

**Sediment Investigation Work Plan
Geotechnical and Sediment Investigation
U.S. Government Moorings
Portland, Oregon**

October 11, 2013



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Submitted To:
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**SEDIMENT INVESTIGATION WORK PLAN
GEOTECHNICAL AND SEDIMENT INVESTIGATION
U.S. GOVERNMENT MOORINGS
PORTLAND, OREGON**

1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE) retained Shannon & Wilson, Inc. (Shannon & Wilson) to provide geotechnical and environmental services for the U.S. Government Moorings Geotechnical and Sediment Investigation in Portland, Oregon. Shannon & Wilson's services are based on the USACE performance work statement (PWS) titled, "Performance Work Statement, Geotechnical and Sediment Investigation, U.S. Government Moorings, Portland, Oregon," dated August 27, 2013 (Appendix A) and Shannon & Wilson's scope of services titled, "Revised Proposal for Geotechnical and Sediment Investigation, U.S. Government Moorings, Portland, Oregon-Task Order 0001" (Appendix B).

The field exploration effort will consist of drilling up to eight vibracores, and logging of cores for evaluation of substantial product. The proposed sediment core depths, locations, and other details are summarized in the table below. A map of the site with proposed sediment core locations is presented in Figure 1.

Sediment Core Number	Northing	Easting	Est. Depth of Sediment Core (ft below mud line)
	State Plane, NAD 1983 Oregon North 3601		
SD-101	706095.6764	7623019.5128	19
SD-102	706164.1659	7623088.8704	19
SD-103	706231.9611	7623013.0024	19
SD-104	706228.9446	7623163.6751	19
SD-105	706042.1390	7623079.3001	19
SD-106	706122.9553	7623153.8566	19
SD-107	706103.3369	7622960.8973	19
SD-108	706415.3369	7622901.4947	19

Notes:

CRD = Columbia River Datum

Est. = Estimated

ft = feet

NAD = North American Datum

This Investigation Work Plan was prepared in support of the requirements specified in the PWS and serves as a guide for the field explorations, including drilling, sampling, field testing, and the handling of investigation-derived waste (IDW).

The Accident Prevention Plan and Health and Safety Plan for Shannon & Wilson are presented in Appendices C and D, respectively. Material Safety Data Sheets are included in Appendix E. Comments received to our Draft Work Plan and our response are included in Appendix F.

2.0 SCHEDULE AND RESPONSIBILITIES

The USACE will provide access and environmental clearances for in-water work. The USACE will also provide an area to review cores, and a temporary storage area for staging of IDW, which may be considered hazardous.

Shannon & Wilson will provide all supplies, equipment, facilities and services required to perform work under this contract detailed in the PWS in Appendix A.

In-water work is required to be completed by October 31, 2013, the close of the fish window. Based on the PWS, we estimate vibracore activities will include two in-water days (and three core logging days). To complete the exploration program by October 31, 2013, and working with subcontractor schedules, we anticipate beginning water work on October 29, 2013. Core logging activities are scheduled for November 4 through 6, 2013.

3.0 OVERWATER ACTIVITIES

This section discusses the methods used to collect sediment cores from the waterway.

3.1 Sediment Coring

Two Shannon & Wilson field representatives will be on site during sediment coring activities. The field representatives will document activities in daily field activity reports and assist with transfer of cores from the sampling vessel to the dock/temporary onshore storage facility. Prior to sampling, Shannon & Wilson will call the utility locate service to mark utilities.

Sampling will be performed by Marine Sampling Systems, Inc. (Burley Washington) using their owned and proprietary vibracore. The vibracore will use a 4-inch-outer-diameter, 3.75-inch-inner-diameter, pre-cleaned aluminum tube that will be driven into the sediment using a combination of vibration and the weight of the tube. Up to three attempts will be made to attain a 65 percent recovery. If 65 percent recovery is not obtained, the tube with the greatest recovery

will be assumed to be sufficient for the location. Cores will be cut into approximately 4-foot segments and the ends sealed with foil/caps or wax for transport/handling. Each section will be labeled with the exploration location ID and sampling interval. Cores will be stored upright until cut open for logging activities. Cores and IDW will be moved onshore at the dock by Shannon & Wilson and Marine Sampling Systems, Inc. If use of the onsite crane is required to transfer materials onshore, we will wait until the end of overwater activities.

Since the primary purpose of sampling will be for visual evaluation (and not in situ characterization), cores will not be maintained on ice. However, cores will be temporarily stored onsite until logging activities.

Shannon & Wilson will provide approximately 35 gallon-sized garbage cans for temporary upright storage of cores collected during overwater activities. The cans will be placed inside the onsite core logging area identified by the USACE, or placed with IDW (discussed in Section 7.0). They will be approximately 22 inches in diameter and 30 inches tall.

3.2 Positioning

A differential global positioning system (DGPS) will be used to navigate to, occupy, and document in-water stations aboard the sampling vessel. A Trimble 4000 RS DGPS utilizing the U.S. Coast Guard differential signal from Astoria, Oregon, will be interfaced to a computer running software enabling real-time plan view navigation to the specified sampling locations. Prior to the start of field collections during each day of survey operations, a known horizontal control point will be occupied to ensure the accuracy of the positioning and navigation systems. For each station, the corresponding water depths will also be recorded.

3.3 Sampling Vessel and Equipment

The sampling vessel, “M/V Nancy Anne,” is owned by Marine Sampling Systems, Inc. The “Nancy Anne” was purpose-built in 1994 to deploy sediment sampling equipment. The vessel is a welded aluminum sampling catamaran with a large forward working deck; it is not configured to carry passengers or cargo. The vessel has a length of 36 feet and a beam of 14 feet. The marine corer has a guide/base assembly which sits on the river bottom, maintaining the core tube and driving assembly vertical to the surface. The vibrator is driven hydraulically, not electronically. The down force generating head weight is isolated from the core tube / vibrator assembly at the vibrator operating frequency. Penetration is monitored ultrasonically and displayed in the coring boat.

4.0 ONSHORE ACTIVITIES

4.1 Coordination

Based on data from previous investigations, there is a potential for “substantial product” to be present in sediments in the vicinity of the dock. (The definition of “substantial product” is provided in the following section.) Therefore, to evaluate this potential, sediment cores will be viewed by several interested parties (which may include, but not be limited to, EPA, USACE-Seattle, USACE-Portland, and/or NW Naturals representatives). Following completion of overwater activities, logging activities will be completed. We assume USACE will notify and coordinate observation activities with the appropriate interested parties for scheduled field activities (October 29 and 30; November 4 through 6).

4.2 Substantial Product

The working definition of “substantial product” per the Gasco Statement of Work (EPA, 2009) is:

- Criterion 1: Bands of product, layers of product, “saturated” sediments, “stained” sediments, and/or seams of product that are greater than 2 inches thick.
- Criterion 2: Any layer or seam of product, regardless of thickness, that is clearly defined as liquid DNAPL that is also mobile (i.e., “oozes” or “drips” out of the core during core observations).

Modifying factors are:

- If the top 5 feet of a core has no substantial product under Criterion 1, then deeper product should be judged as “not substantial,” even if relatively thick layers of product exist at greater depths.
- If there are any seams of mobile liquid DNAPL (not solid or semisolid tar) per Criterion 2, then this is substantial product regardless of depth and the characteristics of overlying sediments.

The following is not defined as “substantial product”:

- Any layers of non-mobile product (i.e., bands, layers, saturated sediments, stained sediments) that are less than 2 inches thick.
- Petroleum odors that are not associated with visual evidence of product beyond sheens and blebs.

- Sheens that are not associated with more substantial visuals of product.
- Isolated product blebs or spots not associated more substantial visuals of product.

An additional criterion (Criterion 3) will consider whether the 5 feet of overlying relatively clean material includes any sediment that would be expected to be removed as part of USACE maintenance dredging in the navigation channel. If so, the 5-foot depth requirement should be judged from the depth to which maintenance dredging would occur.

4.3 Core Logging

4.3.1 Core Extraction

Core extraction will consist of longitudinally cutting and splitting open the 4-foot cores collected during overwater activities. Shannon & Wilson will log the sediment according to USCS visual classification (ASTM D2488). Field notes will include soil classification and whether “substantial product” is observed.

4.3.2 Photograph Documentation

Shannon & Wilson will collect high quality, color photographs during core logging activities. Requirements for the photographs and accompanying information is outlined in the PWS (Appendix A)

4.3.3 Air Monitoring

Air monitoring (including breathing area) and implementation of engineering controls, if warranted, will be completed by EHS International, under subcontract to Shannon & Wilson per the HASP (Section 11.0, Appendix D).

5.0 ENVIRONMENTAL PROTECTION PLAN

5.1 Background

U.S. Government Moorings site is located within the Gasco Sediments Site Area of Interest (currently NW Natural property), part of the Portland Harbor Superfund site. Sediments in the offshore area have been documented to contain varying amounts of product (e.g., solid “tar” and/or non-aqueous phase liquid) and various chemical constituents including diesel, oil, polycyclic aromatic hydrocarbons, volatile organic compounds (VOCs), including benzene, polychlorinated biphenyls (PCBs), pesticides, dioxins, cyanide, and various metals (KTA/TEC, Inc., 2010).

5.2 Overwater Activities

During sampling, disposable sampling equipment will be used to reduce decontamination. Pre-cleaned aluminum tubes will be used for sediment collection. Adsorbent materials will be on site in the event of spills on the vessel deck and address water/fluids that will be released during core tube cutting (to 4-foot lengths).

If needed, generated decontamination fluids will be collected and containerized for temporary storage onsite and disposed of as discussed in Section 7.0. The quantity of decontamination liquids will likely be less than 55 gallons.

5.3 Onshore Activities

The USACE will provide a temporary area to store and review sediment cores. There is a potential that vapors from potential contaminants of concern will become released during core logging activities. Air monitoring and engineering controls, if required, will be completed during these onshore activities. Specifics are discussed in the HASP (Appendix D). We understand no air permit requirements apply.

6.0 REPORTING

Environmental data will be provided in a Sediment Investigation Report. It will include:

- Summary of completed activities and field observations
- Final boring logs
- Analytical data and non-hazardous waste disposal documentation
- Sediment core photographs

No data validation will be completed. No geotechnical testing is being provided on sediment core samples; final boring log classification will be based on visual observation only.

7.0 INVESTIGATION-DERIVED WASTE (IDW)

7.1 Generation and Containers

IDW will be generated during overwater sampling and onshore core logging activities. IDW will be collected in U.S. Department of Transportation (DOT)-approved drums and appropriately labeled (initially as non-regulated waste). Drums containing IDW will be labeled with indelible ink, grease pencil, or similar permanent marker, with the date, site location, boring number, depth or depth interval, weight, and contents (“soil cuttings,” “decontamination water,” etc.).

IDW generated during coring will consist of water (released during core cutting on the sampling vessel and decontamination fluids) and PPE. Sediment investigation IDW will be placed in drums separate from those generated during the geotechnical investigation and will be stored on the boat until coring is completed, or if full, moved at the end of the first day. Upon completion of the field sampling program, drums will be transported from the sampling vessel to the temporary storage area on the U.S. Government Moorings property. Transport of the drums from the sampling vessel to the temporary storage area will be completed by Shannon & Wilson. IDW generated during logging will consist of vibracore sleeves, sediment, PPE, and disposable sampling equipment.

An estimated eight drums of potentially hazardous material will be generated. An estimated three drums of non-hazardous material will be generated.

7.2 Temporary Storage

Drums containing potentially hazardous material (sediment) will be stored in the U.S. Government Moorings Hazardous Storage Area. Drums containing non-hazardous material will be temporarily stored on site in the paved parking lot of the U.S. Government Moorings property. We assume the temporary storage area will be accessible by a flatbed truck, and sized to accommodate all IDW generated during field activities. Drums will remain on site until completion of core logging, characterization, and disposal facility acceptance. No secondary containment (i.e., plastic sheeting to contain potential drum leaks) of the storage area is planned.

7.3 Environmental Sampling and Handling

Sampling is intended for waste disposal purposes only. Therefore, no sampling will be completed during overwater activities. Shannon & Wilson will collect waste characterization samples concurrent with onshore core logging. Specifically, two composite samples will be collected from discarded sediment cores following review and will be representative of the material to be disposed.

All environmental samples will be collected using disposable sampling equipment. New latex or nitrile gloves will be worn by the sample handler during collection of each sample. Samples will be placed into laboratory-provided glassware. Samples will be collected and containerized sequentially with the most volatile target analyte collected first: (a) volatile organics and petroleum, (b) semivolatile organics, and (c) metals. The sample container labels will be completed using indelible ink. The samples will be sealed in plastic bags, and then placed into a cooler and maintained at 4°C (\pm 2°C) with ice or “blue ice.”

Sample information will be recorded on chain-of-custody forms which will accompany the samples until delivery to the analytical laboratory (OnSite Environmental Inc. of Redmond, Washington).

7.4 Analytical Methods

Selected analytical methods include:

- Northwest Total Petroleum Hydrocarbon-Diesel Extended
- Semivolatile organic compounds
- Volatile organic compounds
- Metals (Resource Conservation and Recovery Act 8)
- Organochlorine pesticides
- PCBs
- Chlorinated phenols
- Cyanide
- Toxicity Characteristic Leaching Procedure (if warranted, based on initial testing)

No quality assurance/quality control sampling will be completed e.g., duplicate, rinsate, blank samples). No laboratory reporting limits have been established for this task order and no data validation will be completed.

7.5 Labeling and Offsite Disposal

IDW generated by this work will consist of boring cuttings, decontamination water, and disposable sampling equipment. Material to be containerized will be placed in clean 55-gallon drums, which will be sealed and appropriately labeled. The drums will be sealed and stored on site for management pending receipt of analytical results. Since sediment will be collected from areas most likely to have substantial product, drums containing these IDW will be assumed to be hazardous and offsite disposal will be the responsibility of the USACE. If testing indicates sediment is non-hazardous, Shannon & Wilson will coordinate and manage its offsite disposal at a permitted facility. Shannon & Wilson will also dispose of miscellaneous sampling materials and PPE.

8.0 DECONTAMINATION PLAN

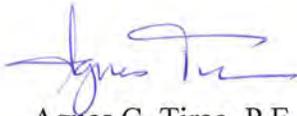
Decontamination of vibracore equipment, if required, will occur on the sampling vessel within a containment area can collect all fluids. All water will be collected and contained in drums. We assume that no permit and no hexane will be required for decontamination activities.

9.0 QUALITY CONTROL (QC) PROCEDURES

In order for the QA/QC requirements to be effective and to be implemented in a consistent manner, site personnel will be knowledgeable of the project-specific requirements and QA/QC policies and procedures.

Subcontractor instruments will be calibrated and maintained in accordance with their QA/QC and Standard Operating Procedures (SOPs). Laboratory internal quality control checks, performance evaluation monitoring, standards, preventative maintenance, and corrective actions will be implemented in accordance with the QA/QC Plan and SOPs.

SHANNON & WILSON, INC.



Agnes C. Tirao, P.E.
Project Manager

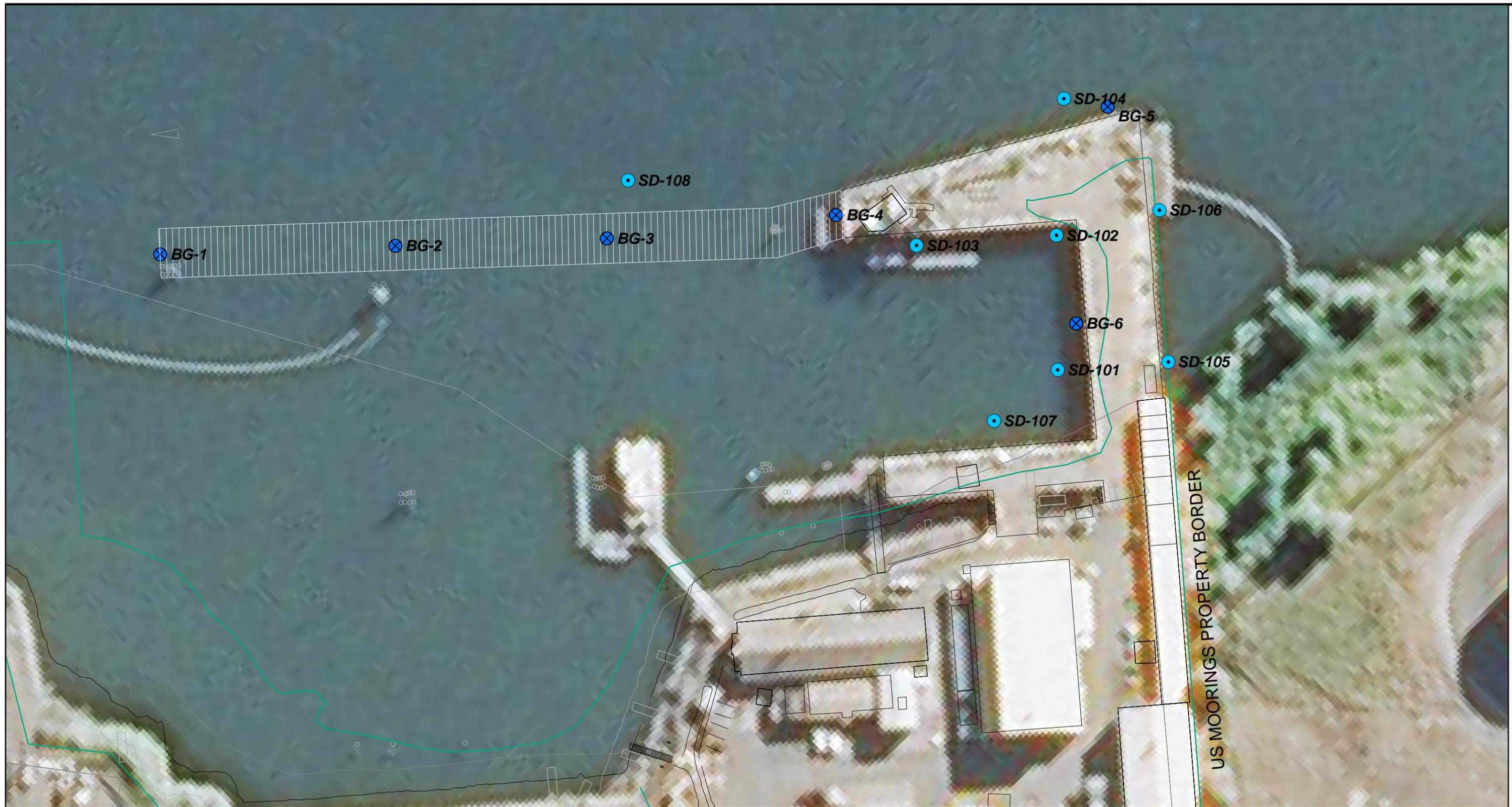
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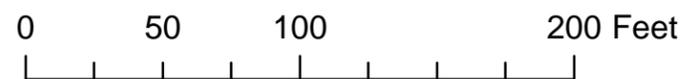
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U.S. Environmental Protection Agency (EPA), 2009, Administrative Settlement Agreement and Order on Consent for Removal Action between NW Natural/Siltronic Corporation and U.S. EPA, CERCLA Docket No. 10-2009-0255, Appendix A, Statement of Work.



Legend

-  Proposed Geotech Borehole Location
-  Proposed Sediment Core Location
-  Proposed New Dock Location



Date: 9/17/2013

**Proposed
Geotechnical Boring and
Sediment Core Locations**
U.S. Government Moorings

Figure 1

APPENDIX A

**PERFORMANCE WORK STATEMENT
GEOTECHNICAL AND SEDIMENT INVESTIGATION
U.S. GOVERNMENT MOORINGS
PORTLAND, OREGON**

PERFORMANCE WORK STATEMENT (PWS)

**GEOTECHNICAL AND
SEDIMENT INVESTIGATION**

**U.S. GOVERNMENT MOORINGS
PORTLAND, OREGON**

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PERFORMANCE WORK STATEMENT (PWS)

GEOTECHNICAL AND SEDIMENT INVESTIGATION

U.S. GOVERNMENT MOORINGS PORTLAND, OREGON

Part 1

General Information

1. **GENERAL:** This is a non-personnel services contract to provide a geotechnical and sediment investigation. The Government shall not exercise any supervision or control over the contract service providers performing the services herein. Such contract service providers shall be accountable solely to the Contractor who, in turn is responsible to the Government.

1.1 **Description of Services/Introduction:** The contractor shall provide all personnel, equipment, supplies, facilities, transportation, tools, materials, supervision, and other items and non-personal services necessary to perform the geotechnical and sediment investigation as defined in this Performance Work Statement except for those items specified as government furnished property and services. The contractor shall perform to the standards in this contract.

1.2 **Background:** The U.S. Government Moorings (Moorings) site address is 8010 Northwest St. Helens, Road, Portland, Oregon. The Moorings is located on the west bank of the Willamette River at approximately river mile 6.08 through 6.21, within the industrial harbor of Portland, Oregon. It is owned and operated by the United States Army Corps of Engineers (USACE) Portland District. Use of the site began in 1903 and currently provides port, supply, and repair facilities for the USACE Portland District fleet of dredges, hydrosurvey vessels, and other support vessels.

The Moorings consists of 13.14 acres; the upland portion is approximately 10 acres and submerged land is partially covered by 26,700 square feet of dock. The site is bounded on the northeast by the Willamette River, on the northwest by Advanced American Construction, on the southwest by Burlington Northern Santa Fe Railway and St. Helens Road, and on the southeast by the NW Natural property (formerly Gasco). The Gasco facility was a producer of manufactured gas products ([MGP](#)).

The Moorings is located within a reach of the Willamette River identified by the United States Environmental Protection Agency (EPA) as the Portland Harbor Superfund site under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The dock footprint and other aquatic portions of the site are affected by contamination from historical releases of tarry material from the former Gasco operation located immediately upstream. The remedial action has been selected for the former Gasco site and gives preference for removal of in-river materials containing “substantial product” (as defined in the Statement of Work for the Gasco Sediment Site) such as non-aqueous phase liquid and tar.

The USACE is in the process of designing the removal of the overwater dock structure to help facilitate future sediment remediation within the dock footprint by others. Data collected as part of the geotechnical investigation will be used to support design of a new replacement dock. Data collected as part of the in-water sediment investigation will be used in the determination of substantial product and future sediment remediation areas.

Previous reports relating to the subsurface conditions beneath the dock include a 1990 Preliminary Geotechnical Evaluation and 2010 U.S. Moorings Remedial Investigation (RI). A bathymetric survey of the area was completed in 2010.

1.3 Objectives:

- Execute a geotechnical investigation consisting of six borings along the proposed alignment of the new dock.
- (Optional Item) Execute an in-water sediment investigation at locations to be determined by the government.

1.4 Scope: *Services include* work plan preparation, subcontracting a drilling company, oversight of drilling, collection of samples for geotechnical analysis, perform or subcontract geotechnical analyses, and Geotechnical Data Report preparation. All geotechnical exploration drilling work is expected to be completed from a barge. Optional services may include an in-water sediment investigation consisting of workplan preparation, subcontracting a vessel and crew, oversight of sediment coring, logging of sediment cores, and documentation of sediment coring activities.

1.5 Period of Performance: The period of performance shall be for 4 months from award of the contract. All drilling or sediment core collection shall be completed during the in-water work period for the Willamette River between July 1 and October 31. Optional items may be awarded up until 6 weeks before the end of the in-water work period for the Willamette River.

1.6 General Information

1.6.1 Quality Control: The contractor shall develop and maintain an effective quality control program to ensure services are performed in accordance with this Performance Work Statement (PWS). The contractor shall develop and implement procedures to identify, prevent, and ensure non-recurrence of defective services. The contractor's quality control program is the means by which he assures himself that his work complies with the requirement of the contract. After acceptance of the quality control plan the contractor shall receive the contracting officer's acceptance in writing of any proposed change to his Quality Control (QC) system.

1.6.2 Quality Assurance: The government shall evaluate the contractor's performance under this contract in accordance with the Quality Assurance Surveillance Plan. This plan is primarily focused on what the Government must do to ensure that the contractor has performed in accordance with the performance standards. It defines how the performance standards will be applied, the frequency of surveillance, and the minimum acceptable defect rate(s).

1.6.3 Recognized Holidays: The Contractor is not required to perform services on the following holidays.

New Year's Day	Labor Day
Martin Luther King Jr.'s Birthday	Columbus Day
President's Day	Veteran's Day
Memorial Day	Thanksgiving Day
Independence Day	Christmas Day

1.6.4 Hours of Operation: The contractor is responsible for conducting business on the Moorings property, between the hours of 6:30 am to 4:00 pm, Monday thru Friday except Federal holidays or when the Government facility is closed due to local or national emergencies, administrative closings, or similar Government directed facility closings. For other than firm fixed price contracts, the contractor will not be reimbursed when the government facility is closed for the above reasons. The Contractor must at all times maintain an adequate workforce for the uninterrupted performance of all tasks defined within this PWS when the Government facility is not closed for the above reasons.

1.6.5 Place of Performance: The work to be performed under this contract will be performed in-water from a barge or boat, at the Moorings property, and the Contractor's geotechnical laboratory.

1.6.6 Type of Contract: The government will award a firm-fixed price contract.

1.6.7 Security Requirements: The contractor shall be required to provide identification upon entry to the Moorings property and coordinate with Moorings personnel to gain access to the site. The contractor shall be required to sign in daily prior to entering the site security area.

1.6.7.1 Physical Security: The contractor shall be responsible for safeguarding all government equipment, information and property provided for contractor use. At the close of each work period, government facilities, equipment, and materials shall be secured.

1.6.7.2 Key Control: Not-Applicable

1.6.7.3 Lock Combinations: Not-Applicable

1.6.8 Special Qualifications: The Contractor is responsible for ensuring that all employees and subcontractors possess current Hazardous Waste Operations and Emergency Response (HAZWOPER) training under Code of Federal Regulations (CFR) 1910.120 since work may encounter hazardous substances associated with the Superfund site.

1.6.9 Post Award Conference/Periodic Progress Meetings: The Contractor agrees to attend any post award conference convened by the contracting activity or contract administration office in accordance with Federal Acquisition Regulation Subpart 42.5. The contracting officer, Contracting Officers Representative (COR), and other Government personnel, as appropriate, may meet periodically with the contractor to review the contractor's performance. At these meetings the contracting officer will apprise the contractor of how the government views the contractor's performance and the contractor will apprise the Government of problems, if any, being experienced. Appropriate action shall be taken to resolve outstanding issues. These meetings shall be at no additional cost to the government.

1.6.10 Contracting Officer Representative (COR): The (COR) will be identified by separate letter. The COR monitors all technical aspects of the contract and assists in contract administration. The COR is authorized to perform the following functions: assure that the Contractor performs the technical requirements of the contract: perform inspections necessary in connection with contract performance: maintain written and oral communications with the Contractor concerning technical aspects of the contract: issue written interpretations of technical requirements, including Government drawings, designs, specifications: monitor Contractor's performance and notifies both the Contracting Officer and Contractor of any deficiencies: coordinate availability of government furnished property, and provide site entry of Contractor personnel. A letter of designation issued to the COR, a copy of which is sent to the Contractor, states the responsibilities and limitations of the COR, especially with regard to changes in cost or price, estimates or changes in delivery dates. The COR is not authorized to change any of the terms and conditions of the resulting order.

1.6.11 Key Personnel: The follow personnel are considered key personnel by the government: Contract Manager, Project Manager (PM), Geotechnical Engineer, Geologist, and Lead Driller. The contractor shall provide a contract manager who shall be responsible for the performance of the work. The name of this person and an alternate who shall act for the contractor when the PM is absent shall be designated in writing to the contracting officer. The PM or alternate shall have full authority to act for the contractor on all contract matters relating to daily operation of this contract. The PM or alternate shall be available between 8:00 a.m. to 4:30 p.m., Monday thru Friday except Federal holidays or when the government facility is closed for administrative reasons. Qualifications for all key personnel are listed below:

- Project Manger shall meet the requirements within the base contract; additionally, the PM shall have at least five years experience as a PM, with at least three years in the field of geotechnical engineering.
- Geotechnical Engineer shall be registered in the State of Oregon and have five years of experience in design of deep foundations.
- Geologist shall be registered in the State of Oregon and have five years of experience in soil logging, core logging, and selection of samples for geotechnical analysis.
- Lead Driller shall have all licenses required to drill subsurface borings in Oregon State and have five years of experience with the type of drill rig selected.

1.6.12 Identification of Contractor Employees: All contract personnel attending meetings, answering Government telephones, and working in other situations where their contractor status is not obvious to third parties are required

to identify themselves as such to avoid creating an impression in the minds of members of the public that they are Government officials. They must also ensure that all documents or reports produced by contractors are suitably marked as contractor products or that contractor participation is appropriately disclosed.

1.6.13 Contractor Travel: Contractor will be required to travel CONUS and within the NCR during the performance of this contract to complete the geotechnical investigation. Contractor will be authorized travel expenses consistent with the substantive provisions of the Joint Travel Regulation (JTR) and the limitation of funds specified in this contract. All travel requires Government approval/authorization and notification to the COR.

1.6.14 Other Direct Costs: Not-Applicable

1.6.15 Data Rights: The Government has unlimited rights to all documents/material produced under this contract. All documents and materials, to include the source codes of any software, produced under this contract shall be Government owned and are the property of the Government with all rights and privileges of ownership/copyright belonging exclusively to the Government. These documents and materials may not be used or sold by the contractor without written permission from the Contracting Officer. All materials supplied to the Government shall be the sole property of the Government and may not be used for any other purpose. This right does not abrogate any other Government rights.

1.6.16 Organizational Conflict of Interest: Not-Applicable

1.6.17 PHASE IN /PHASE OUT PERIOD: Not-Applicable

PART 2 DEFINITIONS & ACRONYMS

2. **DEFINITIONS AND ACRONYMS:**

2.1. DEFINITIONS:

2.1.1. **CONTRACTOR.** A supplier or vendor awarded a contract to provide specific supplies or service to the government. The term used in this contract refers to the prime.

2.1.2. **CONTRACTING OFFICER.** A person with authority to enter into, administer, and or terminate contracts, and make related determinations and findings on behalf of the government. Note: The only individual who can legally bind the government.

2.1.3. **CONTRACTING OFFICER'S REPRESENTATIVE (COR).** An employee of the U.S. Government appointed by the contracting officer to administer the contract. Such appointment shall be in writing and shall state the scope of authority and limitations. This individual has authority to provide technical direction to the Contractor as long as that direction is within the scope of the contract, does not constitute a change, and has no funding implications. This individual does NOT have authority to change the terms and conditions of the contract.

2.1.4. **DEFECTIVE SERVICE.** A service output that does not meet the standard of performance associated with the Performance Work Statement.

2.1.5. **DELIVERABLE.** Anything that can be physically delivered, but may include non-manufactured things such as meeting minutes or reports.

2.1.6. **KEY PERSONNEL.** Contractor personnel that are evaluated in a source selection process and that may be required to be used in the performance of a contract by the Key Personnel listed in the PWS. When key personnel are used as an evaluation factor in best value procurement, an offer can be rejected if it does not have a firm commitment from the persons that are listed in the proposal.

2.1.7. PHYSICAL SECURITY. Actions that prevent the loss or damage of Government property.

2.1.8. QUALITY ASSURANCE. The government procedures to verify that services being performed by the Contractor are performed according to acceptable standards.

2.1.9. QUALITY ASSURANCE SURVEILLANCE PLAN (QASP). An organized written document specifying the surveillance methodology to be used for surveillance of contractor performance.

2.1.10. QUALITY CONTROL. All necessary measures taken by the Contractor to assure that the quality of an end product or service shall meet contract requirements.

2.1.11. SUBCONTRACTOR. One that enters into a contract with a prime contractor. The Government does not have privity of contract with the subcontractor.

