due to inadequate lighting	Improper illumination	Work will proceed during daylight hours only, or under sufficient artificial light.

5.3.1 Cold Stress

Field work is expected to be completed in summer; however, additional phases of work are expected to be conducted in winter months, and if a fall into water occurs, exposure to cold temperatures may be possible. Exposure to moderate levels of cold can cause the body's internal temperature to drop to a dangerously low level, causing hypothermia. Symptoms of hypothermia include slow, slurred speech, mental confusion, forgetfulness, memory lapses, lack of coordination, and drowsiness.

To prevent hypothermia, site personnel will stay dry and avoid exposure. Site personnel will have access to a warm, dry area, such as a vehicle, to take breaks from the cold weather and warm up. Site personnel will be encouraged to wear sufficient clothing in layers such that outer clothing is wind- and waterproof and inner layers retain warmth (wool or polypropylene), if applicable. Site personnel will keep hands and feet well protected at all times. The signs and symptoms and treatment for hypothermia are summarized below.

Signs and Symptoms

- Mild hypothermia (body temperature of 98–90 degrees Fahrenheit [°F])
  - Shivering
  - Lack of coordination, stumbling, fumbling hands
  - Slurred speech
  - Memory loss
  - Pale, cold skin
- Moderate hypothermia (body temperature of 90–86 °F)
  - Shivering stops
  - Unable to walk or stand
  - Confused and irrational
- Severe hypothermia (body temperature of 86–78 °F)
  - Severe muscle stiffness
  - Very sleepy or unconscious
  - Ice cold skin
  - Death

Treatment of Hypothermia—Proper Treatment Depends on the Severity of the Hypothermia

- Mild hypothermia
  - Move to warm area.
  - Stay active.
  - Remove wet clothes, replace with dry clothes or blankets, and cover the head.

- Drink warm (not hot) sugary drinks.

- Moderate hypothermia
  - All of the above, plus:
    - Call 911 for an ambulance.
    - Cover all extremities completely.
    - Place very warm objects such as hot packs or water bottles on the victim's head, neck, chest, and groin.

- Severe hypothermia
  - Call 911 for an ambulance.
  - Treat the victim very gently.
  - Do not attempt to re-warm—the victim should receive treatment in a hospital.

Frostbite

Frostbite occurs when the skin actually freezes and loses water. In severe cases, amputation of the frostbitten area may be required. Although frostbite usually occurs when the temperatures are 30 °F or lower, wind chill factors can allow frostbite to occur in above-freezing temperatures. Frostbite typically affects the extremities, particularly the feet and hands. Frostbite symptoms include cold, tingling, stinging, or aching feeling in the frostbitten area followed by numbness and skin discoloration from red to purple, then white or very pale skin. Should any of these symptoms be observed, wrap the area in soft cloth, do not rub the affected area, and seek medical assistance. Call 911 if the condition is severe.

Protective Clothing

Wearing the right clothing is the most important way to avoid cold stress. The type of fabric also makes a difference. Cotton loses its insulation value when it becomes wet. Wool, on the other hand, retains its insulation even when wet. The following are recommendations for working in cold environments:

- Wear at least three layers of clothing.
  - An outer layer to break the wind and allow some ventilation (like Gortex or nylon)
  - A middle layer of down or wool to absorb sweat and provide insulation even when wet
  - An inner layer of cotton or synthetic weave to allow ventilation
- Wear a hat—up to 40 percent of body heat can be lost when the head is left exposed.
- Wear insulated boots or other footwear.
- Keep a change of dry clothing available in case work clothes become wet.
- Do not wear tight clothing—loose clothing allows better ventilation.

Work Practices

- Drinking—Drink plenty of liquids, avoiding caffeine and alcohol. It is easy to become dehydrated in cold weather.
- Work Schedule—If possible, heavy work should be scheduled during the warmer parts of the day. Take breaks out of the cold in heated vehicles.
- Buddy System—Work in pairs to keep an eye on each other and watch for signs of cold stress.