2.1.12. WORK DAY. The number of hours per day the Contractor provides services in accordance with the contract.

2.1.12. WORK WEEK. Monday through Friday, unless specified otherwise.

2.2. ACRONYMS:

ACOR	Alternate Contracting Officer's Representative
AFARS	Army Federal Acquisition Regulation Supplement
AHA	Activity Hazard Analysis
APP	Accident Prevention Plan
AR	Army Regulation
ASTM	American Society for Testing and Materials
CCE	Contracting Center of Excellence
CFR	Code of Federal Regulations
CONUS	Continental United States (excludes Alaska and Hawaii)
COR	Contracting Officer Representative
COTR	Contracting Officer's Technical Representative
COTS	Commercial-Off-the-Shelf
CRD	Columbia River Datum
DA	Department of the Army
DD250	Department of Defense Form 250 (Receiving Report)
DD254	Department of Defense Contract Security Requirement List
DFARS	Defense Federal Acquisition Regulation Supplement
DMDC	Defense Manpower Data Center
DOD	Department of Defense
EPA	Environmental Protection Agency
FAR	Federal Acquisition Regulation
HAZWOPER	Hazardous Waste Operations and Emergency Response
HIPAA	Health Insurance Portability and Accountability Act of 1996
IDW	Investigation derived waste
KO	Contracting Officer
<u>MGP</u>	<u>Manufactured Gas Plant</u>
Moorings	U.S. Government Moorings
OAR	Oregon Administration Rules
OCI	Organizational Conflict of Interest
OCONUS	Outside Continental United States (includes Alaska and Hawaii)
ODC	Other Direct Costs
PIPO	Phase In/Phase Out
POC	Point of Contact
PRS	Performance Requirements Summary
PWS	Performance Work Statement

QA	Quality Assurance
QAP	Quality Assurance Program
QASP	Quality Assurance Surveillance Plan
QC	Quality Control
QCP	Quality Control Program
RI	Remedial Investigation
SPT	Standard penetration tests
SSHPP	Site Specific Health and Safety Plan
TE	Technical Exhibit
USACE	United States Army Corps of Engineers
UCS	Unconfined compressive strength
USCS	Unified Soil Classification System

PART 3
GOVERNMENT FURNISHED PROPERTY, EQUIPMENT, AND SERVICES

3. GOVERNMENT FURNISHED ITEMS AND SERVICES:

3.1. Services: The Government will provide: Environmental Clearances for performing in-water work. The work shall be completed within the designated in-water work period (i.e. fish window) for the Willamette River between July 1 and October 31. The Government will also provide historical reports regarding previous geotechnical work and sediment contamination referenced in PWS Section 1.2.

3.2 Facilities: The Government will provide an appropriate [temporary](#) storage area for staging of investigation derived waste (IDW), which may be considered hazardous. [The Contractor is responsible for IDW disposal and meeting landfill requirements.](#) All IDW shall be stored in DOT approved drums and appropriately labeled. The Government will provide a location out of the weather for opening and logging sediment cores.

3.3 Utilities: The Government will provide utilities available at the location selected for logging of sediment cores. The Contractor shall instruct employees in utilities conservation practices. The contractor shall be responsible for operating under conditions that preclude the waste of utilities, which include turning off the water faucets or valves after using the required amount to accomplish cleaning vehicles and equipment.

3.4 Equipment: Not-Applicable

3.5 Materials: Not-Applicable

PART 4
CONTRACTOR FURNISHED ITEMS AND SERVICES

4. CONTRACTOR FURNISHED ITEMS AND RESPONSIBILITIES:

4.1 General: The Contractor shall furnish all supplies, equipment, facilities and services required to perform work under this contract that are not listed under Section 3 of this PWS.

4.2 Secret Facility Clearance: Not-Applicable

4.3. Materials: The Contractor shall furnish all materials, supplies, and equipment necessary for the geotechnical and sediment investigation.

4.4. Equipment: The Contractor shall provide all equipment and tools necessary for the geotechnical and sediment investigation.

PART 5 SPECIFIC TASKS

5. Specific Tasks:

5.1. Work Components – Base Bid Items:

5.1.1 Base Item 1. Geotechnical Investigation Work Plan

The Contractor shall prepare a Geotechnical Exploration Work Plan to include:

- Description of the selected drilling methods and sampling procedures
- General description of Quality Control (QC) procedures for each of the field tasks
- Environmental Protection Plan including a plan for controlling drill cuttings containing contaminated sediments
- Investigation Derived Waste (IDW) Plan describing off-site disposal for drill cuttings
- Decontamination procedures
- Site Specific Health and Safety Plan (SSHP) and project specific Accident Prevention Plan (APP), which includes an Activity Hazard Analysis (AHA), that complies with EM-385-1-1 and OSHA Regulations in 29 CFR 1910.
- Schedule for completing the work

5.1.2 Base Item 2. Drilling and Sampling

All work and materials for the drilling and sampling shall conform to the requirements of OAR 690-240. As described in Section 3.1, the Government will provide Environmental Clearances for the in-water work. The Contractor shall be responsible for all other requirements necessary for prosecution of the work including filing drill/decommission boring reports. The Contractor shall also obtain underground utility clearances before drilling takes place. The Contractor is responsible for collecting and analyzing samples for determining IDW disposal in accordance with all applicable regulations.

The Contractor shall acquire the services of a drilling contractor to complete six boreholes along the proposed replacement dock location (Table 1, Figure 1). The Contractor shall locate all borehole locations using a hand-held GPS unit. All boreholes shall be within 10 feet of the specified location. The vertical position shall be recorded in accordance with the Columbia River Datum (CRD). Drill depths shall be referenced from the mud line. The elevation of mud line shall be determined by measuring the water depth to within 6-inches and correcting for CRD using the elevation at the Moorings staff gauge located northwest of the small boat dock.

Drilling and sampling of the boreholes shall at a minimum meet the following specifications:

In-Water Work

All drilling and sampling shall be completed using methods appropriate for in-water work and shall be completed so that there is no potential for drag down of contaminants into cleaner, deeper portions of the boring. The existing dock may be used to tie off, if appropriate. The Contractor shall coordinate with the Moorings Facility Manager for dock access. Drill advancement depths shall be accurately tracked and account for tidal fluctuations in the Willamette River. Average river stages for the area range from 8 feet

CRD in August and September to 12.5 feet CRD in May and June. The 2010 bathymetric map for the Moorings indicates the mud line elevation near the proposed borehole locations up to -30 feet CRD.

Overburden Drilling

Drilling through overburden shall be by a drilling method appropriate for site conditions and collection of representative soil samples for geotechnical analysis. The selected drilling method shall produce minimal disturbance of the surrounding surface sediments and minimize in-water turbidity. Temporary casing shall be required to prevent material loss into the borehole. If a hollow stem auger is used as casing and to advance the boring, a plug assembly must be used to keep soil from entering the inside of the auger. Substantial product (i.e. tarry material associated with the MGP site) may be present in the shallow soils. The upper portion of the borehole shall be sealed to prevent contaminants from reaching deeper, clean areas. The seal shall be placed below the extent of visually contaminated soils. The borehole shall be advanced until bedrock is encountered as verified by the on-site geologist. The remainder of the hole shall be core drilled 20 feet into bedrock.

Drive Samples

Drive samples and Standard Penetration Tests (SPT) shall be collected at ~~2.5~~ foot intervals ~~for the first 25 feet of drilling and at 5 foot intervals thereafter.~~ All samplers shall be decontaminated between uses. SPT samples shall be taken in accordance with ASTM D 6066 to obtain normalized penetration resistance in sand for evaluation of liquefaction potential. The Contractor shall collect soil samples for geotechnical analysis according to the following schedule:

- Moisture content and No. 200 sieve analysis from all overburden samples. Overburden samples containing product shall not be tested. below a depth of 20 feet.
- Particle size analysis from two samples ~~below a depth of 20 feet~~ per borehole. Selected sample locations shall be representative of site conditions that will be used for analysis and design of the dock foundation.

Bedrock Drilling

Drilling through bedrock shall be by an accepted rotary rock core drilling method using appropriate bits for cutting both hard and soft rock. The drilling method shall provide continuous and complete rock cores for any subsurface interval of rock specified for recovery. Prior to beginning rock coring, the depth to the top of the competent rock surface shall be recorded. The coring shall be accomplished according to ASTM D 2113. The Contractor shall collect samples for geotechnical analysis according to the following schedule:

- Point load testing every 5 feet.
- Unconfined Compressive Strength (UCS) tests on competent bedrock from one sample per borehole.

The Contractor shall perform oversight of all activities associated with drilling and sampling. This shall include:

- Field logging of all soil and rock core from the exploration borings. The Contractor shall provide a geologist to log the drilling/coring of all materials. The overburden shall be logged using the Unified Soil Classification System (USCS) according to ASTM D 2488. Rock core logs shall include a geologic description, relative hardness, discontinuity characteristics, RQD, RMR and Q* values.
- Select samples for laboratory testing
- Oversee and record data for SPT tests

5.1.3 Base Item 3. Geotechnical Analyses

The Contractor shall perform geotechnical analyses at their on-site lab. Samples exhibiting signs of contamination can be sent to an off-site environmental lab for analysis. Samples containing product shall not be tested. The Contractor shall perform moisture content analyses and No. 200 sieve analyses on samples collected every 5 feet per borehole, below 20 feet. Testing will be performed on samples every 2.5 feet for the first between 20 and 25 feet and every 5 feet thereafter per borehole, for a total of ~~134~~ 7492 samples. For the purposes of costing, it is assumed that

25% of the samples will be sent to an off-site lab. A No. 200 sieve analysis will not be performed on samples subject to a particle size analysis. Moisture content tests ~~shall be performed in accordance with ASTM D 2216 and~~ No. 200 sieve analysis shall be performed in accordance with ASTM D 1140.

The Contractor shall perform particle size analyses on two samples per borehole, for a total of 12 samples. Particle size analyses shall be performed in accordance with ASTM D 422.

The Contractor shall perform point load tests on samples every 5 feet per borehole, for a total of 24 samples. Point load tests shall be performed in accordance with ASTM D 5731.

The Contractor shall perform UCS tests on one sample per borehole, for a total of 6 samples. UCS tests shall be performed in accordance with ASTM D ~~2938~~7012 Method D.

5.1.4 Base Item 4. Geotechnical Data Report

The Contractor shall provide all field notes and logs to USACE. A report thoroughly documenting the geotechnical investigation shall also be submitted. This report shall include, but not be limited to:

- Summary of field exploration program
- A summary of the geologic conditions encountered
- Results of laboratory testing
- Summary of field data including SPTs
- Two Final cross-sections/~~and~~ profiles
- Final boring logs

5.2 Work Components - OPTIONAL BID ITEMS

5.2.1 Optional Item 1. Sediment Investigation

This work shall be performed in the in-water area adjacent to the dock, where contaminants are suspected. The sediment investigation shall consist of preparing a work plan, collecting sediment core samples, logging sediment core samples, and preparing a report.

5.2.1.1 Sediment Investigation Work Plan

The Contractor shall prepare a draft and final Sediment Investigation Work Plan to include:

- Description of the sediment coring methods and sampling procedures
- General description of Quality Control (QC) procedures for field methods
- Investigation Derived Waste plan describing off-site disposal for sediment cores
- Decontamination procedures
- Site Specific Health and Safety Plan (SSHP) and project specific Accident Prevention Plan (APP), which includes an Activity Hazard Analysis (AHA), that complies with EM-385-1-1 and OSHA Regulations in 29 CFR 1910.
- Schedule for completing the work

5.2.1.2 Sediment Core Collection

The Contractor shall provide a vessel and sampling gear (such as a Vibracore or equivalent) suitable for sediment core sampling in the project area. Sampling locations will be identified by the Government; sampling should be estimated at one day, which includes mobilization and demobilization. The vessel and vessel navigation system must be capable of positioning the sampling device within 20 feet of target sampling locations, maintaining position during sampling, determining the water depth to within 6-inches, and recording sample positions with a minimum 10-foot accuracy. The sampling equipment must be capable of utilizing a collecting 20-foot core tube and driven to

a depth of 19 feet samples. The equipment must also be capable of collecting core samples with a minimum of ~~67~~65% recovery in the type of material to be sampled at the Moorings and with mud line elevations up to -9 feet CRD. Three attempts shall be made at each location to obtain the required 65% interval. The core with the greatest recovery shall be kept for processing, regardless of recovery. The cost for the vessel shall be on a per-day basis (12-hours per day) and include the captain, deck hand and sampling time; any additional days will be on a per-day rate as an option (see Optional Item 2).

The Contractor shall provide personnel experienced in sediment sampling to collect and document samples and extract sediment cores from Vibracore™ tubes. This shall also be on a per-day basis, coordinated with the vessel estimate. Logging (paragraph 5.2.1.3) of sediment cores shall be complete after all sediment cores have been collected at a location on the Moorings property.

The Contractor is responsible for collecting and analyzing samples for determining IDW disposal in accordance with all applicable regulations.

5.2.1.3 Sediment Core Logging

Sediment core logging shall take place in a protected location designated by the Moorings Facility Manager. The Government will provide 100% oversight during the sediment core logging. The Contractor shall coordinate all activities with the Government. Other parties may also be present during the core logging. Sediment cores are expected to contain high concentrations of hazardous chemicals associated with MGP operations. The Contractor shall provide monitoring for hazardous vapors and engineered controls for ventilation (i.e. fans) within the building when personnel are present. The Contractor shall provide all equipment necessary to cut the sediment cores in half.

The Contractor shall provide personnel experienced in sediment core logging. The cost for logging shall be on a per day basis (9-hours per day) and include two days for this effort; any additional days will be on a per-day rate as an option (see Optional Item 3). Cores shall be logged according to USCS visual classification method according to ASTM D 2488 and substantial product identified according to the criteria listed in the Gasco SOW (provided separately). All cores shall be photographed to document site conditions. Photographs shall be of high quality and clearly showing the location of any substantial product. All sediment core photographs shall meet the following requirements:

- All photographs shall be in color and completed using a high quality, digital, camera mounted on a tripod or copy stand.
- Photographic lighting shall be used for photographing cores indoors to keep light conditions constant. The light shall be oriented so that shadows are eliminated. To reduce reflections off wet sediment surfaces, a diffuser shall be placed in front of the lights.
- The axis of the camera shall be perpendicular to the core to minimize distortion of core features.
- A measuring scale and Munsell Soil Color Chart shall be placed adjacent to the core for reference. The measuring scale shall be in inches and referenced from the top of the core.
- Index information in each photograph shall include: core ID, date, top of core, bottom of core.

5.2.1.4 Sediment Investigation Report

The Contractor shall provide all field notes and logs to USACE. A draft and final report thoroughly documenting the in-water sediment investigation shall also be submitted. This report shall include, but not be limited to:

- Summary of field investigation program
- A summary of the conditions encountered
- Final boring logs
- Sediment core photographs (submitted on separate CD)

5.2.2 Optional Item 2. Additional Sediment Core Collection Days

This option, which is identical to the work in paragraph 5.2.1.2 above, will be exercised prior to conclusion of the in-water work under Option 1, for a period not to exceed two additional collection days.

The Contractor shall provide a vessel, equipment and personnel for additional days of sediment core collection, as described in 5.2.1.2, on a per-day basis. Costs assume that extra days are a continuation of the field sampling program in Optional Item 1 and will not include mobilization or demobilization.

5.2.3 Optional Item 3. Additional Sediment Core Logging Days

The Contractor shall provide all equipment and personnel for additional days of sediment core logging, as described in 5.2.1.3, on a per-day basis. This should also include any additional time needed to incorporate this information into the report (5.2.1.4). Costs assume that extra days are a continuation of the logging program in Optional Item 1.

This option will be exercised prior to conclusion of the core logging work under Option 1, for a period not to exceed three additional logging days.

5.3. CONTRACTOR MANAGEMENT REPORTING (CMR): Not required, as this is a non-military project

PART 6 APPLICABLE PUBLICATIONS

6. APPLICABLE PUBLICATIONS (CURRENT EDITIONS)

6.1. The Contractor must abide by all applicable regulations, publications, manuals, and local policies and procedures, including but not limited to:

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 422-07 Standard Test Method for Particle Size Analysis of Soils

ASTM D 1140-06 Standard Test Methods for Amount of Material in Soils Finer than No. 200 (75- μ m) Sieve

ASTM D 2113-08 Standard Practice for Rock Core Drilling and Sampling of Rock for Site Investigation

ASTM D 2216-10 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

ASTM D 2488-09 Description and Identification of Soils (Visual Manual)

ASTM D ~~2938-95~~7012-10 Standard Test Method for ~~Unconfined~~ Compressive Strength and Elastic Modulus of Intact Rock Core Specimens under Varying States of Stress and Temperatures.

ASTM D 5731-08 Standard Test Method for Determination of the Point Load Strength Index of Rock and Application to Rock Strength Classifications

ASTM D 6066-11 Standard Practice for Determining the Normalized Penetration Resistance of Sands for Evaluation of Liquefaction Potential

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.120 Hazardous Waste Operations and Emergency Response

OREGON ADMINISTRATION RULES (OAR)

OAR 690-240 Construction, Maintenance, Alteration, Conversion, and Abandonment of Monitoring Wells, Geotechnical Holes and Other Holes in Oregon

U.S. ARMY CORPS OF ENGINEERS

EM 385-1-1, Safety and Health Requirements Manual

EM 1110-1-1804, Geotechnical Investigations, ENG 1836, ENG 1836A

USACE Engineering Publications may be obtained from the internet web site:

<http://140.194.76.129/publications/eng-manuals/>

TECHNICAL REFERENCES

Geotechnical Resources, Inc. 1990. Preliminary Geotechnical Evaluation, U.S. Moorings Facility, Portland Oregon. June 8, 1990.

KTA and TEC, Inc., 2010. Final Remedial Investigation Report, U.S. Government Moorings, Portland, Oregon. May 2010.

U.S. Environmental Protection Agency (EPA), 2009, Administrative Settlement Agreement and Order on Consent for Removal Action between NW Natural/Siltronic Corporation and U.S. EPA, CERCLA Docket No. 10-2009-0255, Appendix A, Statement of Work.

PART 7

ATTACHMENT/TECHNICAL EXHIBIT LISTING

7. Attachment/Technical Exhibit List:

7.1. Attachment 1/Technical Exhibit 1 – Performance Requirements Summary

7.2. Attachment 2/Technical Exhibit 2 – Deliverables Schedule

7.3 Attachment 3/Technical Exhibit 3 – Drilling locations

TECHNICAL EXHIBIT 1

Performance Requirements Summary

The contractor service requirements are summarized into performance objectives that relate directly to mission essential items. The performance threshold briefly describes the minimum acceptable levels of service required for each requirement. These thresholds are critical to mission success.

Performance Objective (The Service required—usually a shall statement)	Standard	PERFORMANCE THRESHOLD (THIS IS THE MAXIMUM ERROR RATE. IT COULD POSSIBLY BE “ZERO DEVIATION FROM STANDARD”)	Method of Surveillance
PRS # 1. The contractor shall provide a work plan necessary to complete the geotechnical exploration as described in PWS section 5.2.1.	The contractor provided report shall meet the requirements of the PWS.	Report shall meet all requirements of the PWS. All USACE comments shall be addressed in the final report.	100% inspection of written work.
PRS # 2 The contractor shall provide 6 geotechnical boreholes and sampling as described in PWS section 5.1.2.	Boreholes and sampling shall meet the requirements of the PWS.	75% or better recovery of drive samples and rock cores to the satisfaction of the field geologist.	Periodic inspection of Contractor during drilling activities.
PRS # 3 The contractor shall provide a Geotechnical Data Report as described in PWS section 5.1.4.	The contractor provided report shall meet the requirements of the PWS.	Report shall meet all requirements of the PWS. All USACE comments shall be addressed in the final report.	100% inspection of written work.
PRS # 4 The contractor shall provide a work plan necessary to complete the sediment investigation as described in Optional Item 1, PWS section 5.2.1.1.	The contractor provided report shall meet the requirements of the PWS.	Report shall meet all requirements of the PWS. All USACE comments shall be addressed in the final report.	100% inspection of written work.
PRS #5 The contractor shall provide sediment cores as described in Optional Item 2. PWS sections 5.2.1.2 and 5.2.1.3.	Sediment cores and logging shall meet the requirements of the PWS.	67 5% or better recovery of cores to the satisfaction on the field geologist.	100% inspection by onsite Government geologist
PRS # 6 The contractor shall provide a sediment investigation report as described in Optional Item 4, PWS section 5.2.1.4.	The contractor provided report shall meet the requirements of the PWS.	Report shall meet all requirements of the PWS. All USACE comments shall be addressed in the final report.	100% inspection of written work.

TECHNICAL EXHIBIT 2

DELIVERABLES SCHEDULE

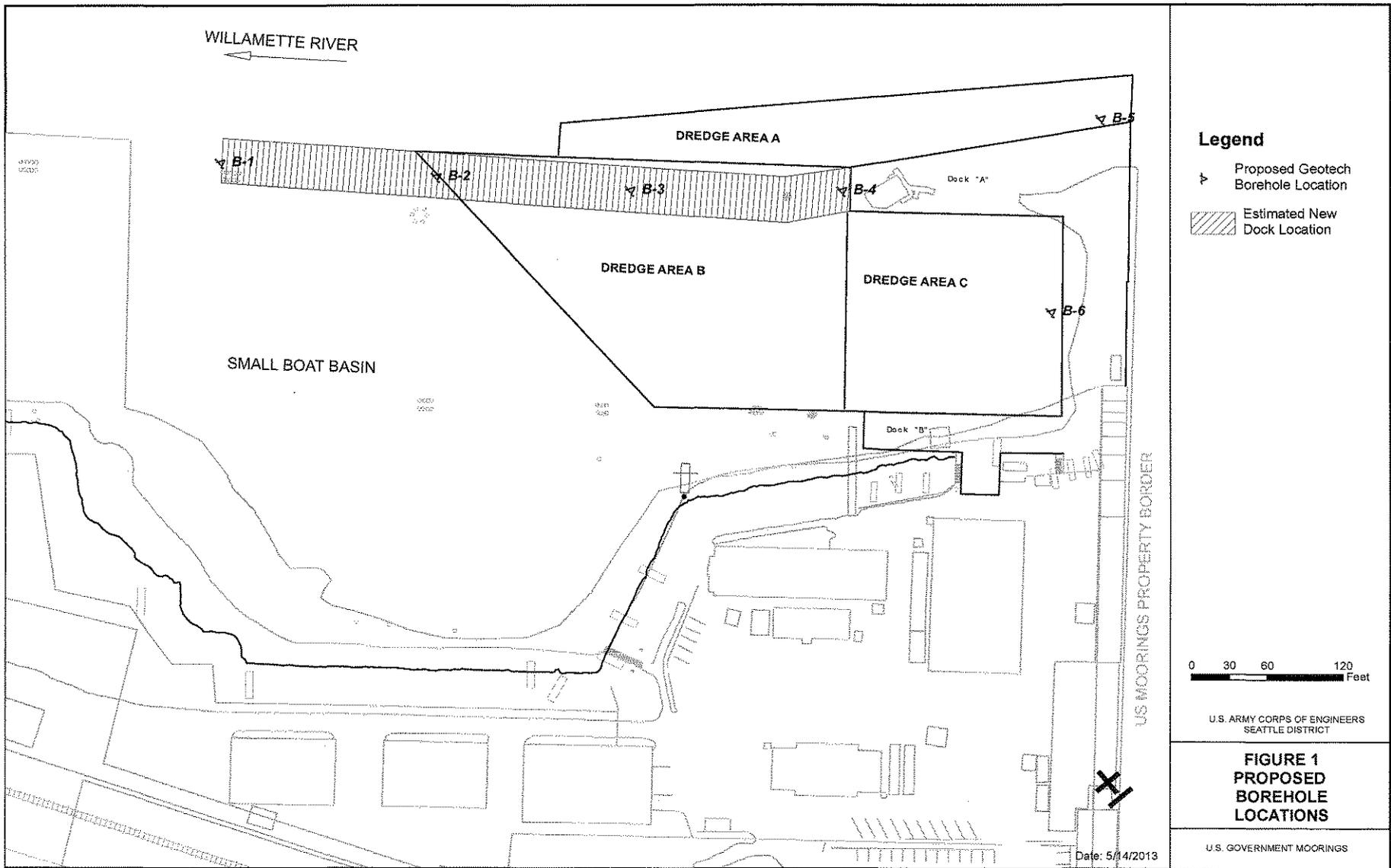
<u>DELIVERABLE</u>	<u>FREQUENCY</u>	<u># OF COPIES</u>	<u>MEDIUM/FORMAT</u>	<u>SUBMIT TO</u>
Geotechnical Exploration Work Plan	Draft submitted 21 days following NTP. Final submitted 14 days following receipt of government comments.	3 hard copies of draft and final work plan	Paper (hard copy) and electronic format (native files and pdf)	USACE Seattle District – 4735 East Marginal Way South, Seattle, Washington 98134 ATTN: Sharon Gelinas: email: Sharon.L.Gelinas@u sace.army.mil
Geotechnical Data Report	Draft submitted 28 days following completion of field work. Final submitted 14 days following receipt of government comments.	3 hard copies of draft and final report	Same as above	Same as above
Sediment Investigation Work Plan (Optional Item)	Draft submitted 21 days following NTP. Final submitted 14 days following receipt of government comments.	3 hard copies of draft and final work plan	Same as above	Same as above
Sediment Investigation Report (Optional Item)	Draft submitted 28 days following completion of field work. Final submitted 14 days following receipt of government comments.	3 hard copies of draft and final report	Same as above	Same as above

TECHNICAL EXHIBIT 3

DRILLING LOCATIONS

Table 1. Location and depth for proposed geotechnical borings

Borehole #	Northing	Easting	Estimated Mudline Elevation (feet CRD)	Estimated Depth to Bedrock (feet below mudline)	Total Estimated Depth of Borehole (feet below mudline)
	US State Plane 1983; Oregon North 3601				
B-1	706625	7622601	-22	90	110
B-2	706506	7622725	-22	90	110
B-3	706399	7622835	-22	90	110
B-4	706292	7622961	-16	90	110
B-5	706206	7623157	-29	90	110
B-6	706113	7623027	-7	70	90



APPENDIX B

**REVISED PROPOSAL FOR GEOTECHNICAL AND
SEDIMENT INVESTIGATION
U.S. GOVERNMENT MOORINGS
PORTLAND, OREGON – TASK ORDER 0001**

September 10, 2013

Ms. Monique Paano
Department of the Army
Seattle District, Corps of Engineers
P.O. Box 3755
Seattle, WA 98124

**RE: REVISED PROPOSAL FOR GEOTECHNICAL AND SEDIMENT
INVESTIGATION, U.S. GOVERNMENT MOORINGS, PORTLAND, OREGON–
TASK ORDER 0001**

Dear Ms. Paano:

We are pleased to submit this revised proposal to provide a geotechnical and sediment investigation at the U.S. Government Moorings property in Portland, Oregon. This revised proposal presents our scope of services and lump sum cost estimate for base and optional tasks based on the revised scope of work presented in U.S. Army Corps of Engineers' (USACE) Performance Work Statement (PWS) titled, "Geotechnical and Sediment Investigation, U.S. Government Moorings, Portland, Oregon," dated August 27, 2013, and telephone conversations with Lynn Daniels, Travis Shaw and Sharon Gelinis, on August 5 and 21 and September 9, 2013. The contract for this work is W912DW-13-D-1011, Task Order No. 0001.

ASSUMPTIONS

Base Bid Items

We have prepared the following list of assumptions that we used to develop our cost proposal as it is currently presented:

- Shannon & Wilson will attend a total of seven meetings with USACE project staff for all base and optional tasks. All meetings will be conference calls lasting approximately 1 hour each.
- All exploration locations will be located by using Global Positioning System coordinates from Technical Exhibit 3 of the PWS. Exploration locations will not be surveyed after completion of the geotechnical and sediment investigation.

- Shannon & Wilson and our subcontractors will have unrestricted access to the boring locations during normal work hours of 0630 to 1600, Monday through Friday. No badging is required.
- All work will be supervised by State of Oregon licensees. Our onsite personnel will have the training, equipment, and experience necessary to perform overwater work in potentially hazardous conditions but will not necessarily be licensed in the State of Oregon.
- We assume power and water are available for use on site. We assume water can be used to support drilling operations. We also assume toilet facilities are available for Contractor use during onsite activities.
- Borings will be performed using a combination of mud rotary and rotary rock core drilling methods with Standard Penetration Test (SPT) samples and tests. One and one-half (1.5)-foot SPT test and sample intervals will begin at a depth of 5 feet and performed at 5-foot intervals thereafter.
- We assumed that borings will be drilled to total depths of 90 feet (one boring) and 110 feet (five borings).
- Samples retrieved from the SPTs and rock coring will be tested in accordance with the test schedule presented in the PWS.
- Each geotechnical borehole will take approximately two to three days to complete.

Since the project will be completed within a Superfund site, we have prepared the following list of assumptions relating to managing contaminated materials:

- No legal support is required.
- No meetings with non-USACE stakeholders/regulators are required, we assume we only need to provide notification to the USACE of field activities.
- We assume contamination is limited to 20 feet below mudline, and that we will seal the boring at 25 feet below mudline to reduce the potential for cross contamination or at the appropriate depth depending on encountered contamination.
- Onsite personnel will have Hazardous Waste Operational Emergency Response (HAZWOPER) certificates.
- A total of eight composite samples will be collected from each geotechnical exploration for waste characterization purposes based on field screening.
- Personal protective equipment is assumed to be: gloves, safety glasses, boot covers or rubber boots, and hard hats. Tyvek suits will be worn if free product is observed.
- Decontamination of drilling equipment will occur over water. We assume that no permit and no hexane will be required for decontamination activities.

- Analytical testing:
 - Will be for waste disposal only, and will be completed by a minority business enterprise-certified laboratory with no Department of Defense (DoD) certification.
 - No DOD-level data deliverables, data validation, or specific reporting limits are required.
 - Analysis will be completed by standard turnaround time, and each sample will be tested for:
 - Northwest Total Petroleum Hydrocarbon-Diesel Extended
 - Semivolatile organic compounds
 - Volatile organic compounds
 - Metals (Resource Conservation and Recovery Act 8)
 - Organochlorine Pesticides
 - Polychlorinated Biphenyls
 - Chlorinated Phenols
 - Cyanide
- Investigation-derived waste (IDW):
 - Will consist of soil, drilling mud, and water that will require solidification (estimated 64 drums). For costing purposes, we have assumed the upper 20 feet of each boring will be D-listed hazardous waste (three drums per boring, totaling 18). The remaining material will be disposed as non-hazardous.
 - On-site drum storage area is assumed to be paved, accessible by a flatbed truck, and sized to accommodate all IDW generated during field activities. Drums will remain on site until completion of core logging (if Optional Item 1 is authorized) and disposal facility acceptance.
- No geotechnical testing will be completed in in-house laboratory if contamination is suspected in samples.

Optional Bid Items

We have prepared the following list of assumptions that we used to develop our cost proposal for Optional Item 1 as it is currently presented. Assumptions listed under Base Bid Items may also apply and are not restated below:

- We assume Optional Bid Items will be authorized prior to initiation of geotechnical borings, and in-water work will be completed prior to October 31, 2013.

- Shannon & Wilson will complete a reconnaissance to review the location, layout and conditions of the core logging building to develop engineering controls prior to work plan development. We will collect appropriate photographs of the site area to aid in developing our work plan.
- All work will be supervised by State of Oregon licensees. Our onsite personnel will have the training, equipment, and experience necessary to perform overwater work in potentially hazardous conditions but will not necessarily be licensed in the State of Oregon.
- Onsite personnel will have HAZWOPER certificates.
- Sediment samples will be collected using vibracore methods. Up to 20-foot-long cores will be collected at each location. If the vibracore meets refusal, up to two more attempts will be made to advance 20 feet. We assume the requirement for 65 percent recovery will be satisfied by three attempts; the core with the highest recovery will be retained.
- Within the one, 12-hour-work day, we assume mobilization/demobilization to the first borehole location, collection of up to four 20-foot-long cores, equipment decontamination, and core and drum transport from over water to the site. Sediment sampling will be observed by two Shannon & Wilson personnel to assist with core management/cutting.
- For storage, cores will be cut to approximate 5-foot lengths, capped, and placed vertically into core boxes for placement in the onsite designated area.
- No meetings with non-USACE stakeholders/regulators are required, we assume we only need to provide notification to the USACE of field activities.
- Decontamination will be as stated for the Base Items work.
- Two composite samples will be completed for waste disposal characterization based on field screening.
- Analytical testing on each sample will be the same as stated in our Base Items assumptions.
- No permit or treatment is required for discharge of vented vapors from the core logging area.
- IDW:
 - Will consist of soil and water that will require solidification and disposal as D-listed hazardous waste (estimated five drums).
 - Drums will be stored with those generated during geotechnical explorations.
- Engineering controls will require: mobilization of equipment and testing, installation, full-time screening during logging, and de-mobilization of equipment.

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- We assume that the core logging area will be free of furniture. Shannon & Wilson will mobilize camera equipment (including tripod), lighting, and tables.
- We assume sediment coring and core logging will not be completed contiguously. Therefore, we assume two mobilizations will be required. We estimate one round trip will require 8 hours and 400 miles.

We have prepared the following list of assumptions that we used to develop our cost proposal for Optional Item 2 as it is currently presented. Per day (up to two), we assume:

- Up to six 20-foot-long cores may be completed during a 9-hour additional sediment core collection day.
- No additional analytical testing will be completed to support this task.
- IDW generated during this task (assumed six drums) will be managed in accordance with assumptions listed under Optional Item 1.
- Additional reporting will be required.

We have prepared the following list of assumptions that we used to develop our cost proposal for Optional Item 3 as it is currently presented:

- An additional day of equipment rental will be required (e.g., camera, engineering controls, health and safety screening equipment).
- Additional reporting will be required.

ESTIMATED COST AND KEY PERSONNEL

The enclosed Fee Proposal Spreadsheet (Tables 1 through 9) consists of the completed bid schedule, as well as a detailed cost breakdown and a combined Lump Sum summary for Base Items 1 through 4 and individual Lump Sum summaries for Optional Items 1 through 3. The costs assume that the work will be completed prior to the close of the fish window on October 31, 2013. Furthermore, these costs assume Marine Sampling Services will be available to do the vibracore sampling. The scope of services will be performed by Shannon & Wilson and our subconsultants. Our key personnel include:

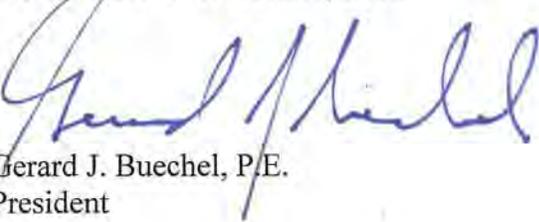
- Project Manager: Andy Caneday, Shannon & Wilson
- Geotechnical Engineer: Tom Gurtowski, Shannon & Wilson
- Geologist: David Higgins, Shannon & Wilson
- Lead Driller: Dale Abernathy, Holt Services

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I am authorized as the contract negotiator for this Task Order. Please contact me if you would like to discuss our approach and proposal, or to set up a time for negotiations. I can be reached at (206) 695-6845 or by e-mail at gjb@shanwil.com.

Sincerely,

SHANNON & WILSON, INC.



Gerard J. Buechel, P.E.
President

AJC:ACT:SWG:GJB/ajc

- Enc: Table 1 – Bid Schedule
Table 2A – Estimate of Architect-Engineer Services, Base Items
Table 2B – Estimate of Architect-Engineer Services, Base Items
Table 2C – Estimate of Architect-Engineer Services, Base Items
Table 2D – Estimate of Architect-Engineer Services, Base Items
Table 3A – Estimate of Architect-Engineer Services Optional Items
Table 3B – Estimate of Architect-Engineer Services Optional Items
Table 3C – Estimate of Architect-Engineer Services Optional Items
Table 4 – Labor Costs (3 pages)
Table 5 – Other Direct Costs (2 pages)
Table 6 – Drilling and Laboratory Testing Schedule
Table 7 – Profit Calculation
Table 8 – Icicle Creek Engineers Costs
Table 9 – EHS International, Inc. Costs

APPENDIX C

**SHANNON & WILSON
ACCIDENT PREVENTION PLAN**

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ATTACHMENT

- 1 OSHA 300 Log of 2012

**ACCIDENT PREVENTION PLAN
GEOTECHNICAL AND SEDIMENT INVESTIGATION
U.S. GOVERNMENT MOORINGS
PORTLAND, OREGON**

1.0 INTRODUCTION

This site-specific Accident Prevention Plan (APP) has been prepared by Shannon & Wilson, Inc. (Shannon & Wilson). The APP along with the Health and Safety Plan (HASP), addresses the specific health and safety requirements associated with the fieldwork to be performed at the site. Consistent with Shannon & Wilson's Corporate Health and Safety Program (HSP), all fieldwork will be conducted to be protective of human health and the environment.

2.0 SITE DESCRIPTION

The U.S. Government Moorings site is located at 8010 NW St. Helens Road, Portland, Oregon, and is bounded on the northeast by the Willamette River, on the northwest by Advanced American Construction, on the southwest by BNSF Railway and State Highway 30 (St. Helens Road), and on the southeast by the NW Natural property (a former oil gasification plant). The site is approximately 13 acres in size, which include about 3 acres of submerged land. A 26,700-square-foot dock is located at the southern portion of the property, adjacent to the NW Natural property. The site is within the initial study area of the Portland Harbor Superfund site.

The adjacent NW Natural property has been contaminated from prior site use. Prior to 1941, wastewater effluent and tar-stills from the gasification process and by-product refining at the site were discharged to a stream channel leading from the production area to the Willamette River, or to low-lying areas of the site. Contamination from this site has been observed in sediment within the Willamette River.

3.0 CONTRACTOR ACCIDENT EXPERIENCE

As required by EM 385-1-1 (July 2012), the interstate experience modification rate for Shannon & Wilson's Seattle Office is 0.81. A copy of our 2012 Occupational Safety & Health Administration (OSHA) 300A log is included as Attachment 1 to this APP.

4.0 CORPORATE HEALTH AND SAFETY POLICY

Shannon & Wilson is committed to maintaining an HSP for the protection of Shannon & Wilson personnel, subcontractors, site visitors, and the general public. Because safety and safe practices are a matter of life and health, there is no task worth the sacrifice of life, health, or pain. Safety is achieved by combining the awareness and cooperation of interacting parties, through communication, with the use of *common sense*. This is a continuous responsibility for *everybody* in the work place. The HSP is to promote better understanding of health and safety issues by all employees; to implement policies related to those issues; to protect the safety and health of the field investigators, the public, and the environment; and to meet legal requirements. All employees and managers associated with the project must review and understand this document. This document supersedes all health and safety documents previously issued by the company.

5.0 STAFF ORGANIZATION, RESPONSIBILITIES, AND LINES OF AUTHORITY

Shannon & Wilson's Corporate Organization Chart is provided in the Corporate HSP that every new employee receives. Please refer to the site-specific HASP in Appendix D for Shannon & Wilson's project organization as it relates to this task order.

6.0 TRAINING

It is Shannon & Wilson's policy to require all field personnel to have completed the applicable training for the tasks to be performed. Consistent with OSHA regulations governing hazardous waste operations and emergency response and having had three days of field experience under the direct supervision of a trained, experienced supervisor, all field personnel will have documented current training in accordance with the requirements stated in 29 Code of Federal Regulations (CFR) 1910.120. In addition, at least one of the field team members will be trained in first aid/cardio-pulmonary resuscitation (CPR). All supervisory personnel managing personnel and activities associated with hazardous waste site activities have received an additional 8 hours of training. The 8-hour training covers at least the following topics: the employer's health and safety program, personal protective equipment (PPE) program, spill containment program, and health hazard monitoring procedures and techniques. Copies of current training certificates are maintained in the local Shannon & Wilson Seattle Office.

All personnel entering the site shall receive site-specific Hazard Communication training and shall be familiar with this APP, including the HASP (Appendix D). Site-specific training shall include at least the description of chemical and physical hazards associated with the project; site control, monitoring, and standard operating procedures that are applicable to the project; location

of emergency response equipment; accident/incident procedures; and the location of the nearest hospital. Training requirements for field personnel will be reviewed by the site safety officer (SSO) and the Health and Safety Officer (HSO) to assure compliance with this APP.

An initial (pre-entry) safety meeting will be held prior to the start of on-site work. The SSO will be responsible for conducting this meeting. This safety meeting will be documented, and any questions about the APP will be answered. In addition, the pre-entry safety meeting will review site safety rules and prohibitions, the location of emergency equipment such as eye wash stations and fire extinguishers, escape routes, accident reporting, directions to the nearest medical facilities, how to summon medical assistance, and PPE requirements for the specific tasks. This safety training should enable field personnel to perform their work in a safe manner.

For the duration of the fieldwork, safety meetings will be held daily. These meetings are conducted to review pertinent aspects of site operations and to establish safe working procedures for those operations. Safety meeting minutes and attendees will be documented. If determined necessary, additional safety meetings will be held to address deficiencies noted or procedural improvements that could be made based on the previous day's activities.

6.1 Visitor Training

All visitors to the site will be required to check in with the SSO and have in their possession the appropriate PPE. If they do not have the appropriate PPE with them, they will be asked to leave the site and obtain the necessary PPE. **No one visiting the site will be allowed to enter the site without the appropriate PPE.** Depending on the purpose of their visit, the SSO will provide visitors with an orientation briefing, which will include site-specific hazards, ways to protect themselves from these hazards, locations of first aid and emergency equipment, and the emergency response procedures.

6.2 Emergency Response Training

As part of the site-specific training, field personnel will also receive training on how to respond to small, contained emergencies, such as injury accident or severe weather. In the event of a major chemical release, fire, or explosion at the site, field personnel will evacuate the site. Following confirmation that all personnel are safely out of the area, the SSO will secure the area and contact the appropriate emergency response agencies (telephone numbers are provided in the HASP, Appendix D). To safely respond to small releases or minor emergencies, field personnel will have a thorough understanding of the emergency response procedures to include at a minimum:

- Emergency chain-of-command
- Communication methods and signals
- How to call for help
- Location of emergency equipment, its use and limitations
- Emergency evacuation routes and assembly line

Visitors will be briefed on the basic emergency procedures such as decontamination, emergency signals, and evacuation routes.

7.0 SAFETY AND HEALTH INSPECTIONS

The SSO will perform a daily inspection of each work area and will record any deficiencies or unsafe conditions in the field logbook. As part of the daily safety inspection, all equipment to be used will be inspected by the SSO and/or operator prior to use. Any item considered to be unsafe will be brought to the immediate attention of the SSO for proper corrective action and documentation. Items considered unsafe will be replaced immediately and/or removed from the job until they are restored to a safe operating condition. Fire extinguishers will be checked and inspected to insure proper charge, condition, and location. First-aid kits will be inspected to ensure a sufficient amount of supplies are available. Any deficiency or unsafe condition encountered and the corrective actions taken will be communicated to all field personnel.

The SSO will perform safety inspections of on-site subcontractors prior to their beginning the contract work and periodically during their performance. Issues or deficiencies will be noted in the field logbook and reported to the subcontractor supervisor. If conditions warrant, the SSO can stop work until the safety violation is addressed and corrected.

8.0 SAFETY AND HEALTH PROGRAMS AND COMPLIANCE

Because safety and safe practices are a matter of life and health, there is no task worth the sacrifice of life, health, or unnecessary pain. Safety is achieved by combining the awareness and cooperation of interacting parties through communication and through the use of *common sense*. This is a continuous responsibility for *everybody* in the work place. The purpose of the APP is to promote better understanding of health and safety issues by all field personnel; to implement policies related to those issues; to protect the safety and health of field personnel, the general public, and the environment; and to meet legal requirements. All personnel associated with the project must review and understand this document.

The Project Manager will have overall responsibility for field personnel performing their work in accordance with the APP and will ensure that all personnel are properly trained. Anyone found

to be blatantly disregarding the requirements of the APP while performing work on site will be reprimanded by the Project Manager and the HSO/SSO, and depending on the severity of the act (procedural versus administrative or documentation), they may possibly be removed from the jobsite. If project personnel identify unsafe conditions, they are required to notify the SSO immediately, who in turn will notify the Project Manager. The Project Manager will contact the HSO to report the condition, develop necessary corrective action measures, and ensure their timely implementation. The HSO will be notified upon implementation of the corrective actions and will perform an inspection to confirm the unsafe condition has been corrected. The HSO may decide, based on the deficiency that additional training or measures are necessary before personnel or work activities are allowed to resume. If this occurs, the HSO will contact the Project Manager and U.S. Army Corps of Engineers (USACE) Contracting Officer's Representative (COR) to inform them of their decision.

9.0 ACCIDENT REPORTING

Shannon & Wilson's APP is designed to reduce the incidence of accidents, illnesses, and near misses while in the work place or at the jobsite. We strive to provide a work environment that is free from physical and chemical hazards. Because of the nature of our business, however, certain hazards cannot be eliminated. Thus, we have developed standard operating procedures and general health and safety guidelines in attempts to minimize these hazards. These procedures and guidelines are presented in the HASP (Appendix D) and our Corporate HSP. Each employee receives a copy of the Corporate HSP, is knowledgeable of the contents of the plan, and is required to comply with the plan.

When an accident, illness, or near miss occurs, the employee must promptly notify the Project Manager and/or Field Investigation Coordinator and the HSO. As described in this section, the required forms must be completed and an investigation into the incident must be conducted within 24 hours of the accident. All accidents will be reported within 24 hours of occurrence to USACE COR, and within three working days, the Shannon & Wilson HSO or SSO will furnish the COR a complete report (OSHA 301) describing the occurrence and any corrective action taken to prevent any such recurrence.

All accidents/incidents (injury or non-injury) will be investigated and reported by the HSO in accordance with EM 385-1-1 and the procedures outlined in the Shannon & Wilson Corporate HASP. Additionally, Shannon & Wilson will internally document accidents in accordance with corporate policy. Reporting formats will be according to EM 385-1-1 and Shannon & Wilson

policy. All accidents, including minor accidents, shall be discussed and analyzed at subsequent safety meetings and training sessions.

All recordable illness and accidents will be recorded on the appropriate OSHA 300, 300-A, or 301 forms. In addition, an accident/incident field report form will be completed by the injured employee, if able, or the Field Investigation Coordinator, with review and signature by the HSO or SSO.

All personnel shall be responsible for performing activities in accordance with this APP. If an accident or illness occurs, personnel are responsible for reporting the incident to the Field Investigation Coordinator/SSO or HSO, as soon as possible. The Field Investigation Coordinator/SSO shall not decline to accept a report of injury from field personnel.

10.0 MEDICAL SUPPORT

10.1 On-site and Off-site Medical Facility Locations

At least one site worker will be trained in administering first aid and CPR treatment techniques. Copies of current certifications are kept in the Shannon & Wilson Corporate office in Seattle, Washington. A first aid station/kit and a portable fire extinguisher will be set up within easy walking distance of all project work areas or will be located in the support vehicle. The locations of the first aid station and fire extinguishers shall be visibly identified and verbally communicated to all field personnel. Each station/kit will be checked for completeness at least weekly by the SSO while site work is occurring. The fire extinguisher will be inspected weekly while site work is occurring and recharged on an annual basis, or as needed. The results of these inspections shall be recorded in the field notes. Any subcontractor working on site will be required to have a first aid kit and portable fire extinguisher, readily available at all times during working hours, depending on the work being performed.

A copy of a map showing the directions from the site to the Hospital is provided in the HASP, Appendix D. The HASP also provides emergency contact names and numbers. The typical procedure to be followed by field personnel in the event of a medical emergency is provided below.

10.2 Medical Emergency Procedures

The following procedures should be performed if a minor injury, medical emergency, or fatality occurs:

- Minor Injury:
 - Have a qualified first-aid site worker administer treatment, if applicable; if not, transport the victim to the hospital.
 - Record the injury on the appropriate OSHA forms.
 - Contact the HSO, SSO, Shannon & Wilson Project Manager, and USACE COR.
- Medical Emergency:
 - Survey the scene and evaluate whether the area is safe for entry.
 - Remove the victim from immediate danger and render critical first aid.
 - Decontaminate the victim after first aid is administered.
 - Call 911 and request ambulance transport of the victim to the hospital; provide the location, name, cellular telephone number, and directions to the site.
 - Contact the HSO, SSO, the Shannon & Wilson Project Manager, and USACE COR.
 - Record the injury on the appropriate OSHA forms.
 - Assess site conditions and determine if it is safe for remaining on-field personnel to return to the area.
- Fatality:
 - Contact the HSO, SSO, the Shannon & Wilson Project Manager, and USACE COR.
 - Comply with OSHA reporting and record keeping requirements.
 - Stop work for at least 24 hours following the accident.

Uninjured personnel shall not enter an area to attempt a rescue if there is any doubt concerning the hazards present at the site. The decision whether to decontaminate a victim prior to evacuation is based on the type and severity of the illness or injury and the nature of the contaminant. If decontamination does not interfere with essential treatment, it should be performed.

11.0 PERSONAL PROTECTION EQUIPMENT

Shannon & Wilson will provide, at no cost to its employees, PPE for use in conjunction with engineering, work practice, and administrative controls to protect worker health. These procedures apply to all employees and subcontractors of Shannon & Wilson who are required by contract or regulation, to wear PPE in the course of their work. The level of protection required

to ensure the health and safety of personnel will be determined by the HSO, based on the specific site activities, available instrumentation readings or existing baseline data, and professional experience and judgment. The levels of PPE required for specific work tasks shall be communicated to all personnel prior to beginning the work, and training shall be provided by the HSO or SSO under the HSO's supervision. Training shall include when PPE is required; what types of PPE are necessary; and how to properly don, doff, adjust, wear, maintain, store, inspect, and dispose of the PPE. Properly fitting PPE will be selected for each affected employee and, where necessary, fit-tested to ensure proper fit. Employees are responsible for using and maintaining all PPE required for each work task. Employees shall be physically able and medically determined qualified to use the PPE required for their job tasks. PPE requirements are discussed in detail in the HASP (Appendix D).

12.0 DECONTAMINATION ACTIVITIES

The minimum level of PPE required for personnel performing decontamination activities is Modified Level D. If a change in site conditions warrants personnel to don higher than Modified Level D PPE, the same level of PPE will be donned during decontamination activities. Decontamination requirements for personnel and equipment are provided in the HASP (Appendix D).

13.0 EMERGENCY RESPONSE PROCEDURES

This section describes contingencies and emergency planning procedures to be implemented during fieldwork. Based on the delivery order scope of work, a wild land fire prevention plan is not anticipated for this task order; thus, it has not been included in the APP. All incidents will be dealt with in a manner to minimize health risks to site workers and the surrounding facilities. In the event of an incident, the following procedures shall be completed at a minimum:

- First aid and other appropriate initial action will be administered by properly trained personnel closest to the incident. This assistance will be conducted in a manner to assure that those rendering assistance are not placed in a situation of unacceptable risk.
- All incidents will be reported to and documented by the SSO, who is responsible for coordinating the emergency response in an efficient, rapid, and safe manner. The SSO will perform emergency equipment inspections to check that standard equipment, as listed in the HASP, is available on site to address likely emergencies. Emergency contact names and telephone numbers are listed in the HASP. The SSO or other site workers, if the SSO is the victim, shall contact the appropriate

emergency response, USACE, and Shannon & Wilson personnel, as outlined in this section.

- In the event of an accident or emergency, all workers on site are responsible to conduct themselves in a mature, calm manner to avoid spreading danger to themselves, surrounding workers, or the community in general.

Potential incidents fall under four general classifications: (a) chemical releases to the atmosphere, soil, or surface water; (b) fire or explosion; (c) worker injury or illness; and (d) severe weather conditions, such as tornado and lightning storms or earthquakes.

13.1 Chemical Release Emergency Response Procedures (Spill Plan)

In the case of a spill or release of contaminated or hazardous materials, the following procedures shall be followed:

- Determine that a spill has occurred.
- Identify PPE and spill containment equipment required to respond.
- Assess spill conditions; if possible, contain the spill and transfer material into an appropriate container for proper disposal.
- Contact the Field Investigation Coordinator and the Project Manager.
- Notify USACE Project Manager.
- If the spill or release is too large to contain with on-site spill equipment, contact the emergency services by dialing 911.
- Document the incident.

13.2 Fire or Explosion Response Procedures (Fire Fighting Plan)

In the event of a major fire or explosion, contact 911 and request the assistance of the Fire Department, with a head count and evacuation procedures occurring concurrently. Inform the Fire Department of the location and nature of the fire, and provide the location of hazardous materials or waste at the site.

For small fires, field personnel may do the following:

- Use a portable fire extinguisher to control or extinguish the fire.
- If it can be done safely, remove or isolate flammable or other hazardous materials that can contribute to the fire.
- Begin containment and recovery of any spilled materials.

- Contact the HSO and the Project Manager.
- Notify USACE Project Manager.
- Document the incident.

13.3 Severe Weather Emergency Response

If an earthquake, tornado, or lightning storm should occur while personnel are on site, the following steps should be taken:

- Stop work. Remain calm and do not panic.
- If possible, institute shutdown procedures.
- If there is an earthquake or lightning storm and you are indoors, stay indoors away from windows and take cover under heavy furniture or inside walls, if possible. If there is a tornado and you are indoors, move to the outside and lie down in a ditch or depressed area of the terrain.
- If you are outside for any of the severe weather emergencies, stay away from power lines, light poles, and buildings.
- Do not use or do anything that may be a source of ignition, i.e., smoking, cutting, or welding.
- Following the severe weather, the SSO should perform a head count.
- Check for injuries. If there are injuries, follow the medical emergency procedures provided in this section.
- Survey the site for damaged vehicles, equipment, and buildings.
- Document the damage and stay out of severely damaged buildings or structures.
- If equipment or buildings are damaged, switch off water, power, and gas until a utility official has performed an inspection and determined it safe.
- Notify the Project Manager and HSO; report any damage or injuries sustained during the severe weather.

13.4 Personnel Evacuation

In the event of an emergency that necessitates the evacuation of the site, such as a chemical release or fire or explosion, field personnel will implement the following procedures:

- Field personnel will be alerted by sounding a portable horn, radio contact, or direct verbal means. (When air horns are used, two sustained blasts followed by two short blasts will notify all personnel to exit along the pre-established evacuation routes.)

- Personnel in the work area may or may not perform field decontamination prior to leaving the work area, depending on the nature of the incident requiring the evacuation. In the event of a fire or explosion, these individuals will evacuate to either the primary or the secondary meeting point (location will be upwind based on prevailing wind direction).
- Once personnel have evacuated to the designated meeting point, the SSO will perform a head count.

13.5 Emergency/Contact Notification System

All field personnel must have access to the emergency contact information provided in the HASP. Field personnel must have access to a cellular telephone in case of an emergency.

14.0 HAZARD COMMUNICATION PROGRAM

It is Shannon & Wilson's policy to ensure that information regarding the hazards of any of the materials and/or processes located or performed on site are transmitted to field personnel through hazard recognition techniques, training, identification through labels and warnings signs, Material Safety Data Sheets (MSDSs)/Safety Data Sheets (SDSs), and other information as required in the OSHA 29 CFR 1926.59, Hazard Communication Standard. Shannon & Wilson's objective is to reduce, through reasonable means, the dangers from hazardous chemicals used within our workplace. The HSO in conjunction with the SSO is responsible for managing this program. All hazardous chemicals brought to the field during either investigation will be accompanied by an MSDS. The information provided on the MSDSs/SDSs will be communicated to all field team members prior to use of the materials. The following hazardous communication program has been established and will be included as part of the indoctrination training received by all field personnel.

14.1 Container Labeling

The SSO will ensure that all containers of hazardous substances brought to the site will be clearly labeled as to the content, appropriate hazard warning, and the name and address of the manufacturer.

14.2 Material Safety Data Sheets (MSDSs)/Safety Data Sheets (SDSs)

The SSO is responsible for establishing and monitoring the MSDS/SDS program. All MSDSs/SDSs will be reviewed for health and safety information. This information will be passed on to field personnel as part of their initial site-specific training. Copies of MSDSs/SDSs

for the hazardous materials that will be used in the field are located in Appendix E. Copies of subcontractor and Shannon & Wilson MSDSs/SDSs will be kept in the support vehicle by the SSO and will be readily available to all field personnel.

14.3 Employee Training and Information

As part of the initial site-specific training, field personnel will be provided Initial Health and Safety training that will meet the requirements of 1910.1200. Retraining is required when the hazard changes or when a new hazard is introduced into the workplace.

14.4 Hazardous Non-Routine Tasks

Although not anticipated for this project, field personnel required to perform non-routine tasks that are potentially hazardous, such as confined space entry, prior to beginning work on such projects, will be given information about any hazards that may be encountered during such an activity. This information shall include:

- Chemical hazard information
- Personal protective equipment
- Safety measures
- Exposure reduction measures (such as ventilation)
- Emergency procedures

14.5 Hazardous Chemical Inventory

The SSO will develop and maintain a list of all known hazardous chemicals used onsite by Shannon & Wilson and subcontractor personnel. The list will include:

- Chemical Name
- Name of the chemical manufacturer
- Work Area
- Quantity (container size and typical amount kept on site)

14.6 Contractor Employers

The SSO will advise subcontractors of any chemical hazards that may be encountered during their work on the site. The following information shall be provided:

- Safety and Health Hazards
- Labeling System
- Protective Measures

- Safe Handling Procedures
- Location of MSDS

Contractors bringing chemicals on site shall provide the HSO or SSO with hazard information for these substances.

15.0 RESPIRATORY PROTECTION PROGRAM

Exposure to elevated airborne concentrations of contaminants above the respective permissible exposure levels is considered to be low to moderate for the field investigation; thus, the use of respiratory protection is only anticipated as an option inside structures. However, if site conditions, field activities, or air monitoring results indicate the need for respiratory protection during other field activities, the SSO and HSO will evaluate the initial activities to be performed by field and core logging personnel, and if necessary, modifications to the PPE requirements will be implemented.

16.0 HEALTH HAZARD CONTROL PROGRAM

Risk is the likelihood of exposure to a given hazard. This subsection evaluates risk of exposure to potential site hazards. If the risk is determined to be reduced and the protective measures are to change, an addendum will be submitted in order to document changes.

Site-specific hazards are discussed in detail in the HASP (Appendix D).

16.1 Risks of Chemical Hazards

Chemical exposure to hazardous wastes may include contact with or inhalation of contaminants present in contaminated surface water or sediments. The chemicals of potential concern that may be present include petroleum hydrocarbons, volatile organic compounds, metals, polychlorinated biphenyls, semivolatile organic compounds. Wearing the proper PPE, training, awareness, and air monitoring, when necessary, will reduce the potential for exposure. PPE requirements for the scoped tasks to be performed during the field investigation activities are provided in the HASP (Appendix D). Revisions to these requirements will be based on periodic evaluation of the hazards associated with these tasks, and the determination for any changes will be made by the SSO, with concurrence from the HSO.

16.2 Risks of Biological Hazards

Direct contact with Willamette River water may be hazardous due to the potential for combined sewer overflow contamination. Use of proper PPE will reduce the potential for exposure.

16.3 Risks of Physical Hazards

Risk of exposure to physical hazards varies from task to task and often with the time of the year. Shannon & Wilson has developed a series of standard operating procedures for these physical hazards, which are provided within the Corporate HSP. Field personnel shall follow these procedures while performing their specific work tasks. The SSO will perform PPE assessments periodically or whenever there are changes to the current site procedures. PPE requirements will be revised, as necessary, based on the results of these assessments.

17.0 FIRE PREVENTION PLAN

In the event of a major fire or explosion, contact the local Fire Department by calling 911 and requesting the assistance of the Fire Department. Also take a head count and initiate evacuation procedures. Inform the Fire Department of the location and nature of the fire, and provide the location of hazardous materials or waste at the site.

For small fires, field personnel may do the following:

- Use a portable fire extinguisher to control or extinguish the fire.
- If it can be done safely, remove or isolate flammable or other hazardous materials that can contribute to the fire.
- Begin containment and recovery of any spilled materials.
- Contact the HSO and the Project Manager.
- Notify USACE Project Manager.
- Document the incident.

18.0 EXCEPTED PLANS

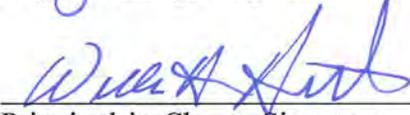
Based on the performance work station, the following plans not be required. However, if a situation occurs where one of the following Plans is required, the HSO will prepare and submit a work plan and/or activity hazard analysis and certifications/qualifications to USACE for review and approval prior to the commencement of work.

- Lead Abatement Plan
- Asbestos Abatement Plan
- Abrasive Blasting
- Confined Space Entry Program
- Hazardous Energy Control Plan
- Critical Lift Procedures

- Access and Haul Road Plan
- Demolition Plan
- Emergency Rescue (Tunneling)
- Underground Construction, Fire Prevention, and Protection Plan
- Compressed Air Plan
- Formwork and Shoring Erection/Removal Plans
- Jacking Plan
- Blasting Plan
- Diving Plan
- Prevention of Alcohol and Drug Abuse
 - It is Shannon & Wilson's policy that the use of narcotics, intoxicants, or similar mind-altering drugs or alcohol during work hours is strictly prohibited. Anyone found to be working under the influence of narcotics, intoxicants, or similar mind-altering drugs or alcohol will be reprimanded and immediately removed from the jobsite.
- Fall Protection Plan
- Steel Erection Plan
- Night Operations Lighting Plan

19.0 ACCIDENT PREVENTION PLAN APPROVAL RECORD

Site Accident Prevention Plan Certification: Based on my review of this Site APP, the APP is written in compliance with industry standards, regulations and guidelines utilizing documents including the USACE Safety and Health Requirements Manual EM 385-1- 1 (dated 20 July 2012).

 Plan Preparer Signature	<u>10/11/13</u> Date
 Project Manager Signature	<u>11 OCT 2013</u> Date
 Principal-in-Charge Signature	<u>11 OCT 2013</u> Date

20.0 ACCIDENT PREVENTION SIGNATURE SHEET

We, the undersigned, have reviewed this plan, are familiar with its contents, and agree to abide by all the provisions herein:

Signature _____ Date _____

ACT:SWG/act

ATTACHMENT 1
OSHA 300 LOG OF 2012

OSHA's Form 300A (Rev. 01/2004) Summary of Work-Related Injuries and Illnesses

Year 2012

Revised

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1216-0178

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	0	0	0
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
0	0
(K)	(L)

Injury and Illness Types

Total number of... (M)	(1) Injury	(2) Skin Disorder	(3) Respiratory Condition	(4) Poisoning	(5) Hearing Loss	(6) All Other Illnesses
	0	0	0	0	0	0

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Public reporting burden for this collection of information is estimated to average 30 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment Information

Your establishment name Shannon & Wilson, Inc.
 Street 400 N. 34th Street, Suite 100 (Corporate HQ)
 City Seattle State WA Zip 98103
 Industry description (e.g., Manufacture of motor truck trailers)
Consulting Engineers
 Standard Industrial Classification (SIC), if known (e.g., SIC 3715)
8 7 1 1
 OR North American Industrial Classification (NAICS), if known (e.g., 336212)
5 4 1 3 3 0

Employment Information

Annual average number of employees 139
 Total hours worked by all employees last year 249,244 **263,447**

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.


 Company Executive
 206-435-8845
 Phone

President
 Title
 1/31/2013
 Date

APPENDIX D

**SHANNON & WILSON
HEALTH AND SAFETY PLAN**

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**HEALTH AND SAFETY PLAN
GEOTECHNICAL AND SEDIMENT INVESTIGATION
U.S. GOVERNMENT MOORINGS
PORTLAND, OREGON**

1.0 INTRODUCTION

This site-specific Health and Safety Plan (HASP) has been prepared by Shannon & Wilson, Inc. (Shannon & Wilson). The HASP along with the Accident Prevention Plan (APP) (Appendix C), addresses the specific health and safety requirements associated with the fieldwork to be performed at the site. Consistent with Shannon & Wilson's Corporate Health and Safety (HSP) Program, all fieldwork will be conducted to be protective of human health and the environment.

2.0 SITE DESCRIPTION

The U.S. Government Moorings site is located at 8010 NW St. Helens Road, Portland, Oregon. It is bounded on the northeast by the Willamette River, on the northwest by Advanced American Construction, on the southwest by BNSF Railway and State Highway 30 (St. Helens Road), and on the southeast by the NW Natural property (a former oil gasification plant). The site is approximately 13 acres in size, which include about 3 acres of submerged land. A 26,700-square-foot dock is located at the southern portion of the property, adjacent to the NW Natural property. The site is within the initial study area of the Portland Harbor Superfund site.

The NW Natural property has been contaminated from prior site use. Prior to 1941, wastewater effluent and tar-stills from the gasification process and by-product refining at the site were discharged to a stream channel leading from the production area to the Willamette River, or to low-lying areas of the site. Contamination from this site has been observed in sediment within the Willamette River.

3.0 STAFF ORGANIZATION, RESPONSIBILITIES, AND LINES OF AUTHORITY

Shannon & Wilson's Corporate Organization Chart is provided in the Corporate HSP that every new employee receives. Shannon & Wilson's project organization, as it relates to this task order, is described in this section. The names and contact information for the Shannon & Wilson project staff that are tentatively planned to work on this investigation are attached to this HASP (Attachment 1). The contact list will be updated as necessary, with the names and contact information of the personnel tasked with those duties.

3.1 Principal-in-Charge

The Principal-in-Charge has ultimate responsibility to ensure that the project conforms to contract specifications. The Principal-in-Charge is responsible for all administrative, technical, and contractual requirements of the contract. He must ensure that all project activities are conducted safely and in accordance with the Corporate HSP and the project-specific APP. The Principal-in-Charge has full authority to stop work due to health and safety deficiencies.

3.2 Project Manager

The Project Manager is responsible for the overall management of the project, including safety, quality, and production. He is responsible for scheduling, reviewing, and managing submittals, including those of subcontractors, with attention to safety and health aspects of performance and procurement. The Project Manager oversees the environmental/industrial hygiene and atmospheric testing performed by field personnel and outside testing laboratories. The Project Manager has full authority to stop work due to health and safety deficiencies.