5.3.2 Heat Stress

To avoid heat-related illness, current regulations in WAC 296-62-095 through 296-62-09570 will be followed during all outdoor work activities. These regulations apply to any outdoor work environment from May 1 through September 30 when workers are exposed to temperatures greater than 89 °F when wearing breathable clothing, greater than 77 °F when wearing double-layered woven clothing (such as jackets or coveralls) or greater than 52 °F when wearing non-breathing clothing such as chemical resistant suits or Tyvek. Floyd|Snider will identify and evaluate temperature, humidity, and other environmental factors associated with heat-related illness including, but not limited to, the provision of rest breaks that are adjusted for environmental factors and encourage frequent consumption of drinking water. Drinking water will be provided and made readily accessible in sufficient quantity to provide at least 1 quart per employee per hour. All Floyd|Snider personnel will be informed and trained for responding to signs or symptoms of possible heat-related illness and accessing medical aid.

Employees showing signs or demonstrating symptoms of heat-related illness must be relieved from duty and provided with a sufficient means to reduce body temperature, including rest areas or temperature-controlled environments (i.e., air conditioned vehicle). Any employee showing signs or demonstrating symptoms of heat-related illness must be carefully evaluated to determine whether it is appropriate to return to work or whether medical attention is necessary.

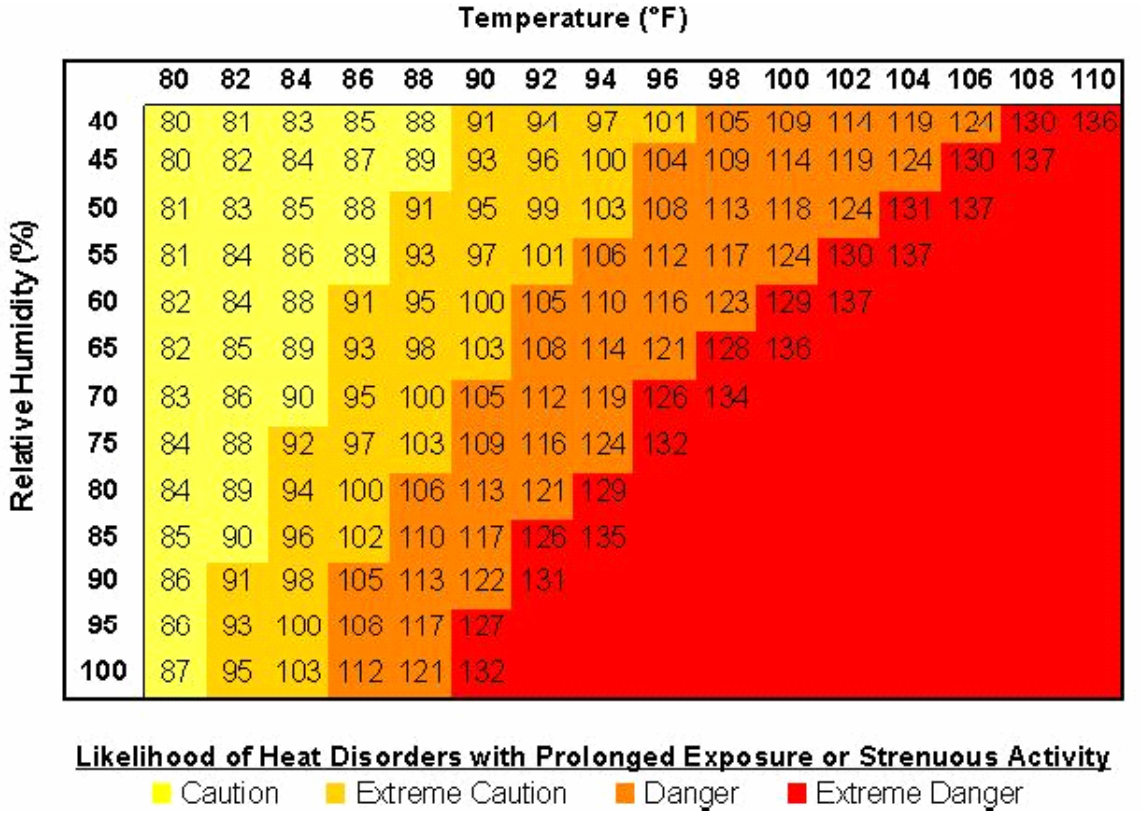
Any incidence of heat-related illness must be immediately reported to the employer directly through the HSO/SS.