3.3 Health and Safety Officer

The Health and Safety Officer (HSO) has reviewed and approved this APP that meets project needs and conforms to federal, state, and local regulations. Specific responsibilities of the HSO include the following:

- Provide guidance to the Project Manager on health and safety issues and in developing the APP.
- Provide direction to the Site Safety Officer (SSO) in health and safety oversight for the field activities.
- Provide technical guidance to field personnel in adhering to task-related health and safety requirements.
- Approve any changes to the APP prior to implementation.

3.4 Field Investigation Coordinator/Site Safety Officer (SSO)

The Field Investigation Coordinator will serve as the SSO during the field investigation activities. The SSO will be responsible for the implementation of the APP during all field investigation activities. The SSO will also be responsible for ensuring that field teams utilize all safety practices, and that appropriate procedures are immediately and effectively initiated during emergency situations. The SSO will be responsible for the control of specific field operations and all related activities, such as personnel decontamination, monitoring of worker heat or cold

stress, distribution of safety equipment, and conformance with all other procedures established by the APP. The SSO has full authority to stop work due to safety and health deficiencies.

3.5 Field Team Members

The Shannon & Wilson field team members will be responsible for conducting their assigned work duties in a safe and healthy manner and for following the procedures established in the site-specific APP, wearing prescribed personal protective equipment (PPE), reporting unsafe conditions to the SSO, and preventing avoidable accidents. Field team members have full authority to stop work due to safety and health deficiencies.

3.6 Subcontractors

Only trained, experienced subcontractors will be used for this project. Prior to the commencement of work, subcontractor personnel will be required to provide appropriate health and safety documentation and copies of certificates and/or qualifications, as appropriate, or agree to work under this HASP. The subcontractors will be required to perform their work in accordance with the requirements outlined in the APP, Activity Hazard Analysis (AHA), and their company's HASP.

4.0 HAZARD EVALUATION AND CONTROL MEASURES

This section discusses the results of the hazard assessment that was conducted for this investigation. These activities were assessed to identify their chemical, physical, and biological hazards and are discussed below. Contaminants of potential concern (COPCs) that may be encountered include metals, volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), and polycyclic aromatic hydrocarbons (PAHs) in sediments in the vicinity of the U.S. Moorings property (KTA/TEC, 2010).¹

The Activity Hazard Analysis (AHA) for site activities is attached to this HASP (Attachment 2). The AHA will be reviewed and modified as necessary to reflect any site, procedural, or personnel changes.

¹ KTA/TEC, Inc., 2010, Final remedial investigation report, U.S. Moorings, Portland, Oregon: Report prepared by KTA/TEC, Inc., Bellevue, Washington, for U.S. Army Corps of Engineers, Portland District, Portland, Oregon, USACE HTRW contract W912DW-06-D-1007, May.

4.1 Risk Assessment

Risk is the likelihood of exposure to a given hazard. This subsection evaluates risk of exposure to potential site hazards.

4.1.1 Risks to Chemical Hazards

Chemical exposure to hazardous materials may include exposure to the COPCs identified in this section. Chemical exposure to hazardous wastes may include contact with or inhalation of contaminants present in contaminated sediment, surface water, or a splash hazard during decontamination procedures. Use of proper PPE, awareness, and air monitoring, when necessary, will reduce the potential for exposure. PPE requirements for the scoped tasks to be performed are discussed in Section 8.0. Final requirements will be based on periodic evaluation of the hazards associated with these tasks, and the determination for any changes will be made by the SSO, with concurrence from the HSO.

4.1.2 Risks to Physical Hazards

Risk of exposure to physical hazards varies from task to task and often with the time of the year. The hazards listed in the AHA represent low-to-moderate risks and are common to this type of fieldwork. Shannon & Wilson has developed a series of standard operating procedures for these physical hazards, which are provided within the Corporate HSP. Field personnel shall follow these procedures while performing their specific work tasks.

4.1.3 Risks to Biological Hazards

Direct contact with Willamette River water may be hazardous due to the potential for combined sewer overflow contamination. Use of proper PPE will reduce the potential for exposure.

4.2 Exposure Routes

Potential routes of exposure to the chemicals include inhalation, dermal contact, and ingestion of dust, mist, gas, vapor, or liquid. Exposure will be minimized by using safe work practices and by wearing the appropriate PPE. Further discussion of PPE requirements is presented in Section 8.0.

4.2.1 Inhalation

Inhalation of particulates, dust, mist, gas, or vapor during coring and sampling activities is possible. Whenever possible the coring equipment will be oriented so that personnel are upwind of the coring location. An organic vapor monitor (OVM) or photoionization detector (PID) will be used to monitor ambient air and the breathing zone within the work area for organic compounds. Table 2 describes OVM action levels and response procedures.

4.2.2 Dermal Contact

Dermal contact with potentially contaminated sediment or water is possible. Direct contact will be minimized through the use of appropriate PPE and decontamination procedures.

4.2.3 Ingestion

Ingestion of contaminants is a less likely route of exposure than inhalation or dermal contact for many of the contaminants of concern. Direct ingestion of contaminants can occur by inhaling airborne dust, mist, or vapors or swallowing contaminants trapped in the upper respiratory tract. Indirect ingestion can occur by introducing the contaminants into the mouth by way of food, tobacco, fingers, or other carriers. Although ingestion of contaminants can occur, proper decontamination/contamination reduction procedures should eliminate the probability of this route of exposure.

4.3 Chemical Hazards

COPCs include metals, VOCs, TPH, PAHs, and cyanide. In addition, there is some potential for exposure to hydrogen sulfide gas from native soil and hexane, which in rare cases may be used as a decontamination liquid. The COPCs have been identified based on previous sediment sampling that has occurred at the site. The COPCs for the designated areas are summarized below.

4.3.1 Polychlorinated Biphenyls (PCBs)

PCB-contaminated soil or dust inhalation could be encountered during this project. PCBs are fat-soluble and can accumulate in the lipids of animals, where they resist metabolic changes. Large concentrations of PCBs may produce irritation to the nose, throat, and lungs; may cause nausea and/or dizziness; and may result in aggravation of acne.

The primary exposure potential is anticipated to be from inhalation of dust particles or direct contact with contaminated soil. PCBs have an extremely low volatility, although they can be transported via dust particles. There is little likelihood of elevated airborne PCB concentrations unless significant airborne dust levels are observed. It is possible that skin contact will present a slight health threat. Therefore, personnel will be protected from skin contact with potentially contaminated sediment and/or decontamination liquid by using nitrile gloves, work clothes, and safety glasses, and by remaining upwind of the sampling and investigation activities as much as possible.

4.3.2 Volatile Organic Compounds (VOCs)

Petroleum hydrocarbon-related VOCs may be present in the soil and/or groundwater at the site. Many VOCs can cause central nervous system depression and irritation, and some are known or suspected carcinogens.

Based on the history of the project location, it is possible that an inhalation health threat or direct contact threat may exist with respect to VOC-contaminated sediment or decontamination water. Therefore, a PID will be used to evaluate that personnel are not exposed to airborne levels of VOCs. In addition, field personnel will perform work duties upwind of the sampling activities, where practicable, and personnel will wear nitrile gloves to prevent skin contact.

4.3.3 Semivolatile Organic Compounds (SVOCs)

SVOCs, which include carcinogenic and non-carcinogenic PAHs, have been associated with increased risk of lung and skin cancers. The primary risk of exposure on this project is through skin contact with contaminated soil and decontamination water. Nitrile gloves will be worn to prevent skin contact with potential SVOC contaminants. The likelihood of the presence of elevated levels of airborne SVOCs is low. Most SVOCs have a low volatility. Nevertheless, a PID will be used to monitor workers' breathing zones during the field investigation activities to ensure that airborne levels of volatile organics are below specified action levels. Inhalation of PAHs is unlikely due to their nonvolatile nature. Dermal or eye contact with PAHs can cause irritation or burning.

4.3.4 Total Petroleum Hydrocarbons (TPH)

Petroleum hydrocarbons at the site include tar and oil related materials in sediments, which contain benzene and aromatic hydrocarbons. Gasoline, diesel, fuel, and waste oil, and

heavier hydrocarbons such as grease may also be present associated with sampling equipment. Volatile components of gasoline include benzene, toluene, ethylbenzene, and xylenes (BTEX). The primary exposure routes for petroleum hydrocarbons during field activities are inhalation, dermal contact, and ingestion of contaminated sediment, dust, or water. Lighter petroleum hydrocarbons such as gasoline and benzene readily volatilize and are primarily an inhalation concern. The primary route of exposure to heavier petroleum hydrocarbons is dermal contact. The target organs primarily affected by prolonged exposure to petroleum hydrocarbons are the respiratory system, central nervous system, kidneys, liver, and skin. Prolonged dermal contact with petroleum hydrocarbons can cause irritation or dermatitis. The BTEX compounds are known or suspected human carcinogens.

It is possible that an inhalation health threat may exist with the presence of TPH. Therefore, an organic vapor monitor (e.g., PID) will be used to ensure that personnel are not exposed to airborne levels of petroleum hydrocarbons. The hazards are minimized by limiting dust-generating activities and by protecting against skin contact with contaminated soil and water. Thus, personnel will wear nitrile gloves, work uniforms or coveralls, and safety glasses at all times during the fieldwork. Based on the time of the year this project will occur, exposure via dust generation is considered to be low. Respiratory protection will be employed if elevated levels of organic compounds are measured, if odors are present, or other conditions warrant its use.

Petroleum hydrocarbons such as gasoline are also flammable and can be a physical hazard when present in high concentrations. Physical hazards associated with flammable compounds are addressed in Section 4.4.10. Combustion of petroleum hydrocarbons can produce carbon dioxide, carbon monoxide, aldehydes, fumes, smoke (particulate matter), and other products of incomplete combustion. Intentional and inadvertent combustion of petroleum hydrocarbons is not expected during sampling activities; however, personnel will be removed from the area should a fire occur.

4.3.5 Metals

Based on the history of the project, it is possible that an inhalation health threat may exist with respect to metal-contaminated soil and/or decontamination water during the field investigation. Potential routes of exposure include percutaneous absorption, ingestion, and skin and eye contact.

Heavy metals have a wide variety of harmful effects and symptoms, depending on the particular metal. Based on the field activities that are planned for this project, there is little likelihood of elevated, airborne, heavy metals concentrations. Heavy metals may be transported via dust particles, but dust generation is unlikely for the anticipated field activities and for the time of the year when this project will occur. It is possible that skin contact will present a slight health threat. Therefore, personnel will be protected from skin contact with potentially contaminated soil and/or groundwater by wearing nitrile gloves, work uniforms or coveralls, and safety glasses at all times during the fieldwork.

4.3.6 Hydrogen Sulfide

Hydrogen sulfide is a naturally occurring gas often associated with organic clay and peat. Hydrogen sulfide gas is potentially toxic through inhalation, ingestion, and contact with the skin and eyes. Inhalation can result in respiratory irritation, rhinitis, and edema of the lungs. Inhalation of hydrogen sulfide gas can result in headache, dizziness, and agitation. Acute exposure at high concentrations may result in coma and death as a result of respiratory failure. Hydrogen sulfide gas has a distinct rotten egg odor, and will be noted if encountered in the field.

4.3.7 Hexane

If necessary, a hexane rinse may be applied to remove hydrocarbon-type compounds to achieve adequate equipment decontamination. Exposure to high concentrations of hexane usually occurs by inhalation. Effects of inhalation may include shallow breathing, possible tachycardia, vertigo or giddiness, nausea, and vomiting. Dermal exposure may result in dermatitis or conjunctival irritation. Eye exposure may cause irritation and requires irrigation.

4.3.8 Cyanide

Cyanide has been detected in onshore soil, groundwater, and in-water sediment. The primary risk of exposure on this project is through skin contact with contaminated sediment and decontamination water. Nitrile gloves will be worn to prevent skin contact. The likelihood of the presence of elevated levels of airborne cyanide is low.

4.4 Physical Hazards

Potential physical hazards associated with the field investigation activities to be performed include mechanical equipment hazards, electrical hazards, heat and cold stress, noise, vehicular traffic, heavy equipment, heavy lifting, unsafe structures, slips, trips, and falls, and overwater hazards. The potential physical hazards are discussed below.

4.4.1 Electrical Hazards

Occupational Safety and Health Administration (OSHA) regulations require that employees who may be exposed to or required to work near electrical equipment be trained to recognize the associated hazards and use the appropriate control methods. Field personnel that will be required to perform such tasks will be properly trained in accordance with OSHA regulations prior to performing their tasks.

4.4.2 Noise

Heavy equipment or operating machinery may produce noise levels that exceed 85 decibels, scale (dBA) for personnel working in or around these areas. Thus, hearing protection must be worn by personnel exposed to noise levels of 85 dBA or greater. Noise measurements, if conducted, should be performed with sound level meters in slow response mode, or with noise dosimeters having a beginning collection point established at 80 dBA. A general guideline to follow is if a conversation cannot be held with a person 4 feet from you without raising your voice, the noise levels are too high and hearing protection should be worn. Anyone within a 20-foot radius of heavy equipment or machinery in operation will wear hearing protection.

4.4.3 Slips, Trips, and Falls

Caution should be exercised to prevent slips on slick surfaces. In particular, sampling from a floating platform requires careful attention to minimize the risk of falling down or falling overboard. The same care should be used in rainy conditions. Field personnel will be required to wear appropriate footwear and to be aware of surroundings when moving about the site.

The deck of the vessel may have numerous stationary fittings and tie-downs that present potential tripping hazards. Trips are always a hazard on the uneven deck of a boat or in a cluttered work area. Field personnel will be required to keep work areas as free as possible from items that interfere with walking and will be aware of stationary obstacles on deck.

Falls may be avoided by working as far away from exposed edges as possible. For this project, the potential for falling is associated primarily with deployment and recovery drill rig pipes, rods, and well casing through the “moonhole” of the vessel, boarding and disembarking the vessel at the dock, and when moving sampling equipment and supplies. Personnel will keep walkways and work areas clear when possible.

4.4.4 Vibracore Equipment

Sediment samples will be collected using vibracore equipment operated from a marine vessel. Prior to initiation of sampling on the vessel, there will be a training session for all field personnel pertaining to the equipment that will be onboard the sampling vessel. The captain will review vessel-specific hazards and safety procedures and will point out the location and proper use of all safety equipment. Field personnel will be shown the locations of all fire extinguishers, flotation rings, and first aid kits and their appropriate uses.

Extreme caution must be taken by all personnel working around mechanical equipment, pumps, and heavy equipment. Only authorized personnel should be allowed in the vicinity of such equipment. All personnel must avoid standing within the turning radius of the equipment or below any suspended load. Loose clothing, jewelry, long hair, or other items that have the potential to come in contact with rotating/operating equipment are prohibited. Job sites must be kept as clean and orderly as possible to prevent unsafe walking and working conditions.

When water is used, care must be taken to avoid creating muddy or slippery conditions. If slippery conditions are unavoidable, barriers and warning signs must be used to warn personnel of these dangers.

4.4.5 Falling Overboard

Sampling will be conducted from a sampling vessel. As with any work completed overwater, there is a chance of falling overboard. A personal flotation device (PFD) for each crew person will be available in the boat at all times. PFDs will be worn and properly buckled and zipped as appropriate, by all personnel on or over water, regardless of work zone.

4.4.6 Manual Lifting

The use of some sampling equipment involves heavy lifting. To assure personnel safety, the following lifting guidelines will be employed at the site:

- If available, use mechanical equipment to move heavy objects.
- If possible, use two individuals to lift heavy objects, use three individuals to lift the 20-foot cores.
- Lift loads with legs and not backs.
- Establish steady footing when lifting the load.
- Spread feet no wider than shoulder width when lifting.

- Use only one person to give commands when conducting team-lifting activities.

4.4.7 Heat Stress

Field personnel may be required to perform their work tasks in ambient temperatures of 70°F or above or while wearing impervious clothing. All personnel must be instructed on the symptoms of the primary heat-related disorders and how to minimize their chances of becoming affected by them. These disorders, their symptoms, and first-aid measures are outlined below:

- **Heat Rash:** Decreased ability to tolerate heat raised red vesicle on affected areas, and clothes that chafe. Maintain good personnel hygiene and use drying powders or lotions.
- **Heat Cramps:** Muscle spasms and pain in the extremities and abdomen. Rest in cool area and drink plenty of fluids. If pain persists, seek medical attention.
- **Heat Exhaustion:** Shallow breathing; pale, cool, moist, clammy skin; profuse sweating; dizziness; lassitude; and fainting. Rest in a cool area and drink plenty of fluids. Get medical attention prior to returning to work.
- **Heat Stroke:** Red, hot, dry skin; no perspiration; nausea; dizziness; confusion; strong rapid pulse; coma. Cool victim immediately with cool or cold water. Seek immediate medical attention.

At a minimum, personnel wearing non-breathable clothing at temperatures greater than 70°F, should take a break every one to two hours and drink plenty of fluids. The intake of an average of one quart of fluids per hour is recommended. A cool or shaded rest area should be provided.

4.4.8 Hypothermia

Field personnel will be instructed on the signs and symptoms and the prevention of cold-related disorders prior to performing specific work tasks. The two major effects of cold stress are frostbite and hypothermia. Wind chill as well as wetness or water immersion can play a significant role. These disorders, their symptoms, and first-aid measures are outlined below:

- **Frostbite:** Sudden blanching of the skin progressing to skin with a waxy or white appearance that is firm to the touch, but the tissue beneath the skin is resilient to the touch.
- **Hypothermia:** The symptoms of systematic hypothermia are exhibited as follows: (a) shivering, (b) apathy, listlessness, and (sometimes) rapid cooling of the body to less than 90°F, (c) unconsciousness, glassy stare, slow pulse, and slow respiratory rate, (d) freezing of the extremities, and (e) death.

Personnel will monitor themselves and other team members for signs of frostbite and hypothermia. Additional signs, preventive measures, operating procedures, and guidelines are provided in Section 10.0 of this plan.

Body temperatures below 90°F require immediate treatment. Current medical practice recommends slow warming of the individual followed by professional medical care. Moving the person to a sheltered area and wrapping them in a blanket can accomplish this portion of the task. If possible, the person should be placed in a warm room. In emergency situations where body temperature falls below 90°F and shelter is not available, a sleeping bag, blankets, and body heat from another individual can be used to help raise body temperature.

4.4.9 Weather

In general, field team members will be equipped for the normal range of weather conditions. The SSO will be aware of current weather conditions and of the potential for those conditions to pose a hazard to the field crew. Some conditions that might force work stoppage are electrical storms, high winds, or high waves resulting from winds.

4.4.10 Flammable Hazards

Petroleum hydrocarbons are flammable in moderate to high concentrations. Therefore, smoking, open flames, and unprotected ignition sources will not be allowed in the work area. An OVM will be used to measure concentrations of organic vapors (i.e., benzene) in the work area. If elevated OVM measurements persist, work will be suspended until corrective measures are taken to ensure a safe work environment.

4.5 Biological Hazards

Field personnel should be provided with the information and training necessary to avoid accidental injury or illness, which can result from exposure to biological hazards. This includes ensuring that the site is carefully assessed prior to work beginning in an area of the site so that the hazards associated with biological entities are recognized and eliminated or controlled. Potential biological hazards that may be present include exposure to river water contamination from CSOs.

Microbial hazards can occur when the materials that workers are handling are biologically contaminated. One source of infection is poor sanitation. Waterborne and food borne diseases can be a problem if adequate precautions are not taken to keep food and drinking water properly

stored and isolated. Tetanus is another form of biological hazard encountered on hazardous waste sites. Personnel will be required to wash their hands and face before eating, drinking, or smoking.

4.6 Activity Hazard Analysis

The activity hazard analysis summarizes the field activities to be performed during field activities, outlines the hazards associated with each activity, and presents controls that can reduce or eliminate the risk of the hazard occurring. The AHA for site activities is attached to this HASP (Attachment 2).

5.0 ACCIDENT PREVENTION PROGRAM

5.1 General Guidelines

Shannon & Wilson's APP is designed to reduce the incidence of accidents, illnesses, and near misses for personnel in the work place or at the jobsite. We strive to provide a work environment that is free from physical and chemical hazards. Because of the nature of our business; however, certain hazards cannot be eliminated. Thus, we have developed standard operating procedures and general health and safety guidelines in attempts to minimize these hazards. These procedures and guidelines are presented in our Corporate HSP. Each employee receives a copy of the Corporate HSP, knowledgeable of the contents of the plan, and is required to comply with the plan.

When an accident, illness, or near miss occurs, the employee must promptly notify the Project Manager and SSO. The following actions shall be taken upon notification of an accident, illness, or near miss.

5.2 Accident Investigation and Reporting

All accidents/incidents (injury or non-injury) will be investigated and reported in accordance with EM 385-1-1 and the procedures outlined in the Shannon & Wilson HSP. Additionally, Shannon & Wilson will internally document accidents in accordance with corporate policy and on Shannon & Wilson corporate safety forms. Reporting formats will be according to EM 385-1-1 and Shannon & Wilson policy.

The reporting format will include as a minimum:

- Description of incident

- Underlying cause
- Corrective action taken
- Risk of recurrence
- Corrective action taken to control future incidents

All recordable illness and accidents will be recorded on the appropriate OSHA 300, 300-A, or 301 forms. In addition, an accident/incident field report form will be completed by the injured employee, if able, or the Field Investigation Coordinator, with review and signature by the HSO or SSO.

All accidents will be reported to the Project Manager and SSO immediately with subsequent reporting to the Contracting Officer's Representative.

6.0 WORK ZONES AND ACCESS CONTROL

The purpose of site control is to minimize the health and safety risks to the field personnel and the general public by means of establishing work zones and control procedures. The vessel captain, onshore coring operator, and the SSO will delineate the boundaries of the work zones aboard the vessel and shoreline and will inform the field crews of the arrangement. The purpose of the zones is to limit the migration of sample material out of the zones and to restrict access to active work areas by defining work zone boundaries.

6.1 Work Zones

The following work zones will be established:

- **Exclusion zone:** The exclusion zone encompasses the sampling vessel where sediment sampling will occur. The sampling area will encompass the area where the samplers will be deployed and recovered. This area will be considered the exclusion zone only when samples are being handled on the vessel. For onshore activities, this zone will be comprised of the entire storage/logging area.
- **Contamination reduction zone (CRZ):** The CRZ during sediment handling is the entire vessel deck, except as noted in the preceding paragraph. Decontamination of both personnel and equipment will occur in this zone to prevent the transfer of chemicals of concern to the support zone. For onshore activities, this zone will be comprised of the area immediately outside the storage/logging area.
- **Support zone:** On the sampling vessel, the support zone will be located in the cabin of the vessel or tug boat or on the vessel deck when contaminated sediments are not on deck. For onshore activities, this zone will be comprised of the areas outside the exclusion zone and CRZ.

Sampling staff will instruct people to stay outside the exclusion zone while sample processing is occurring. Only staff required to enter the exclusion zone should be in the exclusion zone to avoid tracking contaminants into the contaminant reduction and support zones. Only personnel that are current with Hazardous Waste Operations and Emergency Response compliance and OSHA medical monitoring standards will be present on the sampling vessel.

6.2 Decontamination Area

All contaminated materials will be properly captured and disposed. A station will be set up for decontaminating sample processing equipment and personnel gear such as boots or PPE. The station will have the buckets, brushes, soapy water, rinse water, or wipes necessary to perform decontamination operations. Plastic bags will be provided for expendable and disposable materials. The decontamination fluids will be stored in sealable containers and will be disposed of in accordance with the procedures presented in Section 12.5.

6.3 Access Control/Site Control Log

Security and control of access to the sampling vessel and onshore area will be the responsibility of the captain and SSO. Access to the vessel and onshore areas will only be granted to necessary project personnel and authorized visitors. A log of all personnel visiting, entering, or working on the site will be maintained in the field logbook. The log shall include date, name, agency or company, and time entering and exiting the site. Before visitors are allowed to enter they must have the proper PPE required for that area.

7.0 STANDARD OPERATING SAFETY PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES

The work conducted as part of this project will be performed in accordance with the contract specifications, EM 385-1-1, 29 Code of Federal Regulations (CFR) 1910.120, 29 CFR 1926, and Shannon & Wilson's Corporate HSP.

7.1 Shannon & Wilson Standard Operating Procedures

Shannon & Wilson has developed its own Standard Field Operating Procedures that meet the requirements set forth in the documents referenced above. These are contained in the Corporate HSP. These procedures include guidelines for the following: general site rules, heavy construction equipment operations, housekeeping, fall protection, electrical hazards, fire protection and prevention, excavation and trenching, lockout/tagout procedures, etc. All

Shannon & Wilson personnel are familiar with these procedures and are required to follow them while performing applicable work tasks.

7.2 Engineering Controls

As standard policy, Shannon & Wilson maintains that, whenever possible, engineering controls will be used to reduce employee exposure to hazards. Specific engineering controls should be addressed on a task-specific basis. When appropriate, where engineering controls either do not adequately reduce the risk of exposure to specific hazards or are infeasible, PPE will be designated and implemented to reduce the risk of exposure. Engineering controls that may be implemented during core logging are outlined in Paragraph 11.3.

7.3 Daily Safety Meetings

Prior to daily work commencing, a tailgate safety meeting will take place to review site-specific issues, such as:

- Individual responsibilities and the chain of command (highest-ranking able employee directs and commands any emergency activities until he/she is relieved of authority by a higher-ranking person).
- Prevention and recognition of emergencies (any employee may stop work if an emergency is recognized).
- Evacuation routes, safe distances, and places of refuge (proceed to the nearest access point, typically upwind and uphill).
- All field personnel are required to attend the meetings.

7.4 Work Practices

The following work practices shall be followed by the field personnel working on this project:

- Site activities will be planned ahead of time. If changes have to be made, they should be well thought out and have the approval of the Project Manager or HSO prior to implementation.
- Work areas will be established for various operational activities.
- Procedures for leaving a contaminated area must be planned and implemented prior to going to the site. Work areas and decontamination procedures must be established on the basis of prevailing site conditions.
- Personnel and equipment in the contaminated area should be minimized, consistent with effective site operations.

- The "buddy system" should be observed. Never enter or exit a site alone or work in an isolated area alone.
- Contact with contaminated surfaces or with surfaces suspected of being contaminated should be avoided. Whenever possible, avoid puddles, mud, or other discolored surfaces; kneeling on the ground; leaning, sitting, or placing equipment on drums, containers, or the ground.
- Climbing over or under refuse, containers, or other obstacles should be avoided.
- Unusual behavior from other team members, which may indicate fatigue, stress, or illness should be reported.
- Personal physical condition of each field representative should be monitored--do not hesitate to rest or seek medical attention.
- Medicine and alcohol can increase the effects from exposure to toxic chemicals. Prescribed drugs should not be taken by personnel if there is a likelihood of such exposure. Alcoholic beverages are strictly prohibited on site.
- Facial hair, which interferes with a satisfactory fit to the mask-to-face-seal is not allowed on personnel required to wear respiratory protection equipment.
- Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking or any other activities.
- Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.
- Situations should not be assumed to be as safe as they appear to be.
- Weather conditions and wind changes should be monitored.
- Sharp objects should be avoided.
- Employees should be aware of the safe and proper use, storage and maintenance of any tools and equipment on site, including hand and portable powered equipment, compressed gas cylinders and cold cutting saws.
- Eating, drinking, chewing gum or tobacco, and smoking or any practice that increases probability of hand-to-mouth transfer and ingestion of material shall be allowed in designated areas only.
- Employees should dispose of used disposable outerwear in appropriate storage and disposal containers.
- Employees should change from their street clothes to their work clothes prior to entering the site, and change back into street clothes prior to leaving the site.

8.0 PERSONAL PROTECTIVE EQUIPMENT (PPE) AND SAFETY EQUIPMENT

The level of protection required to ensure the health and safety of field personnel will be determined by the HSO, based on the specific site activities, available instrumentation readings, and professional experience and judgment. Based on the specific tasks associated with the remedial investigation, field personnel shall wear Modified Level D PPE, depending on the task. The HSO/SSO will adjust the level of PPE required for a specific work task, as necessary.

The HSO, in conjunction with the SSO, will establish action levels for minimum levels of protection for each area of the site where investigation activities will occur. The action levels will remain the same, but the level of protection may change due to changing site conditions.

8.1 Modified Level D Personal Protective Equipment (PPE)

Modified Level D PPE will be the initial requirement for this investigation. The HSO/SSO will upgrade and/or change the level of PPE as field conditions warrant. Modified Level D PPE includes the following:

- Coveralls or work clothes (dictated by weather).
- Tyvek coveralls or rain gear (optional).
- Gloves (outer), chemical/liquid-resistant when there is a potential for wet work or contact with contaminated materials.
- Gloves (inner), chemical/liquid-resistant (surgical nitrile) when there is a potential to contact contaminated materials.
- Leather safety boots/shoes with chemical-resistant soles and steel-toed shanks (when necessary).
- Safety glasses.
- Chemical resistant boot covers when chemical hazards are present.
- Chemically protective safety boots as an alternative to leather boots with boot covers.
- Hardhat (with splash shield during high splash activities) and safety glasses.
- Hearing protection (where appropriate).

Use of Tyvek coveralls or rain gear on site where work functions preclude splashes of chemicals or long- term contact with contaminated soil or water will be at the discretion of the SSO.

8.2 Level C Personal Protective Equipment (PPE)

If elevated (see Table 1) concentrations of vapors are measured with the OVM, significant contaminant odors are noted, or significant amounts of airborne particulate matter are generated, health and safety requirements may be upgraded to Level C if implementation of engineering controls (i.e., fans) do not decrease the airborne concentrations to acceptable levels. Level C PPE includes the equipment listed under Modified Level D plus:

- Half-face or full face respirator
- Organic vapor/acid gas cartridges, if appropriate
- Particulate filter cartridge, if appropriate

8.3 Considerations for Selecting Levels of Protection

Factors to be considered in selecting the appropriate level of PPE include heat and cold stress; air monitoring results; chemical, physical, and biological hazards associated with the task; routes of exposure; and weather conditions. The HSO will determine the level of PPE required for the specific work task following an evaluation of these factors. The SSO will be responsible for ensuring that all field personnel adhere to the PPE requirements. Based on existing information and data for the activities to be performed, Modified Level D PPE will be the initial requirement for authorized tasks. Exposure to elevated airborne concentrations of contaminants above the respective PELs is considered to be low for this investigation; thus, the use of respiratory protection is anticipated only as an option inside structures. However, if site conditions, field activities, or air-monitoring results indicate the need for respiratory protection during other field activities, the SSO and HSO will evaluate the initial activities to be performed by site personnel, and if necessary, modifications to the PPE requirements will be implemented.

8.4 Personal Protective Equipment (PPE) for Visitors

Site visitors will be required to have the appropriate PPE prior to site entry. No personnel will be allowed to enter the site if they do not have the appropriate PPE.

**TABLE 1
CHEMICAL HAZARDS ASSESSMENT**

Chemical Hazard	TLV/PEL	Route of Exposure	Signs and Symptoms
Petroleum Hydrocarbons (based on gasoline)	PEL-TWA = 300 ppm STEL = 500 ppm	Eye, Skin, Inhalation, Ingestion	Irritated eyes, skin, and mucous membranes; dermatitis; headache, fainting, blurred vision, dizziness, slurred speech, confusion, and convulsions; chemical pneumonia (aspiration); possible liver, kidney damage; carcinogen.
Polychlorinated Biphenyls (PCBs)	TLV = 0.5 mg/m ³ (skin) STEL = 5 mg/m ³	Inhalation, Skin, Ingestion, Eye	Skin and eye irritation on contact. Chloracne. Liver damage. Possible carcinogen. Headaches or numbness may occur if ingested.
Heavy Metals	TLV varies depending on the metal present	Skin, Ingestion, Eye	Skin and eye irritation, dermatitis, headache, and nausea. Ingestion can result in liver or kidney damage.
Volatile Organic Compounds (VOCs)	TLV varies depending on the VOC present	Inhalation, Skin, Ingestion, Eye	Irritated eyes, skin, nose, respiratory system; narcosis, headache, nausea, staggered gait, fatigue; anorexia; anesthesia, central nervous system depression, dermatitis; some may be carcinogens.
Cyanide	TLV = 5 mg/m ³ (skin) STEL = 5 mg/m ³	Skin, Ingestion, Eye	Nausea, vomiting, increased rate and depth of respiration or respiration slow and gasping
Polynuclear Aromatic Hydrocarbons (PAHs)	TLV varies depending on the PAH present	Skin, Ingestion, Eye	Irritated eyes, skin, upper respiratory, mucous membranes; dermatitis, headache, bronchitis, hyper pigmentation of skin; possible liver, kidney damage; some may be carcinogens.

Notes:

mg/m³ = milligram per cubic meter

PEL = permissible exposure limit

ppm = parts per million (milligrams per liter [mg/L])

STEL = 15-minute short-term exposure

TLV = threshold limit value

TWA = time-weighted average

8.5 Safety Equipment

Basic emergency and first aid equipment will be available in the support vehicle, provided by Shannon & Wilson and/or subconsultants. All field personnel will be informed of the locations of the safety equipment and the proper use of the equipment. Equipment will be checked daily to

ensure its readiness for use. PFDs will be worn and properly buckled and zipped as appropriate, by all personnel on or over water, regardless of work zone.

8.6 Communications

Several different means of communication may be utilized by field personnel in order to communicate emergency and non-emergency information. These devices may include but are not limited to:

- Radios – Two-way radio units may be utilized by field teams for communication between field operations and support services.
- Telephones – Field personnel will carry cellular telephones while conducting work in the field.
- Hand Signals – Hand signals may be used on site to communicate safety, emergency response, and evacuation procedures. If this means of communication is to be utilized in the field, all field personnel will be familiar with the hand signals prior to the start of the fieldwork.

9.0 MEDICAL SURVEILLANCE PROGRAM

9.1 Medical Monitoring

All field personnel must meet the medical monitoring requirements of 29 CFR 1910.120. The regulations require that employers implement a medical monitoring program consistent with paragraph (f) of this standard, which states that a medical examination will be completed for each employee prior to employment, annually thereafter (minimum), and as a follow-up to injuries or over-exposures, and upon termination of their employment with the company. Employees who must receive medical examinations include those who wear a respirator for 30 or more days a year, and those who are or may be exposed to hazardous substances at or above PELs, regardless of respirator use, for 30 days or more a year.

Any personnel injured or suspected of being injured as a result of an uncontrolled release of a hazardous substance or energy, or other emergency situation, will be given a medical evaluation as soon as possible thereafter.

9.2 Medical Records Availability

Shannon & Wilson's employee medical records are available upon request from the HSO or the Human Resources Manager, with the employee's permission. The SSO will confirm medical certification to work and wear respiratory protection, and keep a copy of the certification

(containing certifying physician's signature) in the personnel files in the Seattle office. Physical examination forms shall be released only with the individual employee's approval.

10.0 MONITORING PROCEDURES FOR OVERWATER ACTIVITIES

A monitoring program that addresses the potential site hazards will be maintained. The monitoring program includes self-monitoring by the field crew and monitoring with instruments.

10.1 Self Monitoring

All personnel will be instructed to look for and inform each other of changes in their physical or mental condition during the performance of all field activities. Examples include:

- Headaches
- Dizziness
- Nausea
- Blurred vision
- Cramps
- Irritation of eyes, skin, or respiratory system
- Changes in complexion or skin color
- Changes in apparent motor coordination
- Increased frequency of minor mistakes
- Excessive salivation or changes in papillary response
- Changes in speech ability or speech pattern
- Symptoms of heat stress or heat exhaustion (Section 4.4.7)
- Symptoms of hypothermia (Section 4.4.8)

If any of these conditions develop, the personnel) will be moved from the immediate work location and evaluated. If further assistance is needed, personnel at the local hospital will be notified, and an ambulance will be summoned if the condition is thought to be serious. If the condition is the result of sample collection or processing activities, procedures and/or PPE will be modified to address the problem.

10.2 Air Monitoring

Routine air monitoring of the work areas will be required during the fieldwork. Two types of air monitoring will be performed: perimeter air monitoring and breathing zone air monitoring. Due to the anticipated contaminants that will be encountered during the fieldwork and the age of the contaminants, it is not likely that benzene (considered to be the most hazardous of COPCs that personnel could be exposed to during fieldwork) will be encountered in significant quantities. Therefore, an action level of 5 parts per million (ppm), sustained for over one minute in the

breathing zone, has been established for this project. The air monitoring action levels established for this project are summarized in Table 2.

**TABLE 2
AIR MONITORING ACTION LEVELS**

Instrument/Containment/ Exposure Limit	Instrument Response/ Action Limits	Action
PID Meter	< background reading > 5 ppm sustained for 1 minute in the breathing zone	Continue operations. Stop work until readings fall below background, or notify the SSO and HSO. Reassess work plan.
Hydrogen Cyanide Monitor	< background reading > 4 ppm sustained for 1 minute in the breathing zone	Continue operations. Stop work until readings fall below background, or notify the SSO and HSO. Reassess work plan.

Notes:

HSO = Health and Safety Officer

PID = photoionization detector

ppm = parts per million

SSO = Site Safety Officer

10.2.1 Perimeter Air Monitoring

Air monitoring will be conducted during all intrusive activities using a PID to measure volatiles. The instrument will provide real-time measurements of airborne contaminant concentrations and provide the site workers with an additional level of protection against exposure to contaminants or explosive environments.

The meter should be calibrated in accordance with the manufacturer's guidelines on a daily basis prior to the start of that day's field activities. Monitoring of the air within the work zone should be performed at 15-minute intervals in the beginning of the day for a period of one hour. This frequency may be reduced to every 60 minutes after the initial hour of monitoring; however, the decision to reduce the monitoring intervals per hour will be decided based on the initial hour measurements. If no indication of airborne gases or volatiles is detected above the action levels after the first four measurements, air monitoring may be reduced to every 60 minutes. However, if at any time airborne concentrations are detected above the action levels, monitoring frequency will be increased. If sustained elevated levels are detected by the PID, workers will either evacuate the area for a sufficient period of time to allow the concentrations to return to normal, or the decision will be made to upgrade the level of PPE.

Although there are potential contaminants that could pose an airborne particulate concern, efforts will be taken to minimize the visible dust generated during the project. As long as there is not a sufficient amount of visible dust present, perimeter dust monitoring will not be performed.

10.2.2 Breathing Zone Monitoring

Due to the anticipated contaminants that may be encountered during the fieldwork and the age of the contaminants, it is not likely benzene will be encountered in significant quantities. Therefore, an action level of 5.0 ppm sustained for one minute in the worker's breathing zone has been established for this project. If PID readings exceed this established action level, the area may have to be evacuated for a period of time to allow levels to return to below action levels, alternative engineering controls may be implemented to lower the levels such as keeping all field personnel upwind of the borehole, or an upgrade to Level C PPE will be required, which includes the use of respirators. If sustained elevated PID readings are obtained during the fieldwork, personnel will have to evaluate whether they are due to an external source such as a generator or vehicle or if the elevated readings are due to the presence of site contamination.

11.0 MONITORING PROCEDURES FOR ONSHORE ACTIVITIES

11.1 Initial Evaluation

After extraction, the vibracores will be transported to an onshore structure where they will be temporarily stored, then opened, viewed, and logged. Due to the presence of volatile and semi-volatile contaminants in the sediment samples the vibracores will most likely off-gas during the logging phase of the project creating potential worker exposures to the contaminants present. The primary contaminants of concern include: phenanthracene, naphthalene, PAHs, and benzene.

11.2 Air Monitoring

11.2.1 Direct Read Exposure Monitoring

We will use direct read instruments, including a photo-ionization detector (PID) with a 10.6 eV lamp, and chemical-specific colorimetric detector tubes for TCE and vinyl chloride. The PID, calibrated to an isobutylene standard, will be used throughout the logging activities to measure the concentration of total ionizable volatile organic compounds. The PID will be calibrated on a prior to use and bump tested daily. Since the PID is not capable of providing information regarding the concentrations of specific contaminants chemical-specific colorimetric tubes for benzene will be used periodically to provide this information. Chemical-specific

colorimetric detector tubes, capable of measuring concentrations down to, at least, the PELs, and typically the action limits, of the contaminants of interest will be used.

We will maintain a daily log in which pertinent measurements and observations are recorded.

11.2.2 Worker Exposure Monitoring

In addition to the direct read instruments, we will conduct worker exposure monitoring by placing 3M 3520 organic vapor monitoring (OVM) badges in the breathing zones of representative workers during core logging activities. These worker exposure samples will be sent to an accredited laboratory under chain-of-custody control for analysis of more than 30 VOCs, including benzene that may be present in the sediment. The laboratory analytical results will be compared with applicable PELs.

11.3 Engineering Controls

During core logging activities, engineering controls may be required to reduce airborne contaminant levels within the onshore structure. We will have box fans and/or industrial fans which can be used to enhance air movement in the logging area. Fans will be set up in open doors and windows and operated if direct read instruments indicate a potential for exposure to elevated concentrations of contaminants. The fans may also be operated if the individual(s) conducting core logging activities request enhanced air movement. Based on weather conditions at the time of core logging the use of fans to provide enhanced air movement may significantly affect the temperature inside the shed used to log the samples. We assume no supplemental heating is required.

12.0 DECONTAMINATION

Decontamination is necessary to prevent the migration of contaminants from the work zone(s) into the surrounding environment and to minimize the risk of exposure of personnel to contaminated materials. The following sections discuss personnel and equipment decontamination.

Washing facilities will be established on site or near the site. All personnel shall be informed of the location of these facilities. If necessary, mobile washing facilities will be established on the sampling vessel and at a designated onshore location and will consist of water, soap, means of drying, and receptacles for waste. An adequate supply of drinking water will be available near

work areas. Water coolers or water bottles will be clearly marked as to their contents. Toilet facilities are available nearby.

12.1 Minimization of Contamination

One of the most important aspects of decontamination is the prevention of contamination. By practicing preventative measures, the potential for worker exposure and cross-contamination should be minimized. Typical preventative measures include the following:

- Do not walk through areas of obvious or known contamination.
- Do not handle or touch contaminated materials directly.
- Make sure all PPE has no cuts or tears prior to donning.
- Fasten all closures on suits, covering with tape if necessary.
- Take particular care to protect any skin injuries.
- Stay upwind of airborne contaminants.
- Implement dust controls, as necessary.
- Do not carry cigarettes, gum, etc. into the work area.
- Place clean equipment on a plastic sheeting to avoid direct contact with contaminated media.
- Keep contaminated equipment and tools separate from clean equipment and tools.
- Fill sample containers over a plastic tub to contain spillage.
- Clean up spilled material immediately to avoid tracking around the vessel.
- Cover instrument with clear plastic, leaving openings for sampling ports and sensor points.
- Bag sample containers prior to emplacement of sample material.

12.2 Personnel Decontamination

The SSO will ensure that all site personnel are familiar with personnel decontamination procedures. Decontamination procedures will include the following:

- Wash and rinse outer gloves and boots in portable buckets
- If suit is heavily soiled, rinse it off
- Remove outer gloves, inspect and discard if damaged, leave inner gloves on
- Remove inner gloves and wash hands if taking a break

- Don necessary PPE before returning to work
- Dispose of soiled PPE before leaving for the day

Disposable PPE will be worn by field personnel performing general field investigation and decontamination activities. All reusable boots and gloves will be decontaminated using soap and water solution and scrub brushes, or simple removal and disposal, if the PPE is disposable. All waste (decontamination liquids and PPE) generated during decontamination procedures will be stored on site in 55-gallon drums for subsequent disposal pending the associated analytical results. If necessary, disposal of decontamination wastes will be through certified disposal transporters/operators according to the waste characteristics.

12.3 Sampling Equipment Decontamination

Before daily use, all portable monitoring equipment will be bagged or contained in such a way as to allow for simple decontamination procedures. Exposed parts shall be cleaned with wet cloths and/or alcohol wipes.

Non-disposable sampling equipment will be decontaminated. The following procedures will be used to decontaminate equipment:

- Dislodge gross contamination from sampling utensils.
- Scrub with appropriate brush in a phosphate-free detergent.
- Rinse with tap water.
- Rinse with distilled water.
- Rinse with hexane (only if required based on contaminants present).
- Air dry.

12.4 Heavy Equipment Decontamination

The use of heavy equipment is anticipated only during drum transfer. Decontamination of heavy equipment is not anticipated to be required.

12.5 Handling of Investigation-derived Waste

All discarded materials, waste materials, or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left on site. All disposable PPE or sampling equipment (e.g., outer boots and gloves, spoons, aluminum pans, Tyvek suits, towels, etc.) shall be bagged in heavy-duty plastic and placed in 55-gallon drums (with drill cuttings) for appropriate disposal.

13.0 TRAINING REQUIREMENTS

All field team members will complete a site-specific training session of sufficient duration to ensure that they are familiar with site-specific hazards, protective equipment, site control, decontamination, emergency procedures, and security procedures. The SSO will provide site-specific training to new personnel using the training curriculum developed by the HSO. This training must be provided prior to their starting work. Visitors to the site will receive training adequate to address specific tasks, hazards, and protection measures associated with their visit. All training will be documented as to the contents of the training and field personnel in attendance at the training. Names of the personnel in attendance and the topics covered will be documented and kept in the project files.

13.1 Site-specific Training – Initial

An initial site-specific training session shall be conducted by the SSO prior to commencement of significant site work. This training shall cover site hazards, procedures, and all contents of the HASP, and Sections 01.B.02 and 28.D.03 of EM 385-1-1. All field personnel will attend this training. Elements to be covered as part of the site-specific training include:

- Names of personnel and alternates responsible for the site safety and health emergency response for hazardous waste operations.
- Chemical, physical, and biological hazards present at both sites.
- Use, care, maintenance, and limitations of PPE.
- Work practices by which the employees can minimize potential risks from the site hazards.
- Safe use of engineering controls and equipment on the site.
- Medical surveillance requirements, including recognition of symptoms and signs that might indicate overexposure to hazards.
- Use of monitoring equipment.
- Vessel safety practices.
- Description of first aid kit locations.
- Over water safety and PFD usage.
- Emergency response procedures.

13.2 Daily Safety Briefings

Prior to daily work commencing, the SSO or a designee will conduct and document a tailgate safety meeting to review site-specific issues, such as:

- Individual responsibilities and the chain of command (highest-ranking able employee directs and commands any emergency activities until he/she is relieved of authority by a higher-ranking person).
- Prevention and recognition of emergencies (any employee may stop work if an emergency is recognized).
- Activities expected for the day.
- Evacuation routes, safe distances, and places of refuge (proceed to the nearest access point, typically upwind and uphill).

13.3 Site-specific Training – Visitor Training

All visitors to the site will be required to check in with the Field Investigation Coordinator/SSO. Depending on the purpose of their visit, the visitors will receive an orientation briefing from the Field Investigation Coordinator/SSO, which will include site-specific hazards, ways to protect themselves from these hazards, locations of first aid and emergency equipment, and the emergency response procedures.

13.4 Hazard Communication Program

It is Shannon & Wilson's policy to ensure that information regarding the hazards of any of the materials and/or processes located or performed at either site are transmitted to field personnel through hazard recognition techniques, training, identification through labels and warnings signs, Material Safety Data Sheets (MSDSs)/Safety Data Sheets (SDSs), and other information as required in the OSHA 29 CFR 1926.59, Hazard Communication Standard. A description of the Shannon & Wilson Hazard Communication Program is provided in the APP with a more detailed description provided in the Shannon & Wilson Corporate HSP. Copies of MSDSs/SDSs for hazardous materials that will be brought to the field are provided in Appendix E.

14.0 RECORDING AND RECORD KEEPING

Each day the Field Investigation Coordinator/SSO will include a record the safety procedures, equipment used, weather conditions, and level of PPE used during that day's fieldwork. As necessary, other documentation will be obtained or initiated by the SSO. Other documentation

may include field change requests, medical and training records, exposure records, accident/incident report forms, OSHA Form 200s, and material safety data sheets.

15.0 EMERGENCY RESPONSE PLAN

This section describes contingencies and emergency planning procedures to be implemented during the field investigation. OSHA regulations require that an emergency response plan be available for use to guide actions in emergency situations. All incidents will be dealt with in a manner to minimize health risks to field personnel and the surrounding environment. In the event of an incident, the following procedures shall be completed at a minimum:

- First aid and other appropriate initial action will be administered by properly trained personnel closest to the incident. This assistance will be conducted in a manner to assure that those rendering assistance are not placed in a situation of unacceptable risk.
- All incidents will be reported to and documented by the SSO, who is responsible for coordinating the emergency response in an efficient, rapid, and safe manner. The SSO will perform emergency equipment inspections to check that standard equipment is available on site to address likely emergencies.
- In the event of an accident or emergency, all workers on site are responsible to conduct themselves in a mature, calm manner to avoid spreading danger to themselves, the surrounding workers, or the community in general.

Potential incidents fall under four general classifications: (a) chemical releases to the atmosphere, soil, or surface water; (b) fire or explosion; (c) worker injury or illness; and (d) severe weather conditions such as tornado and lightning storms.

The initial response to any emergency will be to protect human health and safety. Secondary response to the emergency will be identification, containment, treatment and disposal of contaminated materials. The local Fire Department will be called in all situations in which fires or explosions have occurred by dialing 911.

If a chemical release has occurred, the first step is notification of field personnel. If the release is determined to be within the on-site emergency response capabilities, the SSO will implement the necessary remedial action. If the incident results in chemical concentrations at the site perimeter exceeding the action levels specified in Section 10.2, the SSO will notify the appropriate support agencies or groups. The SSO should instruct a person on site to immediately contact local authorities to inform them of the possible or immediate need for neighborhood evacuation. If a significant release has occurred, the National Response Center should then be contacted. This

group will alert National or Regional Response Teams as necessary. Following these emergency calls, the reporting individual should then notify the Project Manager and HSO.

In the event of a medical emergency, personnel will take direction from the SSO (or alternate team leader if the SSO is injured), notify the appropriate emergency organization, and implement the following procedures:

- Call 911.
- Identify location, request medical assistance, provide name and telephone number.
- Notify Shannon & Wilson's HSO and file an accident report.

If a non-life-threatening/serious injury occurs, the local hospital will be contacted for assistance, prior to transporting the victim(s). A copy of a map showing the directions from the site to the Hospital is attached to this HASP (Attachment 3).

15.1 Key Safety Personnel

Key safety personnel are listed in the Contact Information sheet attached to this HASP (Attachment 1). The following people share responsibility for health and safety at the site. See Section 3.0 for a description of the role and responsibility of each.

15.2 Pre-emergency Preparation

Before the start of field activities, the SSO will ensure that preparation has been made in anticipation of emergencies. Preparatory actions include the following:

- All field personnel meeting with the SSO or the captain (if on shipboard) and equipment handlers concerning the emergency procedures in the event that a person is injured. Appropriate actions for specific scenarios will be reviewed. These scenarios will be discussed and responses determined before the sampling event commences.
- A training session given by the SSO and captain informing all field personnel of emergency procedures, locations of emergency equipment and their use, and proper evacuation procedures.
- A training session given by senior staff operating field equipment, to apprise field personnel of operating procedures and specific risks associated with that equipment.
- Ensuring that field personnel are aware of the existence of the emergency response plan, its location as Section 14.0 of this HASP, and ensuring that a copy of the HASP accompanies the field team(s).

15.3 Emergency Response Contacts

All field personnel will have access to the emergency contact list provided in the HASP. This list includes local emergency responders and medical facilities, appropriate government officials, and those providing technical information such as the Poison Control Center.

If an emergency occurs that requires outside agency assistance or notification, site employees are instructed never to leave an emergency notification on an answering machine, but rather call the 24-hour emergency answering service number if no one answers the primary number.

15.4 Emergency Response and Alerting Procedures

In the event of an emergency that necessitates the evacuation of the site, such as a chemical release or fire or explosion, field personnel will implement the following procedures:

- Field personnel will be alerted by sounding a portable horn, radio contact, or direct verbal means. (When air horns are used, two sustained blasts followed by one or two blasts will notify all personnel to exit along the pre-established evacuation routes.)
- Personnel in the work zone may or may not perform field decontamination prior to leaving the work zone depending on the nature of the incident requiring the evacuation. In the event it is a fire or explosion, these individuals will evacuate to either the primary or secondary meeting point (location will be based on wind direction).
- Concurrent to the evacuation of field personnel, notification will be immediately made by dialing 911, indicating location of the incident, and providing information to local responders.

Immediately following an evacuation, a head count will be taken. Upon his/her arrival, the SSO, or his designated alternate, will advise the fire commander of the location, nature, and identification of the hazardous materials on site.

15.5 Decontamination

In the case of evacuation, decontamination procedures will be performed only if doing so does not further jeopardize the welfare of site workers. If an injured individual is also heavily contaminated and must be transported by emergency vehicle, the emergency response team will be told of the type of contamination. To the extent possible, contaminated PPE will be removed, but only if doing so does not exacerbate the injury. Plastic sheeting will be used to reduce the potential for spreading contamination to the inside of the emergency vehicle.

15.6 Fire

Personnel will attempt to control only small fires, should they occur. If an explosion appears likely, personnel will follow evacuation procedures specified by the captain or SSO. If a fire cannot be controlled with a fire extinguisher that is part of the required safety equipment, personnel will either withdraw from the vicinity of the fire or use additional firefighting equipment, or evacuate the boat or onshore area as specified by the captain or SS in the training session.

15.7 Natural Disaster

When a severe storm warning has been issued or when a lightning storm occurs, the information will be immediately relayed to all field personnel who shall be notified to stand by for emergency procedures. After the storm warning is cancelled and the storm passes, the SSO will inspect all on-site equipment to ensure its readiness for operation. If any equipment has been damaged, the work will not be restarted until the equipment has been repaired or replaced.

If the SSO's inspection indicates that a fire, explosion, or release has occurred as the result of a severe weather condition, he/she will follow the appropriate procedures outlined in this section.

15.8 Spills and Spill Containment

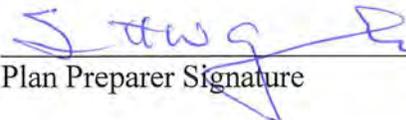
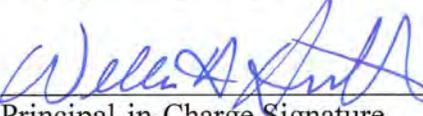
As necessary, spill control measures will be used to contain contaminated materials that may enter into clean areas. Plastic sheeting, sorbent pads, sorbent booms, or a spill control system will be used to prevent spills and contain contaminated material.

If a spill occurs, the SSO will immediately discuss the event with U.S. Environmental Protection Agency or its oversight contractor to evaluate the need for reporting. Any spill will be reported consistent with state and federal law. In the case of a reportable spill, the National Response Center (800-424-8802) and Oregon Emergency Response System (800-452-0311) will be notified by the SSO (or designee) or the Project Manager.

16.0 HEALTH AND SAFETY PLAN (HASP) REVIEW APPROVAL

Site Health and Safety Plan Certification: A written, current, Site Health and Safety Plan, which meets the requirements of OSHA Standard 1910.120 and U.S. Army Corps of Engineers Safety and Health Requirements has been documented in the Shannon & Wilson Corporate Health and Safety Manual that is maintained at the Shannon & Wilson Corporate and Field Offices. This overall Site Health and Safety Plan is written in compliance with industry standards, regulations and guidelines utilizing documents including the U.S. Army Corps of Engineers Safety and Health Requirements Manual EM 385-1- 1 (dated 3 November 2003).

We, the undersigned, have reviewed this plan, are familiar with its contents, and agree to abide by all the provisions herein:

 Plan Preparer Signature	10/11/13 Date
 Project Manager Signature	11 OCT 2013 Date
 Principal-in-Charge Signature	11 OCT 2013 Date

17.0 HEALTH AND SAFETY PLAN (HASP) REVIEW

I acknowledge that I have read the HASP for the US Moorings project and I understand the job hazards and safe job practices summarized in Job Hazard Analysis. I have met with the Project Manager to discuss the project details and any questions I have related to my personal safety. I also acknowledge that I have read the Corporate Health and Safety Program documents for other Health and Safety Requirements.

Signature _____ Date _____

ACT:SWG/act

ATTACHMENT 1
CONTACT INFORMATION

Sediment Investigation, U.S. Government Moorings, Portland, Oregon

Health and Safety Plan Contact Information

Project Role	Name	Phone number
Project Manager	Agnes Tirao	206-695-6881
Principal in Charge	Will Hultman	206-695-6816
Health & Safety Officer	Joe Laprade	206-695-6713
Site Safety Officer	Senior On Site Field Representative	
Client Contact	Sharon Gelinias	206-764-6075
Facility Manager	Arthur Leskowich	503-808-5407
Fire		911
Ambulance		911
Hospital	Legacy Good Samaritan Medical Center	503-413-7711

Shannon & Wilson expects its employees to follow the policies and procedures set forth in this document and in the corporate health and safety program. Employees at all level of the organization are covered by this requirement. In certain cases, deviations to a policy or procedure may be appropriate, but any changes must be justifiable and documented. Changes in this program will only be made with the prior approval of the Site Safety Officer (SSO).

The goal on this project, as on all Shannon & Wilson projects, is to experience zero injuries and to remain in full compliance with applicable federal, state, and local health and safety requirements. Personnel accountable for employees' safety and health on this project include the Project Manager (PM), SSO, and the Health and Safety Officer (HSO).

The PM has the ultimate responsibility to ensure that the project conforms to contract specifications and that all activities are conducted safely. The PM can order Shannon & Wilson's field activities to be suspended if he/she feels that the project may be jeopardized by not doing so. The SSO, who may also be the field representative on site, is responsible for implementing the SSHSP during the project field tasks. The HSO is responsible for reviewing and approving this plan to ensure it is consistent with field exploratory guidelines. Only trained subcontractors and field staff will be used for this project.

ATTACHMENT 2
ACTIVITY HAZARD ANALYSIS

Activity/Work Task:	Sediment Coring Observation	Overall Risk Assessment Code (RAC) (use highest code):	H				
Project Location:	Portland, Oregon	Risk Assessment Code (RAC) Matrix					
Contract No.:	21-1-21880-007	Severity	Probability				
Date Prepared:	9/25/2013		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by: (Name/Title)	Agnes Tirao	Catastrophic	E	E	H	H	M
		Critical	E	H	H	M	L
Reviewed by: (Name/Title)	Will Hultman	Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
Notes: (Field notes, Review Comments, Etc.) • Project Name/No.: US Government Moorings • Site Safety Manager: David Higgins • Description: Observation of Drilling, drilling 6 overwater boreholes using mud rotary drilling methods • Req'd Permits: Site-specific health and safety plan, Environmental Clearance (to be provided by USACE) • Req'd Personal Protective Equipment (PPE): safety glasses, hard hat, high visibility vest, safety toe boots, ear plugs, work gloves (nitrile)		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above) "Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely. "Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.			RAC Chart <div style="background-color: red; padding: 5px; text-align: center;">E = Extremely High Risk</div> <div style="background-color: orange; padding: 5px; text-align: center;">H = High Risk</div> <div style="background-color: yellow; padding: 5px; text-align: center;">M = Moderate Risk</div> <div style="background-color: green; padding: 5px; text-align: center;">L = Low Risk</div>		
Job Steps	Hazards	Controls					RAC
<u>Travel to and from site.</u>	1. Vehicle breakdown	1. • Confirm that vehicle is in good condition before operating. Bring cell phone in case of emergency.					L
	2. Improper operation of vehicle	2. • Only S&W employees with a valid drivers license shall operate S&W vehicles.					L
	3. Injury due to vehicular accident	3. • Confirm that vehicle is in good condition before operating. • Check that mirrors, seat belts, and controls are adjusted correctly. • All vehicle occupants shall wear seat belts. • Do not use cell phone while driving. • Use defensive driving techniques. • Obey traffic rules and speed limits. • Reduce speed, especially when line-of-sight is limited. • Use turnouts to allow for passing vehicles • Take care when driving on slippery surfaces. Use tire chains when necessary.					L
<u>General work on site.</u>	1. Eye or head injury, hearing loss, cuts and abrasions	1. • Wear appropriate clothing and required Personal Protective Equipment (see top of form for required PPE).					L
	2. Injury from distraction or collision	2. • Confirm that you can be seen by traffic, pedestrians, and/or onlookers.					L
	3. Dehydration, fatigue, disorientation	3. • Stay hydrated and keep your body fueled (eat regularly).					L
	4. Fatigue, overexertion	4. • Take breaks, as necessary. • Be aware of reduced work performance (mistakes) and signs of fatigue and stop work if necessary. • Get at least 7 hours of rest in between work periods.					L

Job Steps	Hazards	Controls	RAC
	5. Injury from inability to see	5. • Have appropriate lighting to perform the work. • Have a portable flashlight or other lighting device to travel beyond lighted areas. • Be aware of hidden hazards in unlighted areas.	L
	5. Heat exhaustion/heat stroke (working in PPE)	5. • Be aware of signs of heat exhaustion and heat stroke. • Adjust work schedules as possible to work in cooler parts of day (rest during hotter parts of day). • Establish shaded area or cool shelter nearby for resting. • Maintain body electrolytes and hydration.	L
	5. Frostbite, hypothermia due to cold weather	5. • Be aware of signs of frostbite and hypothermia. • Stay dry. Wear rain gear and have extra clothing available in case primary clothing gets wet. • Stay warm. Wear appropriate layered clothing and footwear. • Establish a warm shelter area or vehicle nearby to warm up.	L
	6. Slips, trips, falls on icy/slippery surfaces	6. • Take care when walking on slippery surfaces.	L
	7. Injury from inclement weather conditions	7. • Check weather report prior to planning work for the day. Do not work if dangerous storms are predicted. • When observing lightning, go to a safe place and use 30-30 rule. • In open areas, seek lowest spot and squat as low as possible. • Stay away from metal objects. • Stay away from tall, isolated objects, open fields, or areas where you may be the tallest object. • Seek shelter in a building or enclosed vehicle. Do not touch steering wheel, knobs, ignition, or radio.	L
<u>Walking around site</u>	1. Sprains, strains, broken bones	1. • Wear appropriate foot protection.	L
	2. Slips, trips, falls	2. • Use caution when working on uneven and wet ground surfaces. • Keep work area clear of debris, tools, and other materials that are not in use.	L
<u>Working on an active operations and maintenance site</u>	1. Injury due to not being seen	1. • Ask Contractor/operators where you can work/observe safely without interfering with their operations. • Make sure the Contractor knows where you will be working on the site. • Get permission from operators and maintain eye contact when moving around working equipment. • Watch and listen for equipment operating near your work zone. • Watch for overhead hazards. Do not work under crane operations. • Keep clear of moving loads and equipment	L
<u>Working on a slope or area of uneven ground</u>	1. Injury due to slips, trips, and falls	1. • Watch out for soft ground areas and/or holes when you are walking. • Wear appropriate foot and ankle protection.	L
	2. Injury due to falling or settling equipment	2. • Do not place equipment or materials near the top of existing slopes that may be unstable.	L
	3. Injury due to not being seen	3. • Do not walk alone in ravines, slopes, or other areas where you cannot be seen.	L
<u>Working overwater</u>	1. General	1. • Do not work alone. • Wear a USCG-approved personal flotation device (PFD-Type III). • Check weather report to confirm safe working conditions (avoid storms). • Stop work if water conditions become hazardous (e.g. high swell, storms, etc.) • Have a throwable Type IV ring buoy with attached line available.	M

Job Steps	Hazards	Controls	RAC
	2. Injury due to falling overboard	2. • Take care when exiting and entering boat from land or barge.	M
	3. Storm induced waves	3. • Make sure the barge or boat is securely anchored at the work location.	L
<u>Working indoors (geotech lab testing/Option Item 1)</u>	1. Inhalation of volatile gases	1. • Make sure that space is properly ventilated.	M
	2. Accumulation of vapors from contaminated media and/or motorized equipment	2. • Make sure that space is properly ventilated.	M
<u>Working near the public</u>	1. Injury to public	1. • Be aware of public onlookers. Make sure they stay outside of work zone. • Provide safe route for the public around the work area. • Make sure public is notified of the work (signs, newsletters, handouts). • Avoid extended conversations with the public - stay focused on your work. • Provide barriers for activities accessible to the public.	L
<u>Soil sampling (geotech lab testing/Option Item 1)</u>	1. Contact with potentially contaminated soil	1. • Wear appropriate PPE, including nitrile gloves, work clothes, and safety glasses • Use proper hygiene	M
	2. Inhalation of volatile gases	2. • Conduct air monitoring and remain upwind whenever possible • Discontinue work if monitoring levels do not decline or engineering controls are not effective	M
<u>Decontaminate equipment</u>	1. Contact with potentially contaminated decontamination solutions	1. • Wear appropriate PPE, including nitrile gloves, work clothes, and safety glasses	H
<u>Handle investigation derived waste/rock core</u>	1. Back strain	1. • Use proper drum/core handling procedures and equipment	L
<u>Vibracore setup</u>	1. Utility damage, explosion, electrocution due to contact with a utility	1. • Make sure utilities have been located/marked prior to drilling. • Provide general boring location information to subcontractor. Allow subcontractor to select exact location, when possible. • Check overhead utilities in work area. Must be at least 10 feet from power lines. • Do not excavate closer than 10 feet to marked utility lines without hand digging to confirm utility location.	L
	2. Injury due to shifting or overturning equipment	2. • Check to make sure ground is stable in area of equipment.	L
	3. Injury due to vehicle impact	3. • Check to make sure vibracore is clear of traffic or other adjacent activities.	L
	4. Injury due to equipment impact	4. • Stay clear of vibracore as it is setting up.	L
<u>Working around a vibracore</u>	1. Injury due to equipment impact	1. • Stay clear of vibracore operating area • Agree with driller as to a safe location for soil/core sample inspection. • Stay clear of drilling equipment when rods/casing is being added/removed.	L
	2. Hearing loss	2. • Wear appropriate PPE (see top of form), including ear protection.	L
	3. Eye injury due to mud/water spray	3. • Wear appropriate PPE (see top of form), including eye protection. • Stay away from back of rig during drill rod breaks.	L
	4. Head injury due to falling or shifting loads	4. • Observe caution with overhead hazards	L

Job Steps	Hazards	Controls	RAC
	5. Injury due to uncontrolled vibracore operation	5. • Know where the "kill" switch is located on the vibracore.	L
<u>Lifting of samples or other heavy items</u>	1. Back injury due to lifting of heavy objects	1. • Stretch muscles before lifting. • Lift with the knees. • When lifting, maintain an upright position and avoid bending and twisting. • Keep the body as close to the load as possible. • Keep the travel distance for the lift to less than 10 feet. • Provide good handles or handholds for grasping loads. • Get assistance from others when possible • Wear back protection, if necessary	L
<u>Using hoists or lifts</u>	1. Injury from moving drums from barge to upland areas	1. • Develop and follow a site-specific fall protection plan. • Follow manufacturer's recommendations for use. • Wear appropriate fall protection • Do not work alone. • Make sure bottom of lift is protected from outside impacts.	L
<u>Parking Lot</u>	1. Injury due to vehicle impact	1. • Make sure traffic control equipment is in place (typically signs and cones). • Follow approved traffic control plan and street use permit, if applicable. • Wear appropriate PPE (see top of form) and high visibility clothing.	L
	2. Vehicular accidents, slips, trips, and falls	2. • Keep Pavement clear of mud, debris, or other materials. • Make sure site is clean and free of obstructions before you leave. • Wear appropriate PPE (see top of form) and high visibility clothing.	L

Equipment to be Used	Training Requirements/Competent or Qualified Personnel Name(s)	Inspection Requirements
First aid kit	Current First Aid certification is required for all S&W employees but use of first aid kit is permitted for anyone.	Check to make sure kit is complete prior to use at site. Replace used or outdated items.
Fire extinguisher	Fire extinguisher use training preferred, but use of fire extinguisher is permitted for anyone in an emergency.	Monthly inspection by S&W and yearly professional inspection. Check to make sure the inspection tag is not expired.
Vehicles	Valid driver's license	Routine inspection by S&W so that vehicles meet the requirements for safe operation on roads. Seat belts shall be in good working order with no visible damage or alterations.
Personal Protective Equipment	Not applicable	PPE shall be in good working order with no visible damage or alterations.