The signs, symptoms, and treatment of heat stress include the following:

Condition	Signs/Symptoms	Treatment
Heat cramps	Painful muscle spasms and heavy sweating	Increase water intake, rest in shade/cool environment.
Heat syncope	Brief fainting and blurred vision	Increase water intake, rest in shade/cool environment.
Dehydration	Fatigue, reduced movement, headaches	Increase water intake, rest in shade/cool environment.

Condition	Signs/Symptoms	Treatment
Heat exhaustion	Pale and clammy skin, possible fainting, weakness, fatigue, nausea, dizziness, heaving sweating, blurred vision, body temperature slightly elevated	Lie down in cool environment, water intake, loosen clothing, and call 911 for ambulance transport if symptoms continue once in cool environment.
Heat stroke	Cessation of sweating, skin hot and dry, red face, high body temp, unconsciousness, collapse, convulsions, confusion or erratic behavior; life-threatening condition	**Medical Emergency!! Call 911** for ambulance transport. Move victim to shade and immerse in water.

If site temperatures are forecast to exceed 85 °F and physically demanding site work will occur in impermeable clothing, the HSO/SS will promptly consult with a certified industrial hygienist (CIH) and a radial pulse monitoring method will be implemented to ensure that heat stress is properly managed among the affected workers. The following heat index chart indicates the relative risk of heat stress.



5.3.3 Biohazards

Bees and other insects may be encountered during the field work tasks. Persons with allergies to bees will make the HSO/SS aware of their allergies and will avoid areas where bees are identified. Controls such as repellents, hoods, nettings, masks, or other personal protection may be used. Report any insect bites or stings to the HSO/SS and seek first aid, if necessary.

Site personnel will maintain a safe distance from any urban wildlife encountered, including stray dogs, raccoons, and rodents, to preclude a bite from a sick or injured animal.

6.0 Site Monitoring

The following sections describe site monitoring techniques and equipment that are to be used during site field activities. The HSO/SS, or a designated alternate, is responsible for site control and monitoring activities.

6.1 SITE MONITORING

Air monitoring will not be conducted, because there are no known or anticipated volatile compounds in site sediments. Visual monitoring for dust will be conducted by the HSO/SS to ensure that inhalation of particles does not occur; however, the field activities are not expected to generate dust. The HSO/SS will visually inspect the work site at least daily to identify any new potential hazards. If new potential hazards are identified, immediate measures will be taken to eliminate or reduce the risks associated with these hazards.

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7.0 Hazard Analysis by Task

This section identifies potential hazards associated with each task listed in Section 2.0 of this HASP. Tasks have been grouped according to the types of potential hazard associated with them.

Task	Potential Hazard
Sediment Sampling	Chemical hazards include potential dermal or eye exposure to sediments. Physical hazards include slip, trip, or fall hazards; heat and cold exposure hazards; water hazards; and biological hazards.

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8.0 Personal Protective Equipment

All work will proceed in Level D PPE, which shall include hard hat, steel-toed boots, hearing protection, eye protection, gloves, and sturdy outer work clothing. For all work involving potential exposure to sediment, workers will wear nitrile gloves and Level D PPE. PFDs will be worn at all times during in-water work.

All personnel will be properly fitted and trained in the use of PPE. The level of protection will be upgraded by the HSO/SS whenever warranted by conditions present in the work area. The HSO/SS will periodically inspect equipment such as gloves and hard hats for defects.