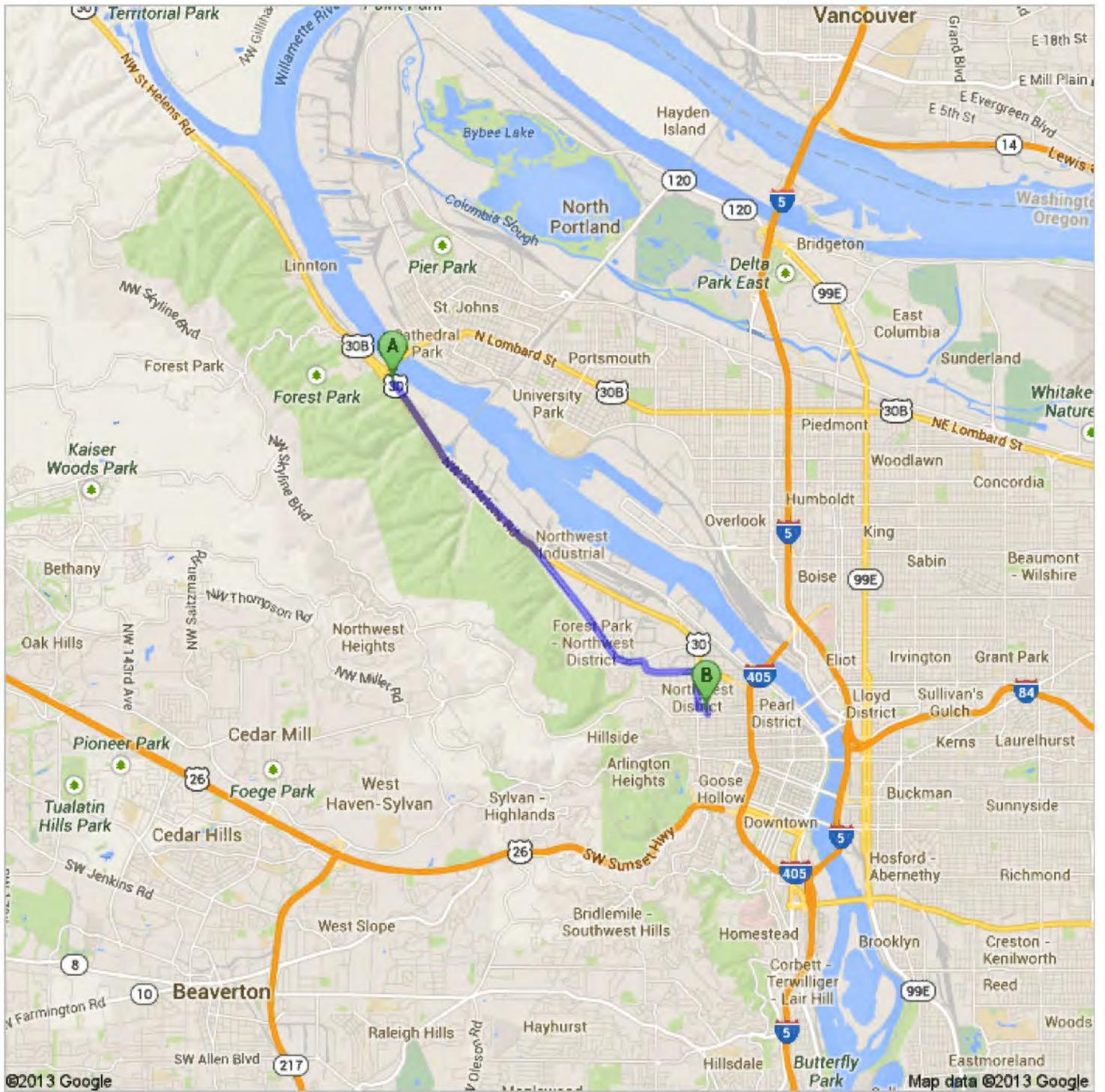
ATTACHMENT 3
DIRECTIONS TO HOSPITAL



Directions to Legacy Good Samaritan Medical Center

1015 NW 22nd Ave, Portland, OR 97210

5.3 mi – about 11 mins



APPENDIX E

**MATERIAL SAFETY DATA SHEETS (MSDSs)/
SAFETY DATA SHEETS (SDSs)**



Material Safety Data Sheet

1 - Chemical Product and Company Identification

Manufacturer: WD-40 Company Address: 1061 Cudahy Place (92110) P.O. Box 80607 San Diego, California, USA 92138 -0607 Telephone: Emergency only: 1-888-324-7596 (PROSAR) Information: 1-888-324-7596 Chemical Spills: 1-800-424-9300 (Chemtrec) 1-703-527-3887 (International Calls)	Chemical Name: Organic Mixture Trade Name: WD-40 Aerosol Product Use: Lubricant, Penetrant, Drives Out Moisture, Removes and Protects Surfaces From Corrosion MSDS Date Of Preparation: 6/8/12
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2 – Hazards Identification

Emergency Overview: DANGER! Flammable aerosol. Contents under pressure. Harmful or fatal if swallowed. If swallowed, may be aspirated and cause lung damage. May cause eye irritation. Avoid eye contact. Use with adequate ventilation. Keep away from heat, sparks and all other sources of ignition. Symptoms of Overexposure: Inhalation: High concentrations may cause nasal and respiratory irritation and central nervous system effects such as headache, dizziness and nausea. Intentional abuse may be harmful or fatal. Skin Contact: Prolonged and/or repeated contact may produce mild irritation and defatting with possible dermatitis. Eye Contact: Contact may be irritating to eyes. May cause redness and tearing. Ingestion: This product has low oral toxicity. Swallowing may cause gastrointestinal irritation, nausea, vomiting and diarrhea. This product is an aspiration hazard. If swallowed, can enter the lungs and may cause chemical pneumonitis, severe lung damage and death. Chronic Effects: None expected. Medical Conditions Aggravated by Exposure: Preexisting eye, skin and respiratory conditions may be aggravated by exposure. Suspected Cancer Agent: Yes No <input checked="" type="checkbox"/>
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3 - Composition/Information on Ingredients

Ingredient	CAS #	Weight Percent
Aliphatic Hydrocarbon	64742-47-8	45-50
Petroleum Base Oil	64742-58-1 64742-53-6 64742-56-9 64742-65-0	<25
LVP Aliphatic Hydrocarbon	64742-47-8	12-18
Carbon Dioxide	124-38-9	2-3
Non-Hazardous Ingredients	Mixture	<10

4 – First Aid Measures

Ingestion (Swallowed): Aspiration Hazard. DO NOT induce vomiting. Call physician, poison control center or the WD-40 Safety Hotline at 1-888-324-7596 immediately. Eye Contact: Flush thoroughly with water. Remove contact lenses if present after the first 5 minutes and continue flushing for several more minutes. Get medical attention if irritation persists. Skin Contact: Wash with soap and water. If irritation develops and persists, get medical attention.
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Inhalation (Breathing): If irritation is experienced, move to fresh air. Get medical attention if irritation or other symptoms develop and persist.

5 – Fire Fighting Measures

Extinguishing Media: Use water fog, dry chemical, carbon dioxide or foam. Do not use water jet or flooding amounts of water. Burning product will float on the surface and spread fire.

Special Fire Fighting Procedures: Firefighters should always wear positive pressure self-contained breathing apparatus and full protective clothing. Cool fire-exposed containers with water. Use shielding to protect against bursting containers.

Unusual Fire and Explosion Hazards: Contents under pressure. Keep away from ignition sources and open flames. Exposure of containers to extreme heat and flames can cause them to rupture often with violent force. Vapors are heavier than air and may travel along surfaces to remote ignition sources and flash back.

6 – Accidental Release Measures

Wear appropriate protective clothing (see Section 8). Eliminate all sources of ignition and ventilate area. Leaking cans should be placed in a plastic bag or open pail until the pressure has dissipated. Contain and collect liquid with an inert absorbent and place in a container for disposal. Clean spill area thoroughly. Report spills to authorities as required.

7 – Handling and Storage

Handling: Avoid contact with eyes. Avoid prolonged contact with skin. Avoid breathing vapors or aerosols. Use only with adequate ventilation. Keep away from heat, sparks, pilot lights, hot surfaces and open flames. Unplug electrical tools, motors and appliances before spraying or bringing the can near any source of electricity. Electricity can burn a hole in the can and cause contents to burst into flames. To avoid serious burn injury, do not let the can touch battery terminals, electrical connections on motors or appliances or any other source of electricity. Wash thoroughly with soap and water after handling. Keep containers closed when not in use. Keep out of the reach of children. Do not puncture, crush or incinerate containers, even when empty.

Storage: Store in a cool, well-ventilated area, away from incompatible materials. Do not store above 120°F or in direct sunlight. U.F.C (NFPA 30B) Level 3 Aerosol.

8 – Exposure Controls/Personal Protection

Chemical	Occupational Exposure Limits
Aliphatic Hydrocarbon	1200 mg/m ³ TWA (manufacturer recommended)
Petroleum Base Oil	5 mg/m ³ TWA, 10 mg/m ³ STEL ACGIH TLV 5 mg/m ³ TWA OSHA PEL
LVP Aliphatic Hydrocarbon	1200 mg/m ³ TWA (manufacturer recommended)
Carbon Dioxide	5000 ppm TWA (OSHA/ACGIH), 30,000 ppm STEL (ACGIH)
Non-Hazardous Ingredients	None Established

The Following Controls are Recommended for Normal Consumer Use of this Product

Engineering Controls: Use in a well-ventilated area.

Personal Protection:

Eye Protection: Avoid eye contact. Always spray away from your face.

Skin Protection: Avoid prolonged skin contact. Chemical resistant gloves recommended for operations where skin contact is likely.

Respiratory Protection: None needed for normal use with adequate ventilation.

For Bulk Processing or Workplace Use the Following Controls are Recommended

Engineering Controls: Use adequate general and local exhaust ventilation to maintain exposure levels below that occupational exposure limits.

Personal Protection:

Eye Protection: Safety goggles recommended where eye contact is possible.

Skin Protection: Wear chemical resistant gloves.

Respiratory Protection: None required if ventilation is adequate. If the occupational exposure limits are exceeded, wear a NIOSH approved respirator. Respirator selection and use should be based on contaminant type, form and concentration. Follow OSHA 1910.134, ANSI Z88.2 and good Industrial Hygiene practice.

Work/Hygiene Practices: Wash with soap and water after handling.

9 – Physical and Chemical Properties

Boiling Point:	361 - 369°F (183 - 187°C)	Specific Gravity:	0.8 – 0.82 @ 60°F
Solubility in Water:	Insoluble	pH:	Not Applicable
Vapor Pressure:	95-115 PSI @ 70°F	Vapor Density:	Greater than 1
Percent Volatile:	70-75%	VOC:	412 grams/liter (49.5%)
Coefficient of Water/Oil Distribution:	Not Determined	Appearance/Odor	Light amber liquid/mild odor
Flash Point:	122°F (49°C) Tag Open Cup (concentrate)	Flammable Limits: (Solvent Portion)	LEL: 0.6% UEL: 8.0%
Pour Point:	-63°C (-81.4°F) ASTM D-97	Kinematic Viscosity:	2.79-2.96cSt @ 100°F

10 – Stability and Reactivity

Stability: Stable

Hazardous Polymerization: Will not occur.

Conditions to Avoid: Avoid heat, sparks, flames and other sources of ignition. Do not puncture or incinerate containers.

Incompatibilities: Strong oxidizing agents.

Hazardous Decomposition Products: Carbon monoxide and carbon dioxide.

11 – Toxicological Information

The oral toxicity of this product is estimated to be greater than 5,000 mg/kg based on an assessment of the ingredients. This product is not classified as toxic by established criteria. It is an aspiration hazard. None of the components of this product is listed as a carcinogen or suspected carcinogen or is considered a reproductive hazard.

12 – Ecological Information

No data is currently available.

13 - Disposal Considerations

If this product becomes a waste, it would be expected to meet the criteria of a RCRA ignitable hazardous waste (D001). However, it is the responsibility of the generator to determine at the time of disposal the proper classification and method of disposal. Dispose in accordance with federal, state, and local regulations.

14 – Transportation Information

DOT Surface Shipping Description: Consumer Commodity, ORM-D

After 1/1/2014 UN1950, Aerosols, 2.1 Ltd. Qty (Note: Shipping Papers are not required for Limited Quantities unless transported by air or vessel – each package must be marked with the Limited Quantity Mark)

IMDG Shipping Description: UN1950, Aerosols, 2.1, LTD QTY

ICAO Shipping Description: UN1950, Aerosols, flammable, 2.1 NOTE: WD-40 does not test aerosol cans to assure that they meet the pressure and other requirements for transport by air. We do not recommend that our aerosol products be transported by air.

15 – Regulatory Information

U.S. Federal Regulations:

CERCLA 103 Reportable Quantity: This product is not subject to CERCLA reporting requirements, however, oil spills are reportable to the National Response Center under the Clean Water Act and many states have more stringent release reporting requirements. Report spills required under federal, state and local regulations.

SARA TITLE III:

Hazard Category For Section 311/312: Acute Health, Fire Hazard, Sudden Release of Pressure

Section 313 Toxic Chemicals: This product contains the following chemicals subject to SARA Title III Section 313 Reporting requirements: None

Section 302 Extremely Hazardous Substances (TPQ): None

EPA Toxic Substances Control Act (TSCA) Status: All of the components of this product are listed on the TSCA inventory.

California Safe Drinking Water and Toxic Enforcement Act (Proposition 65): This product does not contain chemicals regulated under California Proposition 65.

VOC Regulations: This product complies with the consumer product VOC limits of CARB, the US EPA and states adopting the OTC VOC rules.

Canadian Environmental Protection Act: One of the components is listed on the NDSL. All of the other ingredients are listed on the Canadian Domestic Substances List or exempt from notification.

Canadian WHMIS Classification: Class B-5 (Flammable Aerosol)

This MSDS has been prepared according to the criteria of the Controlled Products Regulation (CPR) and the MSDS contains all of the information required by the CPR.

16 – Other Information:

HMIS Hazard Rating:

Health – 1 (slight hazard), Fire Hazard – 4 (severe hazard), Reactivity – 0 (minimal hazard)

SIGNATURE: _____



TITLE: Adm. Scientific Manager

REVISION DATE: June 2012

SUPERSEDES: March 2010

Safety Data Sheet

According to OSHA HCS 2012 (29 CFR 1910.1200)



Section 1: Identification

Product Identifier: **No. 2 Diesel Fuel**

Other means of identification: #2DSL ULS (All Grades); #2DSL HS (All Grades); #2DSL LS (All Grades); CARB DSL (All Grades); DIST CARB-Diesel (All Grades); Distillate,Diesel (All Grades); Gas Oil (All Grades); Hydrodewaxer Diesel (All Grades); Diesel Fuel (All Grades); EPA Diesel Fuel (All Grades); No. 2 Diesel (All Grades); No. 2 Diesel Fuel Oil (All Grades); No. 2 Distillate; No. 2 Diesel with Renewable Diesel (All Grades); Super Diesel Fuel (All Grades); Distillate Blend Stock; Fuels, Diesel; Virgin Diesel Fuel

SDS Number: **001847**

MARPOL Annex I Category: Gas Oils, Including Ship's Bunkers

Intended Use: Fuel

Uses Advised Against: All others

Emergency Health and Safety Number: Chemtrec: 800-424-9300 (24 Hours)

Manufacturer: Phillips 66 Company
P.O. Box 4428
Houston, Texas 77210

SDS Information:
Phone: 800-762-0942
Email: SDS@P66.com
URL: www.Phillips66.com

Customer Service:
800-527-5476 **Technical Information:** 800-527-5476

Section 2: Hazards Identification

Classified Hazards

H226 -- Flammable liquids -- Category 3
H315 -- Skin corrosion/irritation -- Category 2
H304 -- Aspiration Hazard -- Category 1
H332 -- Acute toxicity, Inhalation -- Category 4
H373 -- Specific target organ toxicity (repeated exposure) -- Category 2
H351 -- Carcinogenicity -- Category 2
H410 -- Hazardous to the aquatic environment, chronic toxicity -- Category 1

Other Hazards

Electrostatic charge may be generated during pumping and other operations

Label Elements



DANGER

Flammable liquid and vapor
Causes skin irritation
May be fatal if swallowed and enters airways
Harmful if inhaled
May cause damage to organs through prolonged or repeated exposure
Suspected of causing cancer
Very toxic to aquatic life with long lasting effects



Obtain special instructions before use; Do not handle until all safety precautions have been read and understood; Keep away from heat/sparks/open flames/hot surfaces. - No smoking; Keep away from any possible contact with water, because of violent reaction and possible flash fire; Ground/bond container and receiving equipment; Use explosion-proof electrical/ventilating/lighting equipment; Use only non-sparking tools; Take precautionary measures against static discharge; Do not breathe dust/fume/gas/mist/vapours/spray; Wash thoroughly after handling; Use only outdoors or in a well-ventilated area; Avoid release to the environment; Wear protective gloves / protective clothing / eye protection / face protection; Call a POISON CENTER or doctor/physician if you feel unwell; IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician; Do NOT induce vomiting; IF ON SKIN: Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower; IF ON SKIN: Wash with plenty of soap and water; If skin irritation occurs: Get medical advice/attention; IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing; Take off contaminated clothing and wash before reuse; In case of fire: Use dry chemical, carbon dioxide, or foam for extinction; Store in a well-ventilated place. Keep cool; Dispose of contents/container to approved disposal facility



Section 3: Composition / Information on Ingredients

Chemical Name	CASRN	Concentration ¹
Fuels, diesel, no. 2	68476-34-6	95-100
Naphthalene	91-20-3	<1

Total Sulfur: < 0.1 wt%

¹ All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Section 4: First Aid Measures

Eye Contact: If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

Skin Contact: Remove contaminated shoes and clothing, and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops, seek medical attention. Wash contaminated clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician. (see Note to Physician)

Inhalation (Breathing): If respiratory symptoms or other symptoms of exposure develop, move victim away from source of exposure and into fresh air in a position comfortable for breathing. If symptoms persist, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

Most important symptoms and effects, both acute and delayed: While significant vapor concentrations are not likely, high concentrations can cause minor respiratory irritation, headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue. Ingestion can cause irritation of the digestive tract, nausea, diarrhea, and vomiting. Dry skin and possible irritation with repeated or prolonged exposure.

Notes to Physician: When using high-pressure equipment, injection of product under the skin can occur. In this case, the casualty should be sent immediately to the hospital. Do not wait for symptoms to develop. High-pressure hydrocarbon injection injuries may produce substantial necrosis of underlying tissue despite an innocuous appearing external wound. These injuries often require extensive emergency surgical debridement and all injuries should be evaluated by a specialist in order to assess the extent of injury. Early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

Section 5: Fire-Fighting Measures

NFPA 704 Hazard Class

Health: 1 Flammability: 2 Instability: 0



0 (Minimal)
1 (Slight)
2 (Moderate)
3 (Serious)
4 (Severe)

Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Specific hazards arising from the chemical

Unusual Fire & Explosion Hazards: Flammable This material can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. This product will float and can be reignited on surface water. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Hazardous Combustion Products: Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Oxides of nitrogen and sulfur may also be formed.

Special protective actions for firefighters: For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

Section 6: Accidental Release Measures

Personal precautions, protective equipment and emergency procedures: Flammable Spillages of liquid product will create a fire hazard and may form an explosive atmosphere. Keep all sources of ignition and hot metal surfaces away from spill/release if safe to do so. The use of explosion-proof electrical equipment is recommended. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions: Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use foam on spills to minimize vapors. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

Methods and material for containment and cleaning up: Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal. If spilled on water remove with appropriate methods (e.g. skimming, booms or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations.

Recommended measures are based on the most likely spillage scenarios for this material; however local conditions and regulations may influence or limit the choice of appropriate actions to be taken.

Section 7: Handling and Storage

Precautions for safe handling: Keep away from ignition sources such as heat/sparks/open flame – No smoking. Take precautionary measures against static discharge. Nonsparking tools should be used. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe vapors or mists. Use only outdoors or in well-ventilated area. Wear protective gloves/clothing and eye/face protection. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8). Flammable May vaporize easily at ambient temperatures. The vapor is heavier than air and may create an explosive mixture of vapor and air. Beware of accumulation in confined spaces and low lying areas. Open container slowly to relieve any pressure. The use of explosion-proof electrical equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-70 and/or API RP 2003 for specific bonding/grounding requirements. Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing of high pressure hydraulic oil equipment.

For use as a motor fuel only. Do not use as a solvent due to its flammable and potentially toxic properties. Siphoning by mouth can result in lung aspiration which can be harmful or fatal.

The use of hydrocarbon fuel in an area without adequate ventilation may result in hazardous levels of incomplete combustion products (e.g. carbon monoxide, oxides of sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels.

Diesel engine exhaust contains hazardous combustion products and has been identified as a cancer hazard. Exposure should be minimized to reduce potential risk.

Static Accumulation Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding of tanks, transfer piping, and storage tank level floats are necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. Special care should be given to ensure that special slow load procedures for "switch loading" are followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such as gasoline or naphtha). For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.

Conditions for safe storage: Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Store only in approved containers. Post area "No Smoking or Open Flame." Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Section 8: Exposure Controls / Personal Protection

Chemical Name	ACGIH	OSHA	Other
Fuels, diesel, no. 2	TWA: 100 mg/m ³ Skin	---	TWA: 100 mg/m ³ (Phillips 66 Guidelines)

Naphthalene	STEL: 15 ppm TWA: 10 ppm 10 ppm TWA; skin; A3 - confirmed animal carcinogen with unknown relevance to humans; TLV basis: upper respiratory tract irritation Skin	TWA: 10 ppm : 50 mg/m ³	---
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Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

Eye/Face Protection: The use of eye protection that meets or exceeds ANSI Z.87.1 is recommended to protect against potential eye contact, irritation, or injury. Depending on conditions of use, a face shield may be necessary.

Skin/Hand Protection: The use of gloves impervious to the specific material handled is advised to prevent skin contact. Users should check with manufacturers to confirm the breakthrough performance of their products. Depending on exposure and use conditions, additional protection may be necessary to prevent skin contact including use of items such as chemical resistant boots, aprons, arm covers, hoods, coveralls, or encapsulated suits. Suggested protective materials: Nitrile

Respiratory Protection: Where there is potential for airborne exposure above the exposure limit a NIOSH certified air purifying respirator equipped with organic vapor cartridges/canisters may be used.

A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use. Air purifying respirators provide limited protection and cannot be used in atmospheres that exceed the maximum use concentration (as directed by regulation or the manufacturer's instructions), in oxygen deficient (less than 19.5 percent oxygen) situations, or under conditions that are immediately dangerous to life and health (IDLH).

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse.

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

Section 9: Physical and Chemical Properties

Note: Unless otherwise stated, values are determined at 20°C (68°F) and 760 mm Hg (1 atm). Data represent typical values and are not intended to be specifications.

Appearance: Straw colored to dyed red

Physical Form: Liquid

Odor: Diesel fuel

Odor Threshold: No data

pH: Not applicable

Vapor Density (air=1): > 3

Upper Explosive Limits (vol % in air): 10.0

Lower Explosive Limits (vol % in air): 0.3

Evaporation Rate (nBuAc=1): <1

Particle Size: N/A

Percent Volatile: Negligible @ ambient conditions

Flammability (solid, gas): N/A

Flash Point: 125 - 180 °F / 52 - 82 °C

Test Method: Pensky-Martens Closed Cup (PMCC), ASTM D93, EPA 1010

Initial Boiling Point/Range: 300 - 690 °F / 149 - 366 °C

Vapor Pressure: 0.40 mm Hg

Partition Coefficient (n-octanol/water) (Kow): No data

Melting/Freezing Point: No data

Auto-ignition Temperature: 500 °F / 260 °C

Decomposition Temperature: No data

Specific Gravity (water=1): 0.81-0.88 @ 60°F (15.6°C)

Bulk Density: 7.08 lbs/gal

Viscosity: N/D

Solubility in Water: Negligible

Section 10: Stability and Reactivity

Reactivity: Not chemically reactive.

Chemical stability: Stable under normal ambient and anticipated conditions of use.

Possibility of hazardous reactions: Hazardous reactions not anticipated.

Conditions to avoid: Avoid high temperatures and all sources of ignition. Prevent vapor accumulation.

Incompatible materials: Avoid contact with strong oxidizing agents and strong reducing agents.

Hazardous decomposition products: Not anticipated under normal conditions of use.

Section 11: Toxicological Information

Information on Toxicological Effects of Substance/Mixture

Acute Toxicity	Hazard	Additional Information	LC50/LD50 Data
Inhalation	Harmful if inhaled		4.65 mg/L (mist)
Dermal	Unlikely to be harmful		> 4.1 g/kg
Oral	Unlikely to be harmful		> 5 g/kg

Aspiration Hazard: May be fatal if swallowed and enters airways.

Skin Corrosion/Irritation: Causes skin irritation. Repeated exposure may cause skin dryness or cracking.

Serious Eye Damage/Irritation: Causes mild eye irritation.

Skin Sensitization: Not expected to be a skin sensitizer.

Respiratory Sensitization: Not expected to be a respiratory sensitizer.

Specific Target Organ Toxicity (Single Exposure): Not expected to cause organ effects from single exposure.

Specific Target Organ Toxicity (Repeated Exposure): May cause damage to organs through prolonged or repeated exposure. Repeated dermal application of petroleum gas oils for 90 days resulted in decreased liver, thymus, and spleen weights, and altered bone marrow function. Microscopic alterations included liver hypertrophy and necrosis, decreased hematopoiesis and lymphocyte depletion.

Carcinogenicity: Suspected of causing cancer. Petroleum middle distillates have been shown to cause skin tumors in mice following repeated and prolonged skin contact. Follow-up studies have shown that these tumors are produced through a non-genotoxic mechanism associated with frequent cell damage and repair, and that they are not likely to cause tumors in the absence of prolonged skin irritation.

Germ Cell Mutagenicity: Not expected to cause heritable genetic effects.

Reproductive Toxicity: Not expected to cause reproductive toxicity.

Other Comments: Diesel engine exhaust has been classified by the International Agency for Research on Cancer (IARC) and National Toxicology Program (NTP) as a carcinogen.

Information on Toxicological Effects of Components

Naphthalene

Carcinogenicity: Naphthalene has been evaluated in two year inhalation studies in both rats and mice. The US National Toxicology Program (NTP) concluded that there is clear evidence of carcinogenicity in male and female rats based on increased incidences of respiratory epithelial adenomas and olfactory epithelial neuroblastomas of the nose. NTP found some evidence of carcinogenicity in female mice (alveolar adenomas) and no evidence of carcinogenicity in male mice. Naphthalene has been identified as a carcinogen by IARC and NTP.

Section 12: Ecological Information

	<p>GHS Classification: H410 -- Hazardous to the aquatic environment, chronic toxicity -- Category 1 Very toxic to aquatic life with long lasting effects.</p>
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Toxicity: Experimental studies of gas oils show that acute aquatic toxicity values are typically in the range 2-20 mg/L. These values are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon compositions. They should be regarded as toxic to aquatic organisms, with the potential to cause long term adverse effects in the aquatic environment.

Persistence and Degradability: Gas oils are complex combinations of individual hydrocarbon species. Based on the known or expected properties of individual constituents, category members are not predicted to be readily biodegradable. Some hydrocarbon constituents of gas oils are predicted to meet the criteria for persistence; on the other hand, some components can be easily degraded by microorganisms under aerobic conditions.

Persistence per IOPC Fund definition: Non-Persistent

Bioaccumulative Potential: Gas oil components have measured or calculated Log Kow values in the range of 3.9 to 6 which indicates a high potential to bioaccumulate. Lower molecular weight compounds are readily metabolized and the actual bioaccumulation potential of higher molecular weight compounds is limited by the low water solubility and large molecular size.

Mobility in Soil: Releases to water will result in a hydrocarbon film floating and spreading on the surface. For the lighter components, volatilization is an important loss process and reduces the hazard to aquatic organisms. In air, the hydrocarbon vapors react readily with hydroxyl radicals with half-lives of less than one day. Photooxidation on the water surface is also a significant loss process particularly for polycyclic aromatic compounds. In water, the majority of components will be adsorbed on sediment. Adsorption is the most predominant physical process on release to soil. Adsorbed hydrocarbons will slowly degrade in both water and soil.

Other adverse effects: None anticipated.

Section 13: Disposal Considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.

This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste. However, it would likely be identified as a federally regulated RCRA hazardous waste for the following characteristic(s) shown below. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.

Container contents should be completely used and containers should be emptied prior to discard. Container residues and rinseates could be considered to be hazardous wastes.

EPA Waste Number(s)

- D001 - Ignitability characteristic

Section 14: Transport Information

U.S. Department of Transportation (DOT)

Shipping Description: Aquatic toxicity studies indicate this material may be classified as a Marine Pollutant under IMDG Code. It is not currently regulated as a marine pollutant by the USDOT. If there is not a Shipping Description or other DOT marking, labeling, placarding and packaging references shown in this section, it is not regulated as a hazardous material by the USDOT.

Non-Bulk Package Marking: UN1202, Diesel fuel, Combustible liquid III
Non-Bulk Package Labeling: Not Regulated [49 CFR 173.150(f)(2)]
Bulk Package/Placard Marking: Not Regulated [49 CFR 173.150(f)(2)]
Packaging - References: Combustible / 1993
Emergency Response Guide: None; None; 49 CFR 173.241
Note: (Exceptions; Non-bulk; Bulk)
 128
 **NA1993 may be used instead of UN1202 for domestic land transportation. Bulk Package/Placard Marking would also be changed to: 1202 Container(s) greater than 5 liters (liquids) or 5 kilograms (solids), shipped by water mode and ALL bulk shipments may require the shipping description to contain the "Marine Pollutant" notation [49 CFR 172.203(l)] and the container(s) to display the [Marine Pollutant Mark] [49 CFR 172.322].

International Maritime Dangerous Goods (IMDG)

Shipping Description: If flashpoint is >60° C closed-cup and the material meets the IMDG definition of a Marine Pollutant, an alternate shipping name such as "Environmentally hazardous substance, n.o.s." with hazard class 9 and PG III must be used.
 UN1202, Diesel fuel, 3, III, (FP° C cc), [where FP is the material's flash point in degrees Celsius closed cup]
Non-Bulk Package Marking: Diesel fuel, UN1202
Labels: Flammable liquid
Placards/Marking (Bulk): Flammable / 1202
Packaging - Non-Bulk: P001, LP01
EMS: F-E, S-E
Note: Proper Shipping name can be: Gas Oil or Diesel fuel or Heating Oil, light
 If transported in bulk by marine vessel in international waters, product is being carried under the scope of MARPOL Annex I.
 If container(s) is greater than 5 liters (liquids) or 5 kilograms (solids), shipment may require the shipping description to contain the "Marine Pollutant" description [IMDG 5.4.1.4.3.5] and the container(s) to display the Marine Pollutant mark [IMDG 5.2.1.6].

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)

UN/ID #: Not regulated if flashpoint is >60° C closed-cup
 UN1202
Proper Shipping Name: Diesel fuel
Hazard Class/Division: 3
Packing Group: III
Non-Bulk Package Marking: Diesel fuel, UN1202
Labels: Flammable liquid
ERG Code: 3L
Note: If container(s) is greater than 5 liters (liquids) or 5 kilograms (solids), shipment may require the container to display the "Environmentally hazardous substance" mark [IATA 7.1.6.3].

	LTD. QTY	Passenger Aircraft	Cargo Aircraft Only
Packaging Instruction #:	Y344	355	366
Max. Net Qty. Per Package:	10 L	60 L	220 L

Section 15: Regulatory Information

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):

This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.

CERCLA/SARA - Section 311/312 (Title III Hazard Categories)

Acute Health Hazard: yes
Chronic Health Hazard: Yes
Fire Hazard: Yes
Pressure Hazard: No
Reactive Hazard: No

CERCLA/SARA - Section 313 and 40 CFR 372:

This material contains the following chemicals subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR 372:

Chemical Name	Concentration ¹	de minimis
Naphthalene	<1	0.1%

EPA (CERCLA) Reportable Quantity (in pounds):

EPA's Petroleum Exclusion applies to this material - (CERCLA 101(14)).

California Proposition 65:

Warning: This material may contain detectable quantities of the following chemicals, known to the State of California to cause cancer, birth defects or other reproductive harm, and which may be subject to the warning requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

Chemical Name	Type of Toxicity
Naphthalene	Cancer

International Hazard Classification

Canada:

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the Regulations.

WHMIS Hazard Class:

B3 - Combustible liquid
D1B - Toxic materials
D2A - Very toxic materials
D2B - Toxic materials

National Chemical Inventories

All components are either listed on the US TSCA Inventory, or are not regulated under TSCA
All components are either on the DSL, or are exempt from DSL listing requirements.

U.S. Export Control Classification Number: EAR99

Section 16: Other Information

Date of Issue:	Previous Issue Date:	SDS Number:	Status:
18-Jul-2013	06-Mar-2013	001847	FINAL

Revised Sections or Basis for Revision:

Physical Properties (Section 9); Shipping information (Section 14)

Guide to Abbreviations:

ACGIH = American Conference of Governmental Industrial Hygienists; CASRN = Chemical Abstracts Service Registry Number; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; GHS = Globally Harmonized System; IARC = International Agency for Research on Cancer; INSHT = National Institute for Health and Safety at Work; IOPC = International Oil Pollution Compensation; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

Disclaimer of Expressed and implied Warranties:

The information presented in this Safety Data Sheet is based on data believed to be accurate as of the date this Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

Safety Data Sheet

According to OSHA HCS 2012 (29 CFR 1910.1200)



Section 1: Identification

Product Identifier: **No. 1 Diesel Fuel**
Other means of identification: Diesel Fuel No. 1; No. 1 Diesel, Ultra Low Sulfur, Dyed and Undyed; No. 1 High Sulfur Diesel – Dyed; No. 1 High Sulfur Distillate; No. 1 Low Sulfur Diesel – Dyed; No. 1 Low Sulfur Distillate; #1 DSL ULS 15 NRLM; #1 DSL ULS 15 NRLM D
SDS Number: **001929**
MARPOL Annex I Category: Kerosenes
Intended Use: Fuel
Uses Advised Against: All others

Manufacturer:
Phillips 66 Company
P.O. Box 4428
Houston, Texas 77210

SDS Information:
Phone: 800-762-0942
Email: SDS@P66.com
URL: www.Phillips66.com

Emergency Health and Safety Number:
Chemtrec: 800-424-9300 (24 Hours)

Customer Service:
800-527-5476 *Technical Information:*
800-527-5476

Section 2: Hazards Identification

Classified Hazards

H226 -- Flammable liquids -- Category 3
H315 -- Skin corrosion/irritation -- Category 2
H304 -- Aspiration Hazard -- Category 1
H336 -- Specific target organ toxicity (single exposure) -- Category 3
H411 -- Hazardous to the aquatic environment, chronic toxicity -- Category 2

Other Hazards

Electrostatic charges may be generated during handling.

Label Elements



DANGER

Flammable liquid and vapor
Causes skin irritation
May be fatal if swallowed and enters airways
May cause drowsiness or dizziness
Toxic to aquatic life with long lasting effects



Keep away from heat/sparks/open flames/hot surfaces. - No smoking; Ground/bond container and receiving equipment; Use explosion-proof electrical/ventilating/lighting equipment; Use only non-sparking tools; Take precautionary measures against static discharge; Avoid breathing dust/fume/gas/mist/vapours/spray; Wash thoroughly after handling; Use only outdoors or in a well-ventilated area; Avoid release to the environment; Wear protective gloves / protective clothing / eye protection / face protection; Call a POISON CENTER or doctor/physician if you feel unwell; IF ON SKIN: Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower; If skin irritation occurs: Get medical advice/attention; IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician; Do NOT induce vomiting; IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing; Take off contaminated clothing and wash before reuse; In case of fire: Use dry chemical, carbon dioxide, or foam for extinction; Store in a well-ventilated place. Keep container tightly closed; Keep cool; Dispose of contents/container to approved disposal facility



Section 3: Composition / Information on Ingredients

Chemical Name	CASRN	Concentration ¹
Petroleum distillates, hydrotreated light	64742-47-8	0-100
Kerosine, petroleum, hydrodesulfurized	64742-81-0	0-100
Kerosine, petroleum	8008-20-6	0-100
Naphthalene	91-20-3	<3

Total Sulfur: < 0.1 wt%

¹ All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Section 4: First Aid Measures

Eye Contact: If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

Skin Contact: Remove contaminated shoes and clothing, and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops, seek medical attention. Wash contaminated clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician. (see Note to Physician)

Inhalation (Breathing): First aid is not normally required. If breathing difficulties develop, move victim away from source of exposure and into fresh air in a position comfortable for breathing. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

Most important symptoms and effects:

Acute: Minor respiratory irritation at high vapor concentrations.

Delayed: Dry skin and possible irritation with repeated or prolonged exposure.

Notes to Physician: When using high-pressure equipment, injection of product under the skin can occur. In this case, the casualty should be sent immediately to hospital. Do not wait for symptoms to develop. High-pressure hydrocarbon injection injuries may produce substantial necrosis of underlying tissue despite an innocuous appearing external wound. These injuries often require extensive emergency surgical debridement and all injuries should be evaluated by a specialist in order to assess the extent of injury. Early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

Section 5: Fire-Fighting Measures

NFPA 704 Hazard Class

Health: 1 Flammability: 2 Instability: 0



- 0 (Minimal)
- 1 (Slight)
- 2 (Moderate)
- 3 (Serious)
- 4 (Severe)

Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Specific hazards arising from the chemical

Unusual Fire & Explosion Hazards: Flammable. This material can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. This product will float and can be reignited on surface water. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Hazardous Combustion Products: Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Oxides of nitrogen and sulfur may also be formed.

Special protective actions for firefighters: For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

Section 6: Accidental Release Measures

Personal precautions, protective equipment and emergency procedures: Flammable. Spillages of liquid product will create a fire hazard and may form an explosive atmosphere. Keep all sources of ignition and hot metal surfaces away from spill/release if safe to do so. The use of explosion-proof electrical equipment is recommended. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions: Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use foam on spills to minimize vapors. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

Methods and material for containment and cleaning up: Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal. If spilled on water remove with appropriate methods (e.g. skimming, booms or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations.

Recommended measures are based on the most likely spillage scenarios for this material; however local conditions and regulations may influence or limit the choice of appropriate actions to be taken.

Section 7: Handling and Storage

Precautions for safe handling: Keep away from ignition sources such as heat/sparks/open flame – No smoking. Take precautionary measures against static discharge. Nonsparking tools should be used. Wear protective gloves/clothing and eye/face protection. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8). Flammable. May vaporize easily at ambient temperatures. The vapor is heavier than air and may create an explosive mixture of vapor and air. Beware of accumulation in confined spaces and low lying areas. Open container slowly to relieve any pressure. The use of explosion-proof electrical equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-70 and/or API RP 2003 for specific bonding/grounding requirements. Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing of high pressure hydraulic oil equipment.

For use as a motor fuel only. Do not use as a solvent due to its flammable and potentially toxic properties. Siphoning by mouth can result in lung aspiration which can be harmful or fatal.

The use of hydrocarbon fuel in an area without adequate ventilation may result in hazardous levels of incomplete combustion products (e.g. carbon monoxide, oxides of sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels.

Diesel engine exhaust contains hazardous combustion products and has been identified as a cancer hazard. Exposure should be minimized to reduce potential risk.

Static Accumulation Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding of tanks, transfer piping, and storage tank level floats are necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. Special care should be given to ensure that special slow load procedures for "switch loading" are followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such as gasoline or naphtha). For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.

Conditions for safe storage: Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Store only in approved containers. Post area "No Smoking or Open Flame." Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Section 8: Exposure Controls / Personal Protection

Chemical Name	ACGIH	OSHA	Other
Petroleum distillates, hydrotreated light	TWA: 200 mg/m ³ Skin	---	---
Kerosine, petroleum, hydrodesulfurized	TWA: 200 mg/m ³ Skin	---	---
Kerosine, petroleum	TWA: 200 mg/m ³ Skin	---	---

Naphthalene	STEL: 15 ppm TWA: 10 ppm 5 ppm TWA; skin; A3 - confirmed animal carcinogen with unknown relevance to humans; TLV basis: upper respiratory tract irritation Skin	TWA: 10 ppm : 50 mg/m ³	TWA: 0.2 mg/m ³ (as total of 17 PNAs measured by NIOSH Method 5506) (Phillips 66 Guidelines)
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Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

Eye/Face Protection: The use of eye protection that meets or exceeds ANSI Z.87.1 is recommended to protect against potential eye contact, irritation, or injury. Depending on conditions of use, a face shield may be necessary.

Skin/Hand Protection: The use of gloves impervious to the specific material handled is advised to prevent skin contact. Users should check with manufacturers to confirm the breakthrough performance of their products. Depending on exposure and use conditions, additional protection may be necessary to prevent skin contact including use of items such as chemical resistant boots, aprons, arm covers, hoods, coveralls, or encapsulated suits. Suggested protective materials: Nitrile

Respiratory Protection: Where there is potential for airborne exposure above the exposure limit a NIOSH certified air purifying respirator equipped with organic vapor cartridges/canisters may be used.

A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use. Air purifying respirators provide limited protection and cannot be used in atmospheres that exceed the maximum use concentration (as directed by regulation or the manufacturer's instructions), in oxygen deficient (less than 19.5 percent oxygen) situations, or under conditions that are immediately dangerous to life and health (IDLH).

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse.

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

Section 9: Physical and Chemical Properties

Data represent typical values and are not intended to be specifications. N/A = Not Applicable; N/D = Not Determined

Appearance: Clear, light yellow or light green (may be dyed red) **Flash Point:** 100-150 °F / 38-66 °C

Physical Form: Liquid

Odor: Kerosene

Odor Threshold: No data

pH: Not applicable

Vapor Density (air=1): > 4.5

Upper Explosive Limits (vol % in air): 7.0

Lower Explosive Limits (vol % in air): 0.7

Evaporation Rate (nBuAc=1): <1

Particle Size: N/A

Percent Volatile: 98-100% @ 545°F (285°C)

Flammability (solid, gas): N/A

VOC Content(%): 0.16 lb/1000 gal

Test Method: Tag Closed Cup (TCC), ASTM D56

Initial Boiling Point/Range: 300 - 572 °F / 149 - 300 °C

Vapor Pressure: 0.40 mmHg

Partition Coefficient (n-octanol/water) (Kow): No data

Melting/Freezing Point: < -40 °F / < -40 °C

Auto-ignition Temperature: 410 °F / 210 °C

Decomposition Temperature: No data

Specific Gravity (water=1): 0.775-0.840 @ 68°F / 20°C

Bulk Density: 6.73 lbs/gal

Viscosity: 1-2.4 cSt @ 40°C

Solubility in Water: <0.1%

Section 10: Stability and Reactivity

Reactivity: Not chemically reactive.

Chemical stability: Stable under normal ambient and anticipated conditions of use.

Possibility of hazardous reactions: Hazardous reactions not anticipated.

Conditions to avoid: Avoid high temperatures and all sources of ignition. Prevent vapor accumulation.

Incompatible materials: Avoid contact with strong oxidizing agents and strong reducing agents.

Hazardous decomposition products: Not anticipated under normal conditions of use.

Section 11: Toxicological Information

Information on Toxicological Effects of Substance/Mixture

Acute Toxicity	Hazard	Additional Information	LC50/LD50 Data
Inhalation	Unlikely to be harmful		>5.2 mg/L (mist)
Dermal	Unlikely to be harmful		> 2 g/kg
Oral	Unlikely to be harmful		> 5 g/kg

Aspiration Hazard: May be fatal if swallowed and enters airways.

Skin Corrosion/Irritation: Causes skin irritation. Repeated exposure may cause skin dryness or cracking.

Serious Eye Damage/Irritation: Causes mild eye irritation.

Symptoms of Overexposure: While significant vapor concentrations are not likely, high concentrations can cause minor respiratory irritation, headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue. Ingestion can cause irritation of the digestive tract, nausea, diarrhea, and vomiting.

Skin Sensitization: Not expected to be a skin sensitizer.

Respiratory Sensitization: Not expected to be a respiratory sensitizer.

Specific Target Organ Toxicity (Single Exposure): May cause drowsiness and dizziness.

Specific Target Organ Toxicity (Repeated Exposure): Not expected to cause organ effects from repeated exposure.

Carcinogenicity: Not expected to cause cancer. Petroleum middle distillates have been shown to cause skin tumors in mice following repeated and prolonged skin contact. Follow-up studies have shown that these tumors are produced through a non-genotoxic mechanism associated with frequent cell damage and repair, and that they are not likely to cause tumors in the absence of prolonged skin irritation.

Germ Cell Mutagenicity: Not expected to cause heritable genetic effects.

Reproductive Toxicity: Not expected to cause reproductive toxicity.

Other Comments: Diesel engine exhaust has been classified by the International Agency for Research on Cancer (IARC) and National Toxicology Program (NTP) as a carcinogen.

Information on Toxicological Effects of Components

Naphthalene

Carcinogenicity: Naphthalene has been evaluated in two year inhalation studies in both rats and mice. The US National Toxicology Program (NTP) concluded that there is clear evidence of carcinogenicity in male and female rats based on increased incidences of respiratory epithelial adenomas and olfactory epithelial neuroblastomas of the nose. NTP found some evidence of carcinogenicity in female mice (alveolar adenomas) and no evidence of carcinogenicity in male mice. Naphthalene has been identified as a carcinogen by IARC and NTP.

Section 12: Ecological Information

Toxicity: Acute aquatic toxicity studies on samples of jet fuel and kerosine streams show acute toxicity values greater than 1 mg/L and mostly in the range 1-100 mg/L. These tests were carried out on water accommodated fractions, in closed systems to prevent evaporative loss. Results are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon composition. Kerosines should be regarded as toxic to aquatic organisms, with the potential to cause long term adverse effects in the aquatic environment.

Persistence and Degradability: The hydrocarbons in this material are not readily biodegradable but are regarded as inherently biodegradable since their hydrocarbon components can be degraded by microorganisms.

Persistence per IOPC Fund definition: Non-Persistent

Bioaccumulative Potential: Hydrocarbon constituents of kerosine show measured or predicted Log Kow values ranging from 3 to 6 and above and therefore would be regarded as having the potential to bioaccumulate. In practice, metabolic processes may reduce bioconcentration.

Mobility in Soil: On release to water, hydrocarbons will float on the surface and since they are sparingly soluble, the only significant loss is volatilization to air. It is possible that some of the higher molecular weight hydrocarbons will be adsorbed on sediment. Biodegradation in water is a minor loss process. In air, these hydrocarbons are photodegraded by reaction with hydroxyl radicals with half lives varying from 0.1 to 0.7 days.

Other Adverse Effects: None anticipated.

Section 13: Disposal Considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.

This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste. However, it would likely be identified as a federally regulated RCRA hazardous waste for the following characteristic(s) shown below. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.

Container contents should be completely used and containers should be emptied prior to discard. Container residues and rinseates could be considered to be hazardous wastes.

EPA Waste Number(s)

- D001 - Ignitability characteristic

Section 14: Transport Information

U.S. Department of Transportation (DOT)

Shipping Description: *Aquatic toxicity studies indicate this material may be classified as a Marine Pollutant under IMDG Code. It is not currently regulated as a marine pollutant by the USDOT. If there is not a Shipping Description or other DOT marking, labeling, placarding and packaging references shown in this section, it is not regulated as a hazardous material by the USDOT.*

Non-Bulk Package Marking: NA1993, Diesel fuel, Combustible liquid, III
Non-Bulk Package Labeling: Not Regulated [49 CFR 173.150(f)(2)]
Bulk Package/Placard Marking: Not Regulated [49 CFR 173.150(f)(2)]
Packaging - References: Combustible / 1993
None; None; 49 CFR 173.241
(Exceptions; Non-bulk; Bulk)
Emergency Response Guide: 128

Note: May also be shipped as: UN1202, Diesel fuel, Combustible liquid,, III
 Bulk Package/Placard Marking would also be changed to: 1202
 Container(s) greater than 5 liters (liquids) or 5 kilograms (solids), shipped by water mode and ALL bulk shipments may require the shipping description to contain the "Marine Pollutant" notation [49 CFR 172.203(l)] and the container(s) to display the [Marine Pollutant Mark] [49 CFR 172.322].

International Maritime Dangerous Goods (IMDG)

Shipping Description: Not regulated if flashpoint is >60° C closed-cup
 UN1202, Diesel fuel, 3, III, (FP° C cc), [where FP is the material's flash point in degrees Celsius closed cup]

Non-Bulk Package Marking: Diesel fuel, UN1202

Labels: Flammable liquid

Placards/Marking (Bulk): Flammable / 1202

Packaging - Non-Bulk: P001, LP01

EMS: F-E, S-E

Note: If container(s) is greater than 5 liters (liquids) or 5 kilograms (solids), shipment may require the shipping description to contain the "Marine Pollutant" description [IMDG 5.4.1.4.3.5] and the container(s) to display the Marine Pollutant mark [IMDG 5.2.1.6].
 If transported in bulk by marine vessel in international waters, product is being carried under the scope of MARPOL Annex I.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)

UN/ID #: Not regulated if flashpoint is >60° C closed-cup
 UN1202

Proper Shipping Name: Diesel fuel

Hazard Class/Division: 3

Packing Group: III

Non-Bulk Package Marking: Diesel fuel, UN1202

Labels: Flammable liquid

ERG Code: 3L

Note: If container(s) is greater than 5 liters (liquids) or 5 kilograms (solids), shipment may require the container to display the "Environmentally hazardous substance" mark [IATA 7.1.6.3].

	LTD. QTY	Passenger Aircraft	Cargo Aircraft Only
Packaging Instruction #:	Y344	355	366
Max. Net Qty. Per Package:	10 L	60 L	220 L

Section 15: Regulatory Information

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):

This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.

CERCLA/SARA - Section 311/312 (Title III Hazard Categories)

Acute Health: Yes
Chronic Health: Yes
Fire Hazard: Yes
Pressure Hazard: No
Reactive Hazard: No

CERCLA/SARA - Section 313 and 40 CFR 372:

This material contains the following chemicals subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR 372:

Chemical Name	Concentration ¹	de minimis
Naphthalene	<3	0.1%

EPA (CERCLA) Reportable Quantity (in pounds):

EPA's Petroleum Exclusion applies to this material - (CERCLA 101(14)).

California Proposition 65:

Warning: This material may contain detectable quantities of the following chemicals, known to the State of California to cause cancer, birth defects or other reproductive harm, and which may be subject to the warning requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

Chemical Name	Type of Toxicity
Toluene	Developmental Toxicant Female Reproductive Toxicant
Benzene	Cancer Developmental Toxicant Male Reproductive Toxicant
Naphthalene	Cancer

Diesel engine exhaust is on the Proposition 65 list of chemicals known to the State of California to cause cancer.

Canada:

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the Regulations.

WHMIS Hazard Class:

B3 - Combustible Liquids
D2B

National Chemical Inventories

All components are either listed on the US TSCA Inventory, or are not regulated under TSCA
All components are either on the DSL, or are exempt from DSL listing requirements.

U.S. Export Control Classification Number: EAR99

Section 16: Other Information

Date of Issue:	Previous Issue Date:	SDS Number:	Status:
26-Feb-2013	10-Aug-2012	001929	FINAL

Revised Sections or Basis for Revision:

Format change; Identified Hazards (Section 2); Precautionary Statement(s) (Section 2); First Aid (Section 4); Fire Fighting information (Section 5)

Guide to Abbreviations:

ACGIH = American Conference of Governmental Industrial Hygienists; CASRN = Chemical Abstracts Service Registry Number; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; GHS = Globally Harmonized System; IARC = International Agency for Research on Cancer; INSHT = National Institute for Health and Safety at Work; IOPC = International Oil Pollution Compensation; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

Disclaimer of Expressed and implied Warranties:

The information presented in this Safety Data Sheet is based on data believed to be accurate as of the date this Safety Data Sheet was prepared. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THE INFORMATION PROVIDED ABOVE, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. No responsibility is assumed for any damage or injury resulting from abnormal use or from any failure to adhere to recommended practices. The information provided above, and the product, are furnished on the condition that the person receiving them shall make their own determination as to the suitability of the product for their particular purpose and on the condition that they assume the risk of their use. In addition, no authorization is given nor implied to practice any patented invention without a license.

Safety Data Sheet

According to OSHA HCS 2012 (29 CFR 1910.1200)



Section 1: Identification

Product Identifier:	Marine Diesel Oil	
Other means of identification:	Diesel Fuel Marine; Marine Diesel - Dyed; Marine Fuel Oil; Marine Gas Oil; Residual Marine Fuel Oil; Residual Marine Gas Oil	
SDS Number:	724260	
MARPOL Annex I Category:	Gas Oils, Including Ship's Bunkers	
Intended Use:	Fuel	
Uses Advised Against:	All others	
Manufacturer:	SDS Information:	Emergency Health and Safety Number:
Phillips 66 Company P.O. Box 4428 Houston, Texas 77210	Phone: 800-762-0942 Email: SDS@P66.com URL: www.Phillips66.com	Chemtrec: 800-424-9300 (24 Hours)
		Customer Service: 800-527-5476 <i>Technical Information:</i> 800-527-5476

Section 2: Hazards Identification

Classified Hazards	Other Hazards
H227 -- Flammable liquids -- Category 4 H315 -- Skin corrosion/irritation -- Category 2 H304 -- Aspiration Hazard -- Category 1 H332 -- Acute toxicity, Inhalation -- Category 4 H373 -- Specific target organ toxicity (repeated exposure) -- Category 2 H351 -- Carcinogenicity -- Category 2 H411 -- Hazardous to the aquatic environment, chronic toxicity -- Category 2	Electrostatic charges may be generated during handling.

Label Elements	
	DANGER Combustible liquid Causes skin irritation May be fatal if swallowed and enters airways Harmful if inhaled May cause damage to organs through prolonged or repeated exposure Suspected of causing cancer Toxic to aquatic life with long lasting effects
	Obtain special instructions before use; Do not handle until all safety precautions have been read and understood; Keep away from heat/sparks/open flames/hot surfaces. - No smoking; Do not breathe dust/fume/gas/mist/vapours/spray; Avoid contact during pregnancy and while nursing; Wash thoroughly after handling; Do not eat, drink or smoke when using this product; Use only outdoors or in a well-ventilated area; Avoid release to the environment; Wear protective gloves / protective clothing / eye protection / face protection; Call a POISON CENTER or doctor/physician if you feel unwell; IF ON SKIN:; Wash with plenty of soap and water; If skin irritation occurs:; Get medical advice/attention; IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing; IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician; Do NOT induce vomiting; Collect spillage; In case of fire: Use dry chemical, carbon dioxide, or foam for extinction; Store in a well-ventilated place. Keep cool; Dispose of contents/container to approved disposal facility

Section 3: Composition / Information on Ingredients

Chemical Name	CASRN	Concentration ¹
Fuels, diesel, no. 2	68476-34-6	100
Naphthalene	91-20-3	<1

Total Sulfur: < 2.0 wt%

¹ All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Section 4: First Aid Measures

Eye Contact: If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

Skin Contact: Remove contaminated shoes and clothing, and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops, seek medical attention. Wash contaminated clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician. (see Note to Physician)

Inhalation (Breathing): If respiratory symptoms or other symptoms of exposure develop, move victim away from source of exposure and into fresh air in a position comfortable for breathing. If symptoms persist, seek immediate medical attention. If victim is not breathing, clear airway and immediately begin artificial respiration. If breathing difficulties develop, oxygen should be administered by qualified personnel. Seek immediate medical attention.

Ingestion (Swallowing): Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

Most important symptoms and effects:

Acute: Minor respiratory irritation at high vapor concentrations.

Delayed: None known or anticipated. See Section 11 for information on effects from chronic exposure, if any.

Notes to Physician: When using high-pressure equipment, injection of product under the skin can occur. In this case, the casualty should be sent immediately to hospital. Do not wait for symptoms to develop. High-pressure hydrocarbon injection injuries may produce substantial necrosis of underlying tissue despite an innocuous appearing external wound. These injuries often require extensive emergency surgical debridement and all injuries should be evaluated by a specialist in order to assess the extent of injury. Early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

Section 5: Fire-Fighting Measures

NFPA 704 Hazard Class

Health: 1 Flammability: 2 Instability: 0



0 (Minimal)
1 (Slight)
2 (Moderate)
3 (Serious)
4 (Severe)

Extinguishing Media: Dry chemical, carbon dioxide, foam, or water spray is recommended. Water or foam may cause frothing of materials heated above 212°F / 100°C. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam.

Specific hazards arising from the chemical

Unusual Fire & Explosion Hazards: Combustible. This material can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, or mechanical/electrical equipment). May create vapor/air explosion hazard if heated. This product will float and can be reignited on surface water. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Hazardous Combustion Products: Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Oxides of nitrogen and sulfur may also be formed.

Special protective actions for firefighters: For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

Section 6: Accidental Release Measures

Personal precautions, protective equipment and emergency procedures: Combustible. Keep all sources of ignition away from spill/release. The use of explosion-proof electrical equipment is recommended. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions: Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

Methods and material for containment and cleaning up: Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal. If spilled on water remove with appropriate methods (e.g. skimming, booms or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations.

Recommended measures are based on the most likely spillage scenarios for this material; however local conditions and regulations may influence or limit the choice of appropriate actions to be taken.

Section 7: Handling and Storage

Precautions for safe handling: Keep away from ignition sources such as heat/sparks/open flame – No smoking. Take precautionary measures against static discharge. Nonsparking tools should be used. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/clothing and eye/face protection. Do not breathe vapors or mists. Use only outdoors or in well-ventilated area. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8). Open container slowly to relieve any pressure. The use of explosion-proof electrical equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-70 and/or API RP 2003 for specific bonding/grounding requirements. Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing of high pressure hydraulic oil equipment.

For use as a motor fuel only. Do not use as a solvent due to its flammable and potentially toxic properties. Siphoning by mouth can result in lung aspiration which can be harmful or fatal.

The use of hydrocarbon fuel in an area without adequate ventilation may result in hazardous levels of incomplete combustion products (e.g. carbon monoxide, oxides of sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels. Diesel engine exhaust contains hazardous combustion products and has been identified as a cancer hazard. Exposure should be minimized to reduce potential risk.

Static Accumulation Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding of tanks, transfer piping, and storage tank level floats are necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. Special care should be given to ensure that special slow load procedures for "switch loading" are followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such as gasoline or naphtha). For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.

Conditions for safe storage: Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated area away from heat and all sources of ignition. Post area "No Smoking or Open Flame." Store only in approved containers. Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Section 8: Exposure Controls / Personal Protection

Chemical Name	ACGIH	OSHA	Other
Fuels, diesel, no. 2	TWA: 100 mg/m ³ Skin	---	TWA: 100 mg/m ³ (Phillips 66 Guidelines)
Naphthalene	STEL: 15 ppm TWA: 10 ppm 5 ppm TWA; skin; A3 - confirmed animal carcinogen with unknown relevance to humans; TLV basis: upper respiratory tract irritation Skin	TWA: 10 ppm : 50 mg/m ³	TWA: 0.2 mg/m ³ (as total of 17 PNAs measured by NIOSH Method 5506) (Phillips 66 Guidelines)

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

Eye/Face Protection: The use of eye protection that meets or exceeds ANSI Z.87.1 is recommended to protect against potential eye contact, irritation, or injury. Depending on conditions of use, a face shield may be necessary.

Skin/Hand Protection: The use of gloves impervious to the specific material handled is advised to prevent skin contact. Users should check with manufacturers to confirm the breakthrough performance of their products. Depending on exposure and use conditions, additional protection may be necessary to prevent skin contact including use of items such as chemical resistant boots, aprons, arm covers, hoods, coveralls, or encapsulated suits. Suggested protective materials: Nitrile

Respiratory Protection: Where there is potential for airborne exposure above the exposure limit a NIOSH certified air purifying respirator equipped with organic vapor cartridges/canisters may be used.

A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use. Air purifying respirators provide limited protection and cannot be used in atmospheres that exceed the maximum use concentration (as directed by regulation or the manufacturer's instructions), in oxygen deficient (less than 19.5 percent oxygen) situations, or under conditions that are immediately dangerous to life and health (IDLH).

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse.

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

Section 9: Physical and Chemical Properties

Data represent typical values and are not intended to be specifications. N/A = Not Applicable; N/D = Not Determined

Appearance: Dyed red to dark brown

Physical Form: Liquid

Odor: Petroleum

Odor Threshold: No data

pH: Not applicable

Vapor Density (air=1): < 3

Upper Explosive Limits (vol % in air): 10.0

Lower Explosive Limits (vol % in air): 0.3

Evaporation Rate (nBuAc=1): <1

Particle Size: N/A

Percent Volatile: Negligible

Flammability (solid, gas): N/A

Flash Point: > 140 °F / > 60 °C

Test Method: Pensky-Martens Closed Cup (PMCC), ASTM D93, EPA 1010

Initial Boiling Point/Range: 320 - 725 °F / 160 - 385 °C

Vapor Pressure: 0.40 mm Hg

Partition Coefficient (n-octanol/water) (Kow): No data

Melting/Freezing Point: No data

Auto-ignition Temperature: 446-500 °F / 230-260 °C

Decomposition Temperature: No data

Specific Gravity (water=1): 0.90 maximum @ 60°F (15.6°C)

Bulk Density: 7.5 lbs/gal

Viscosity: 1.9-24mm²/s @ 40°C

Solubility in Water: Negligible

Section 10: Stability and Reactivity

Reactivity: Not chemically reactive.

Chemical stability: Stable under normal ambient and anticipated conditions of use.

Possibility of hazardous reactions: Hazardous reactions not anticipated.

Conditions to avoid: Avoid all possible sources of ignition.

Incompatible materials: Avoid contact with strong oxidizing agents and strong reducing agents.

Hazardous decomposition products: Not anticipated under normal conditions of use.

Section 11: Toxicological Information

Information on Toxicological Effects of Substance/Mixture

Acute Toxicity	Hazard	Additional Information	LC50/LD50 Data
Inhalation	Harmful if inhaled		> 4.65 mg/L (mist)
Dermal	Unlikely to be harmful		> 4.1 g/kg
Oral	Unlikely to be harmful		> 5 g/kg

Aspiration Hazard: May be fatal if swallowed and enters airways.