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9.0 Site Control and Communication

Access to the sediments will be via vessel, which will be launched from a publicly accessible dock. All sampling activities, however, will be conducted aboard the vessel and will not be accessible to the public.

Work area controls will be provided to limit the potential for chemical exposure associated with site activities. The support zone for the site includes all areas outside the work area and decontamination areas. Staff will decontaminate all equipment and gear as necessary aboard the vessel and care will be taken not to track excess sediment from the work area to other areas aboard the vessel or when disembarking. Decontamination will be conducted overboard the vessel.

All site work will occur on one vessel where staff will be able to hear spoken communications; however, the operator may have necessity to communicate with field staff from the cabin of the vessel. Communication from the cabin will be accomplished via loudspeaker, or the operator may use horn blasts to get the attention of sampling staff if needed.

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10.0 Decontamination and Waste Disposal

Decontamination procedures will be strictly followed to prevent offsite spread of contaminated sediment or water. The HSO/SS will assess the effectiveness of decontamination procedures by visual inspection.

Sampling equipment will first be rinsed with site water, then washed with a non-phosphate detergent and rinsed with distilled water. Waste sediment will be washed overboard at its sample station before moving to the next sampling location if there is no visible sign of contamination (i.e., oily sheen, droplets). If oil or sheen are observed, excess sediment will be collected in buckets aboard the sampling vessel and taken upland to a secure area of the Site for temporarily storage in watertight drum(s) pending the receipt of analytical results and offsite disposal coordination.

Hands must be thoroughly washed before leaving the Site to eat, drink, or use tobacco.

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11.0 Emergency Response and Contingency Plan

This section defines the emergency action plan for the Site. It will be rehearsed with all site personnel and reviewed whenever the plan is modified or the HSO/SS believes that site personnel are unclear about the appropriate emergency actions.

A muster point of refuge (that is clear of adjacent hazards and not located downwind of site investigation activities) will be identified by the HSO/SS and communicated to the field team each day. In an emergency, all site personnel and visitors will evacuate to the muster point for roll call. It is important that each person onsite understand their role in an emergency and that they remain calm and act efficiently to ensure everyone's safety.

After each emergency is resolved, the entire project team will meet and debrief on the incident—the purpose is not to fix blame, but to improve the planning and response to future emergencies. The debriefing will review the sequence of events, what was done well, and what can be improved. The debriefing will be documented in a written format and communicated to the PM. Modifications to the emergency plan will be approved by the PM.

Reasonably foreseeable emergency situations include medical emergencies; accidental release of hazardous materials (such as gasoline or diesel) or hazardous waste; and general emergencies such as vehicle accident, fire, thunderstorm, and earthquake. Expected actions for each potential incident are outlined below.

11.1 MEDICAL EMERGENCIES

In the event of a medical emergency, the following procedures should be used:

- Stop any imminent hazard if you can safely do so.
- Remove ill, injured, or exposed person(s) from immediate danger if moving them will clearly not cause them harm and no hazards exist to the rescuers.
- Evacuate other onsite personnel to a safe place in an upwind or cross-wind direction until it is safe for work to resume.
- If serious injury or a life-threatening condition exists, call 911 for paramedics, fire department, and police. Return immediately to shore to meet emergency personnel.
- Clearly describe the location, injury, and conditions to the dispatcher. Designate a person to go to the site entrance and direct emergency equipment to the injured person(s). Provide the responders with a copy of this HASP to alert them to chemical exposure hazards (listed in Section 5.1).
- Trained personnel may provide first aid/cardiopulmonary resuscitation if it is necessary and safe to do so. Remove contaminated clothing and PPE only if this can be done without endangering the injured person.

- Call the PM and HSO/SS.
- Immediately implement steps to prevent recurrence of the accident.

Refer to Figure B.1 in Section 3.2 for a map showing the nearest hospital location with phone number and address.

11.2 ACCIDENTAL RELEASE OF HAZARDOUS MATERIALS OR WASTES

1. Evacuate all onsite personnel to a safe place in an upwind direction until the HSO/SS determines that it is safe for work to resume.
2. Instruct a designated person to contact the PM and confirm a response.
3. Contain the spill, if it is possible and can be done safely.
4. If the release is not stopped, contact 911 to alert the fire department.
5. Contact the Washington State Emergency Response Commission at 1 (800) 258-5990 to report the release.
6. Initiate cleanup.
7. The PM will submit a written report to Ecology in the event of a reportable release of hazardous materials or wastes.

11.3 GENERAL EMERGENCIES

In the case of fire, explosion, earthquake, or imminent hazards, work shall be halted and all onsite personnel will be immediately evacuated to a safe place. The local police/fire department shall be notified if the emergency poses a continuing hazard by calling 911.

In the event of a thunderstorm, the vessel will return to shore if possible and outdoor work will be discontinued until the threat of lightning has abated. During the incipient phase of a fire, the available fire extinguisher(s) may be used by persons trained in putting out fires, if it is safe for them to do so. Contact the fire department as soon as feasible.

11.4 EMERGENCY COMMUNICATIONS

In the case of an emergency, a horn will be used as needed to signal the emergency. One long (5-second) blast will be given as the emergency/stop work signal. If the air horn is not working, waving of arms will be used to signal the emergency. In any emergency, all personnel will evacuate to the designated refuge area and await further instruction.

11.5 EMERGENCY EQUIPMENT

The following minimum emergency equipment will be readily available on site and functional at all times:

- First Aid Kit—contents approved by the HSO/SS, including two blood-borne pathogen barriers.
- Portable fire extinguisher (2A:20B minimum).
- A copy of the current HASP.

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12.0 Administrative

12.1 MEDICAL SURVEILLANCE

Floyd|Snider personnel involved with field activities must be covered under Floyd|Snider's medical surveillance program, which includes biennial physical examinations. These medical monitoring programs must be in compliance with all applicable worker health and safety regulations.

12.2 RECORDKEEPING

The HSO/SS, or a designated alternate, will be responsible for keeping attendance lists of personnel present at site health and safety meetings, accident reports, and signatures of all personnel who have read this HASP.

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13.0 Approvals

Project Manager	Date
Project Health & Safety Officer	Date

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14.0 Signature Page

I have read this Health and Safety Plan and understand its contents. I agree to abide by its provisions and will immediately notify the HSO/SS if site conditions or hazards not specifically designated herein are encountered.

Name (Print)	Signature	Date	Company/Affiliation

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Former Time Oil Company
Seattle Terminal

Surface Sediment Quality Evaluation Sampling and Analysis Plan/ Quality Assurance Project Plan

Appendix B
Health and Safety Plan

Attachment B.1
Daily Tailgate Safety Meeting Form

DAILY TAILGATE SAFETY MEETING AND DEBRIEF FORM

Instructions:
To be completed by supervisor prior to beginning of work each day, when changes in work procedures occur, or when additional hazards are present. Please maintain a copy of this form with the site-specific HASP for the record.

PROJECT NAME AND ADDRESS:	**WORK COMPLETED/TOOLS USED:**

TOPICS/HAZARDS DISCUSSED:

Chemicals of concern:
Slip, trip, fall:
Heat or cold stress:
Required PPE:
Other Potential Hazards:
• Environmental:
• Physical:
• Biological:
• Other :

INFORMAL TRAINING CONDUCTED (Name, topics):

NAMES OF EMPLOYEES:

ADDITIONAL HAZARDS IDENTIFIED AT END OF WORK DAY:

Near Misses/Incidents? If so proceed to Page 2 Near Miss and Incident Reporting Form

Supervisor's Signature/Date: _____

NEAR MISS AND INCIDENT REPORTING FORM

INCIDENTS:

INJURIES:

NEAR MISSES:

CORRECTIVE ACTIONS:

Supervisor's Signature/Date: _____