Skin Corrosion/Irritation: Causes skin irritation. Repeated exposure may cause skin dryness or cracking.

Serious Eye Damage/Irritation: Causes mild eye irritation.

Symptoms of Overexposure: While significant vapor concentrations are not likely, high concentrations can cause minor respiratory irritation, headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue. Ingestion can cause irritation of the digestive tract, nausea, diarrhea, and vomiting.

Skin Sensitization: Not expected to be a skin sensitizer.

Respiratory Sensitization: Not expected to be a respiratory sensitizer.

Specific Target Organ Toxicity (Single Exposure): Not expected to cause organ effects from single exposure.

Specific Target Organ Toxicity (Repeated Exposure): May cause damage to organs through prolonged or repeated exposure. Repeated dermal application of petroleum gas oils for 90 days resulted in decreased liver, thymus, and spleen weights, and altered bone marrow function. Microscopic alterations included liver hypertrophy and necrosis, decreased hematopoiesis and lymphocyte depletion.

Carcinogenicity: Suspected of causing cancer. Petroleum middle distillates have been shown to cause skin tumors in mice following repeated and prolonged skin contact. Follow-up studies have shown that these tumors are produced through a non-genotoxic mechanism associated with frequent cell damage and repair, and that they are not likely to cause tumors in the absence of prolonged skin irritation.

Germ Cell Mutagenicity: Not expected to cause heritable genetic effects.

Reproductive Toxicity: Inadequate information available.

Other Comments: Diesel engine exhaust has been classified by the International Agency for Research on Cancer (IARC) and National Toxicology Program (NTP) as a carcinogen.

Information on Toxicological Effects of Components

Naphthalene

Carcinogenicity: Naphthalene has been evaluated in two year inhalation studies in both rats and mice. The US National Toxicology Program (NTP) concluded that there is clear evidence of carcinogenicity in male and female rats based on increased incidences of respiratory epithelial adenomas and olfactory epithelial neuroblastomas of the nose. NTP found some evidence of carcinogenicity in female mice (alveolar adenomas) and no evidence of carcinogenicity in male mice. Naphthalene has been identified as a carcinogen by IARC and NTP.

Section 12: Ecological Information

Toxicity: Experimental studies of gas oils show that acute aquatic toxicity values are typically in the range 2-20 mg/L. These values are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon compositions. They should be regarded as toxic to aquatic organisms, with the potential to cause long term adverse effects in the aquatic environment.

Persistence and Degradability: Gas oils are complex combinations of individual hydrocarbon species. Based on the known or expected properties of individual constituents, category members are not predicted to be readily biodegradable. Some hydrocarbon constituents of gas oils are predicted to meet the criteria for persistence; on the other hand, some components can be easily degraded by microorganisms under aerobic conditions.

Persistence per IOPC Fund definition: Non-Persistent

Bioaccumulative Potential: Gas oil components have measured or calculated Log Kow values in the range of 3.9 to 6 which indicates a high potential to bioaccumulate. Lower molecular weight compounds are readily metabolized and the actual bioaccumulation potential of higher molecular weight compounds is limited by the low water solubility and large molecular size.

Mobility in Soil: Releases to water will result in a hydrocarbon film floating and spreading on the surface. For the lighter components, volatilization is an important loss process and reduces the hazard to aquatic organisms. In air, the hydrocarbon vapors react readily with hydroxyl radicals with half-lives of less than one day. Photooxidation on the water surface is also a significant loss process particularly for polycyclic aromatic compounds. In water, the majority of components will be adsorbed on sediment. Adsorption is the most predominant physical process on release to soil. Adsorbed hydrocarbons will slowly degrade in both water and soil.

Other Adverse Effects: None anticipated.

Section 13: Disposal Considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.

This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste and is not believed to exhibit characteristics of hazardous waste. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.

Container contents should be completely used and containers should be emptied prior to discard.

Section 14: Transport Information

U.S. Department of Transportation (DOT)

Shipping Description: *Aquatic toxicity studies indicate this material may be classified as a Marine Pollutant under IMDG Code. It is not currently regulated as a marine pollutant by the USDOT. If there is not a Shipping Description or other DOT marking, labeling, placarding and packaging references shown in this section, it is not regulated as a hazardous material by the USDOT.*

Non-Bulk Package Marking: NA1993, Diesel fuel, Combustible liquid, III

Non-Bulk Package Labeling: Not Regulated [49 CFR 173.150(f)(2)]

Bulk Package/Placard Marking: Not Regulated [49 CFR 173.150(f)(2)]

Bulk Package/Placard Marking: Combustible / 1993

Packaging - References: None; None; 49 CFR 173.241
(Exceptions; Non-bulk; Bulk)

Hazardous Substance: See Section 15 for RQ's

Emergency Response Guide: 128

Note: *May also be shipped as: UN1202, Diesel fuel, Combustible liquid,, III
Bulk Package/Placard Marking would also be changed to: 1202
Container(s) greater than 5 liters (liquids) or 5 kilograms (solids), shipped by water mode and ALL bulk shipments may require the shipping description to contain the "Marine Pollutant" notation [49 CFR 172.203(l)] and the container(s) to display the [Marine Pollutant Mark] [49 CFR 172.322].*

International Maritime Dangerous Goods (IMDG)

Shipping Description: UN3082, Environmentally hazardous substance, liquid, n.o.s., (Petroleum distillates), 9, Marine Pollutant

Non-Bulk Package Marking: Environmentally hazardous substance, liquid, n.o.s., (Petroleum distillates), UN3082, [Marine Pollutant] *

Labels: Class 9

Placards/Marking (Bulk): Class 9 / 3082

Packaging - Non-Bulk: P001, LP01

EMS: F-A, S-F
Note: * Note: Marine Pollutant Mark not required if container is < 5 L or 5 kg
 U.S. DOT compliance requirements may apply. See 49 CFR 171.22, 23 & 25. If transported in bulk by marine vessel in international waters, product is being carried under the scope of MARPOL Annex I.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)

UN/ID #: UN3082
Proper Shipping Name: Environmentally hazardous substance, liquid, n.o.s. (Petroleum distillates)
Hazard Class/Division: 9
Packing Group: III
Non-Bulk Package Marking: Environmentally hazardous substance, liquid, n.o.s. (Petroleum distillates), UN3082, [Environmentally Hazardous Substance Mark] (if > 5L container)
Labels: Class 9
ERG Code: 9L
Note: Note: Environmentally Hazardous Substance Mark not required if container is < 5 L or 5 kg
 U.S. DOT compliance requirements may apply. See 49 CFR 171.22, 23 & 24.

	LTD. QTY	Passenger Aircraft	Cargo Aircraft Only
Packaging Instruction #:	Y964	964	964
Max. Net Qty. Per Package:	30 kg	450 L	450 L

Section 15: Regulatory Information

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):

This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.

CERCLA/SARA - Section 311/312 (Title III Hazard Categories)

Acute Health: Yes
Chronic Health: Yes
Fire Hazard: Yes
Pressure Hazard: No
Reactive Hazard: No

CERCLA/SARA - Section 313 and 40 CFR 372:

This material contains the following chemicals subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR 372:

Chemical Name	Concentration ¹	de minimis
Naphthalene	<1	0.1%

EPA (CERCLA) Reportable Quantity (in pounds):

EPA's Petroleum Exclusion applies to this material - (CERCLA 101(14)).

California Proposition 65:

Warning: This material may contain detectable quantities of the following chemicals, known to the State of California to cause cancer, birth defects or other reproductive harm, and which may be subject to the warning requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

Chemical Name	Type of Toxicity
Naphthalene	Cancer
Toluene	Developmental Toxicant Female Reproductive Toxicant

Benzene	Cancer Developmental Toxicant Male Reproductive Toxicant
---------	--

Diesel engine exhaust is on the Proposition 65 list of chemicals known to the State of California to cause cancer.

Canada:

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the Regulations.

WHMIS Hazard Class:
B3 - Combustible Liquids
D1B
D2A
D2B

National Chemical Inventories

All components are either listed on the US TSCA Inventory, or are not regulated under TSCA
All components are either on the DSL, or are exempt from DSL listing requirements.

U.S. Export Control Classification Number: EAR99

Section 16: Other Information

Date of Issue:	Previous Issue Date:	SDS Number:	Status:
26-Feb-2013	10-Aug-2012	724260	FINAL

Revised Sections or Basis for Revision:

Format change; Identified Hazards (Section 2); Precautionary Statement(s) (Section 2); First Aid (Section 4); Fire Fighting information (Section 5)

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Safety Data Sheet

According to OSHA HCS 2012 (29 CFR 1910.1200)



Section 1: Identification

Product Identifier: Conventional Gasoline
Other means of identification: Gasoline, Unleaded, Conventional (All Grades)
Gasoline, Low Sulfur Unleaded (All Grades)
SDS Number: 251720
MARPOL Annex I Category: Gasoline and Spirits
Intended Use: Fuel
Uses Advised Against: All others

Manufacturer:
Phillips 66 Company
P.O. Box 4428
Houston, Texas 77210

SDS Information:
Phone: 800-762-0942
Email: SDS@P66.com
URL: www.Phillips66.com

Emergency Health and Safety Number:
Chemtrec: 800-424-9300 (24 Hours)

Customer Service:
800-527-5476 *Technical Information:*
800-527-5476

Section 2: Hazards Identification

Classified Hazards

H224 -- Flammable liquids -- Category 1
H315 -- Skin corrosion/irritation -- Category 2
H304 -- Aspiration Hazard -- Category 1
H336 -- Specific target organ toxicity (single exposure) -- Category 3
H350 -- Carcinogenicity -- Category 1B
H411 -- Hazardous to the aquatic environment, chronic toxicity -- Category 2

Other Hazards

Electrostatic charges may be generated during handling.

Label Elements



DANGER

Extremely flammable liquid and vapor
Causes skin irritation
May be fatal if swallowed and enters airways
May cause drowsiness or dizziness
May cause cancer
Toxic to aquatic life with long lasting effects



Obtain special instructions before use; Do not handle until all safety precautions have been read and understood; Keep away from heat/sparks/open flames/hot surfaces. - No smoking; Keep container tightly closed; Ground/bond container and receiving equipment; Use explosion-proof electrical/ventilating/lighting equipment; Use only non-sparking tools; Take precautionary measures against static discharge; Avoid breathing dust/fume/gas/mist/vapours/spray; Wash thoroughly after handling; Use only outdoors or in a well-ventilated area; Avoid release to the environment; Wear protective gloves / protective clothing / eye protection / face protection; Call a POISON CENTER or doctor/physician if you feel unwell; IF ON SKIN: Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower; If skin irritation occurs; Get medical advice/attention; IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician; Do NOT induce vomiting; IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing; Take off contaminated clothing and wash before reuse; In case of fire: Use dry chemical, carbon dioxide, or foam for extinction; Collect spillage; Dispose of contents/container to approved disposal facility



Section 3: Composition / Information on Ingredients

Chemical Name	CASRN	Concentration ¹
Gasoline	NONE	100
Toluene	108-88-3	0-15
Benzene	71-43-2	0-5

Total Sulfur: < 0.1 wt%

¹ All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

Section 4: First Aid Measures

Eye Contact: If irritation or redness develops from exposure, flush eyes with clean water. If symptoms persist, seek medical attention.

Skin Contact: Remove contaminated shoes and clothing, and flush affected area(s) with large amounts of water. If skin surface is damaged, apply a clean dressing and seek medical attention. If skin surface is not damaged, cleanse affected area(s) thoroughly by washing with mild soap and water or a waterless hand cleaner. If irritation or redness develops, seek medical attention. Wash contaminated clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician. (see Note to Physician)

Inhalation (Breathing): If respiratory symptoms develop, move victim away from source of exposure and into fresh air in a position comfortable for breathing. If breathing is difficult, oxygen or artificial respiration should be administered by qualified personnel. If symptoms persist, seek medical attention.

Ingestion (Swallowing): Aspiration hazard: Do not induce vomiting or give anything by mouth because this material can enter the lungs and cause severe lung damage. If victim is drowsy or unconscious and vomiting, place on the left side with the head down. If possible, do not leave victim unattended and observe closely for adequacy of breathing. Seek medical attention.

Most important symptoms and effects:

Acute: Headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue

Delayed: None known or anticipated. See Section 11 for information on effects from chronic exposure, if any.

Notes to Physician: Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to high concentrations of hydrocarbon solvents (e.g., in enclosed spaces or with deliberate abuse). The use of other drugs with less arrhythmogenic potential should be considered. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias.

When using high-pressure equipment, injection of product under the skin can occur. In this case, the casualty should be sent immediately to hospital. Do not wait for symptoms to develop. High-pressure hydrocarbon injection injuries may produce substantial necrosis of underlying tissue despite an innocuous appearing external wound. These injuries often require extensive emergency surgical debridement and all injuries should be evaluated by a specialist in order to assess the extent of injury. Early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

Federal regulations (29 CFR 1910.1028) specify medical surveillance programs for certain exposures to benzene above the action level or PEL (specified in Section (i)(1)(i) of the Standard). In addition, employees exposed in an emergency situation shall, as described in Section (i)(4)(i), provide a urine sample at the end of the shift for measurement of urine phenol.

Section 5: Fire-Fighting Measures

NFPA 704 Hazard Class

Health: 1 Flammability: 3 Instability: 0



0 (Minimal)
1 (Slight)
2 (Moderate)
3 (Serious)
4 (Severe)

Extinguishing Media: Dry chemical, carbon dioxide, or foam is recommended. Water spray is recommended to cool or protect exposed materials or structures. Carbon dioxide can displace oxygen. Use caution when applying carbon dioxide in confined spaces. Simultaneous use of foam and water on the same surface is to be avoided as water destroys the foam. Water may be ineffective for extinguishment, unless used under favorable conditions by experienced fire fighters.

Specific hazards arising from the chemical

Unusual Fire & Explosion Hazards: Extremely flammable. This material can be ignited by heat, sparks, flames, or other sources of ignition (e.g., static electricity, pilot lights, mechanical/electrical equipment, and electronic devices such as cell phones, computers, calculators, and pagers which have not been certified as intrinsically safe). Vapors may travel considerable distances to a source of ignition where they can ignite, flash back, or explode. May create vapor/air explosion hazard indoors, in confined spaces, outdoors, or in sewers. This product will float and can be reignited on surface water. Vapors are heavier than air and can accumulate in low areas. If container is not properly cooled, it can rupture in the heat of a fire.

Hazardous Combustion Products: Combustion may yield smoke, carbon monoxide, and other products of incomplete combustion. Oxides of nitrogen and sulfur may also be formed.

Special protective actions for firefighters: For fires beyond the initial stage, emergency responders in the immediate hazard area should wear protective clothing. When the potential chemical hazard is unknown, in enclosed or confined spaces, a self contained breathing apparatus should be worn. In addition, wear other appropriate protective equipment as conditions warrant (see Section 8).

Isolate immediate hazard area and keep unauthorized personnel out. Stop spill/release if it can be done safely. Move undamaged containers from immediate hazard area if it can be done safely. Water spray may be useful in minimizing or dispersing vapors and to protect personnel. Cool equipment exposed to fire with water, if it can be done safely. Avoid spreading burning liquid with water used for cooling purposes.

See Section 9 for Flammable Properties including Flash Point and Flammable (Explosive) Limits

Section 6: Accidental Release Measures

Personal precautions, protective equipment and emergency procedures: Extremely flammable. Spillages of liquid product will create a fire hazard and may form an explosive atmosphere. Keep all sources of ignition and hot metal surfaces away from spill/release if safe to do so. The use of explosion-proof electrical equipment is recommended. Stay upwind and away from spill/release. Avoid direct contact with material. For large spillages, notify persons down wind of the spill/release, isolate immediate hazard area and keep unauthorized personnel out. Wear appropriate protective equipment, including respiratory protection, as conditions warrant (see Section 8). See Sections 2 and 7 for additional information on hazards and precautionary measures.

Environmental Precautions: Stop spill/release if it can be done safely. Prevent spilled material from entering sewers, storm drains, other unauthorized drainage systems, and natural waterways. Use foam on spills to minimize vapors. Use water sparingly to minimize environmental contamination and reduce disposal requirements. If spill occurs on water notify appropriate authorities and advise shipping of any hazard. Spills into or upon navigable waters, the contiguous zone, or adjoining shorelines that cause a sheen or discoloration on the surface of the water, may require notification of the National Response Center (phone number 800-424-8802).

Methods and material for containment and cleaning up: Notify relevant authorities in accordance with all applicable regulations. Immediate cleanup of any spill is recommended. Dike far ahead of spill for later recovery or disposal. Absorb spill with inert material such as sand or vermiculite, and place in suitable container for disposal. If spilled on water remove with appropriate methods (e.g. skimming, booms or absorbents). In case of soil contamination, remove contaminated soil for remediation or disposal, in accordance with local regulations.

Recommended measures are based on the most likely spillage scenarios for this material; however local conditions and regulations may influence or limit the choice of appropriate actions to be taken.

Section 7: Handling and Storage

Precautions for safe handling: Keep away from ignition sources such as heat/sparks/open flame – No smoking. Take precautionary measures against static discharge. Nonsparking tools should be used. Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves/clothing and eye/face protection. Wash thoroughly after handling. Use good personal hygiene practices and wear appropriate personal protective equipment (see section 8). Extremely Flammable. May vaporize easily at ambient temperatures. The vapor is heavier than air and may create an explosive mixture of vapor and air. Beware of accumulation in confined spaces and low lying areas. Open container slowly to relieve any pressure. Electrostatic charge may accumulate and create a hazardous condition when handling or processing this material. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. The use of explosion-proof electrical equipment is recommended and may be required (see appropriate fire codes). Refer to NFPA-70 and/or API RP 2003 for specific bonding/grounding requirements. Do not enter confined spaces such as tanks or pits without following proper entry procedures such as ASTM D-4276 and 29CFR 1910.146. Do not wear contaminated clothing or shoes. Keep contaminated clothing away from sources of ignition such as sparks or open flames.

High pressure injection of hydrocarbon fuels, hydraulic oils or greases under the skin may have serious consequences even though no symptoms or injury may be apparent. This can happen accidentally when using high pressure equipment such as high pressure grease guns, fuel injection apparatus or from pinhole leaks in tubing of high pressure hydraulic oil equipment.

For use as a motor fuel only. Do not use as a solvent due to its flammable and potentially toxic properties. Siphoning by mouth can result in lung aspiration which can be harmful or fatal.

The use of hydrocarbon fuel in an area without adequate ventilation may result in hazardous levels of incomplete combustion products (e.g. carbon monoxide, oxides of sulfur and nitrogen, benzene and other hydrocarbons) and/or dangerously low oxygen levels.

Gasoline engine exhaust contains hazardous combustion products and has been identified as a possible cancer hazard. Exposure should be minimized to reduce potential risk.

Static Accumulation Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding of tanks, transfer piping, and storage tank level floats are necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. Special care should be given to ensure that special slow load procedures for "switch loading" are followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil or diesel) is loaded into tanks previously containing low flash point products (such as gasoline or naphtha). For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.

Conditions for safe storage: Keep container(s) tightly closed and properly labeled. Use and store this material in cool, dry, well-ventilated areas away from heat, direct sunlight, hot metal surfaces, and all sources of ignition. Store only in approved containers. Post area "No Smoking or Open Flame." Keep away from any incompatible material (see Section 10). Protect container(s) against physical damage. Outdoor or detached storage is preferred. Indoor storage should meet OSHA standards and appropriate fire codes.

Portable Containers: Static electricity may ignite gasoline vapors when filling portable containers. To avoid static buildup do not use a nozzle lock open device. Use only approved containers for the storage of gasoline. Place the container on the ground before filling. Keep the nozzle in contact with the container during filling. Do not fill any portable container in or on a vehicle or marine craft.

"Empty" containers retain residue and may be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury or death. "Empty" drums should be completely drained, properly bunged, and promptly shipped to the supplier or a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Before working on or in tanks which contain or have contained this material, refer to OSHA regulations, ANSI Z49.1, and other references pertaining to cleaning, repairing, welding, or other contemplated operations.

Section 8: Exposure Controls / Personal Protection

Chemical Name	ACGIH	OSHA	Other
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Gasoline	TWA: 300 ppm TWA: 890 mg/m ³ STEL: 500 ppm STEL: 1480 mg/m ³	---	0.5 ppm TWA8hr (as benzene) 0.25 ppm TWA12hr (as benzene) 2.5 ppm STEL (as benzene) (Phillips 66 Guidelines)
Toluene	TWA: 20 ppm	Ceiling: 300 ppm TWA: 200 ppm	---
Benzene	STEL: 2.5 ppm TWA: 0.5 ppm Skin	Ceiling: 25 ppm STEL: 5 ppm TWA: 10 ppm TWA: 1 ppm	---

Note: State, local or other agencies or advisory groups may have established more stringent limits. Consult an industrial hygienist or similar professional, or your local agencies, for further information.

Engineering controls: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure limits, additional engineering controls may be required.

Eye/Face Protection: The use of eye protection that meets or exceeds ANSI Z.87.1 is recommended to protect against potential eye contact, irritation, or injury. Depending on conditions of use, a face shield may be necessary.

Skin/Hand Protection: The use of gloves impervious to the specific material handled is advised to prevent skin contact. Users should check with manufacturers to confirm the breakthrough performance of their products. Depending on exposure and use conditions, additional protection may be necessary to prevent skin contact including use of items such as chemical resistant boots, aprons, arm covers, hoods, coveralls, or encapsulated suits. Suggested protective materials: Nitrile

Respiratory Protection: Where there is potential for airborne exposure above the exposure limit a NIOSH certified air purifying respirator equipped with organic vapor cartridges/canisters may be used.

A respiratory protection program that meets or is equivalent to OSHA 29 CFR 1910.134 and ANSI Z88.2 should be followed whenever workplace conditions warrant a respirator's use. Air purifying respirators provide limited protection and cannot be used in atmospheres that exceed the maximum use concentration (as directed by regulation or the manufacturer's instructions), in oxygen deficient (less than 19.5 percent oxygen) situations, or under conditions that are immediately dangerous to life and health (IDLH).

If benzene concentrations equal or exceed applicable exposure limits, OSHA requirements for personal protective equipment, exposure monitoring, and training may apply (29CFR1910.1028 - Benzene).

Other Protective Equipment: Eye wash and quick-drench shower facilities should be available in the work area. Thoroughly clean shoes and wash contaminated clothing before reuse.

Suggestions provided in this section for exposure control and specific types of protective equipment are based on readily available information. Users should consult with the specific manufacturer to confirm the performance of their protective equipment. Specific situations may require consultation with industrial hygiene, safety, or engineering professionals.

Section 9: Physical and Chemical Properties

Data represent typical values and are not intended to be specifications. N/A = Not Applicable; N/D = Not Determined

Appearance: Clear to amber

Physical Form: Liquid

Odor: Gasoline

Odor Threshold: No data

pH: Not applicable

Vapor Density (air=1): >1

Upper Explosive Limits (vol % in air): 7.6

Lower Explosive Limits (vol % in air): 1.4

Evaporation Rate (nBuAc=1): >1

Particle Size: N/A

Percent Volatile: 100%

Flammability (solid, gas): N/A

Flash Point: < -49 °F / < -45 °C

Test Method: (estimate)

Initial Boiling Point/Range: 80 - 440 °F / 27 - 227 °C

Vapor Pressure: 330-775 mm Hg / 6.4-15 psia (Reid VP) @ 100°F / 37.8°C

Partition Coefficient (n-octanol/water) (Kow): No data

Melting/Freezing Point: No data

Auto-ignition Temperature: 833 °F / 445 °C

Decomposition Temperature: No data

Specific Gravity (water=1): 0.72-0.75 @ 60°F (15.6°C)

Bulk Density: 6.17 lbs/gal

Viscosity: N/D

Solubility in Water: Negligible

Section 10: Stability and Reactivity

Reactivity: Not chemically reactive.

Chemical stability: Stable under normal ambient and anticipated conditions of use.

Possibility of hazardous reactions: Hazardous reactions not anticipated.

Conditions to avoid: Avoid high temperatures and all sources of ignition. Prevent vapor accumulation.

Incompatible materials: Avoid contact with strong oxidizing agents and strong reducing agents.

Hazardous decomposition products: Not anticipated under normal conditions of use.

Section 11: Toxicological Information

Information on Toxicological Effects of Substance/Mixture

Acute Toxicity	Hazard	Additional Information	LC50/LD50 Data
Inhalation	Expected to have a low degree of toxicity by inhalation		>5.2 mg/L (vapor)
Dermal	Unlikely to be harmful		3.75 g/kg
Oral	Unlikely to be harmful		14 g/kg

Aspiration Hazard: May be fatal if swallowed and enters airways.

Skin Corrosion/Irritation: Causes skin irritation. Repeated exposure may cause skin dryness or cracking.

Serious Eye Damage/Irritation: Causes mild eye irritation.

Symptoms of Overexposure: Effects of overexposure can include slight irritation of the respiratory tract, nausea, vomiting, and signs of nervous system depression (e.g., headache, drowsiness, dizziness, loss of coordination, disorientation and fatigue). Continued exposure to high concentrations can result in vomiting, cardiac irregularities and sudden loss of consciousness.

Skin Sensitization: Not expected to be a skin sensitizer.

Respiratory Sensitization: Not expected to be a respiratory sensitizer.

Specific Target Organ Toxicity (Single Exposure): May cause drowsiness and dizziness.

Specific Target Organ Toxicity (Repeated Exposure): Not expected to cause organ effects from repeated exposure. Two year inhalation studies of wholly vaporized unleaded gasoline, and 90 days studies of various petroleum naphthas, did not produce significant target organ toxicity in laboratory animals. Nephropathy in male rats, characterized by the accumulation of alpha-2-u- globulin in epithelial cells of the proximal tubules was observed, however follow-up studies suggest that these changes are unique to the male rat.

Carcinogenicity: May cause cancer. Two year inhalation studies of vaporized unleaded gasoline produced an increased incidence of kidney tumors in male rats and liver tumors in female mice. Repeated skin application of various petroleum naphthas in mice for two years resulted in an increased incidence of skin tumors but only in the presence of severe skin irritation. Follow-up mechanistic studies suggest that the occurrence of these tumors may be the consequence of promotional processes and not relevant to human risk assessment. Epidemiology data collected from a study of more than 18,000 petroleum marketing and distribution workers showed no increased risk of leukemia, multiple myeloma, or kidney cancer from gasoline exposure. Unleaded gasoline has been identified as a possible carcinogen by the International Agency for Research on Cancer.

Germ Cell Mutagenicity: Not expected to cause heritable genetic effects. Gasoline was negative in microbial mutagenicity and unscheduled DNA tests in rat hepatocytes. Gasoline did not induce chromosome aberrations in vivo in rat bone marrow cells and was negative in a mouse dominant lethal assay.

Reproductive Toxicity: Not expected to cause reproductive toxicity. No evidence of developmental toxicity was found in pregnant laboratory animals (rats and mice) exposed to high vapor concentrations of unleaded gasoline and petroleum naphthas via inhalation. A two-generation reproductive toxicity study of vapor recovery gasoline did not adversely affect reproductive function or offspring survival and development.

Other Comments: Gasoline engine exhaust has been classified by the International Agency for Research on Cancer (IARC) as possibly carcinogenic to human.

Information on Toxicological Effects of Components

Xylenes (o-, m-, p- isomers)

Target Organs: Rats exposed to xylenes at 800, 1000 or 1200 ppm 14 hours daily for 6 weeks demonstrated high frequency hearing loss. Another study in rats exposed to 1800 ppm 8 hours daily for 5 days demonstrated middle frequency hearing loss.
Reproductive Toxicity: Both mixed xylenes and the individual isomers produced limited evidence of developmental toxicity in laboratory animals. Inhalation and oral administration of xylene resulted in decreased fetal weight, increased incidences of delayed ossification, skeletal variations and resorptions, but no evidence of teratogenicity.

Toluene

Carcinogenicity: Exposure of rats and mice to toluene at concentrations ranging from 120-1200 ppm for two years did not demonstrate evidence of carcinogenicity. Toluene has not been listed as a carcinogen by IARC.
Target Organs: Epidemiology studies suggest that chronic occupational overexposure to toluene may damage color vision. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and central nervous system (brain) damage in laboratory animals. Intentional misuse by deliberate inhalation of high concentrations of toluene has been shown to cause liver, kidney, and central nervous system damage, including hearing loss and visual disturbances.
Reproductive Toxicity: Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. Decreased fetal body weight and increased skeletal variations in both inhalation and oral studies, but only at doses that were maternally toxic. No fetal toxicity was seen at doses that were not maternally toxic. Decreased sperm counts have been observed in male rats in the absence of a reduction in fertility. Toluene has been reported to cause mental or growth retardation in the children of solvent abusers who directly inhale toluene during pregnancy.

Benzene

Carcinogenicity: Benzene is an animal carcinogen and is known to produce acute myelogenous leukemia (a form of cancer) in humans. Benzene has been identified as a human carcinogen by IARC, the US National Toxicology Program and the US-Occupational Safety and Health Administration.
Target Organs: Prolonged or repeated exposures to benzene vapors can cause damage to the blood and blood forming organs, including disorders like leukopenia, thrombocytopenia, and aplastic anemia.
Reproductive Toxicity: Some studies in occupationally exposed women have suggested benzene exposure increased risk of miscarriage and stillbirth and decreased birth weight and gestational age. The size of the effects detected in these studies was small, and ascertainment of exposure and outcome in some cases relied on self-reports, which may limit the reliability of these results.
Germ Cell Mutagenicity: Benzene exposure has resulted in chromosomal aberrations in human lymphocytes and animal bone marrow cells. Exposure has also been associated with chromosomal aberrations in sperm cells in human and animal studies.

Ethylbenzene

Carcinogenicity: Rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study demonstrated limited evidence of kidney, liver, and lung cancer. Ethyl benzene has been listed as a possible human carcinogen by IARC.
Target Organs: In rats and mice exposed to 0, 75, 250, or 750 ppm ethyl benzene in a two year inhalation study there was mild damage to the kidney (tubular hyperplasia), liver (eosinophilic foci, hypertrophy, necrosis), lung (alveolar epithelium metaplasia), thyroid (hyperplasia), thyroid (hyperplasia) and pituitary (hyperplasia). In animal models (particularly rats), ethyl benzene affects the auditory function mainly in the cochlear mid-frequency range and ototoxicity was observed after combined exposure to noise and ethyl benzene. There is no evidence of either ethyl benzene-induced hearing losses or ototoxicity with combined exposure to ethyl benzene and noise in workers.

Hexane

Target Organs: Excessive exposure to n-hexane can result in peripheral neuropathies. The initial symptoms are symmetrical sensory numbness and paresthesias of distal portions of the extremities. Motor weakness is typically observed in muscles of the toes and fingers but may also involve muscles of the arms, thighs and forearms. The onset of these symptoms may be delayed for several months to a year after the beginning of exposure. The neurotoxic properties of n-hexane are potentiated by exposure to methyl ethyl ketone and methyl isobutyl ketone.
Reproductive Toxicity: Prolonged exposure to high concentrations of n-hexane (>1,000 ppm) resulted in decreased sperm count and degenerative changes in the testes of rats but not those of mice.

Section 12: Ecological Information

Toxicity: Acute aquatic toxicity studies on samples of gasoline and naphtha streams show acute toxicity values greater than 1 mg/L and mostly in the range 1-100 mg/L. These tests were carried out on water accommodated fractions, in closed systems to prevent evaporative loss. Results are consistent with the predicted aquatic toxicity of these substances based on their hydrocarbon composition. These substances should be regarded as toxic to aquatic organisms, with the potential to cause long term adverse effects in the aquatic environment.

Persistence and Degradability: The hydrocarbons in this material are not readily biodegradable but are regarded as inherently biodegradable since their hydrocarbon components can be degraded by microorganisms.

Persistence per IOPC Fund definition: Non-Persistent

Bioaccumulative Potential: Log Kow values measured for the hydrocarbon components of this material range from 3 to greater than 6 and therefore are regarded as having the potential to bioaccumulate. In practice, metabolic processes or physical properties may prevent this effect or limit bioavailability.

Mobility in Soil: On release to water, hydrocarbons will float on the surface and since they are sparingly soluble, the only significant loss is volatilization to air. In air, these hydrocarbons are photodegraded by reaction with hydroxyl radicals with half lives varying from 6.5 days for benzene to 0.5 days for n-dodecane.

Other Adverse Effects: None anticipated.

Section 13: Disposal Considerations

The generator of a waste is always responsible for making proper hazardous waste determinations and needs to consider state and local requirements in addition to federal regulations.

This material, if discarded as produced, would not be a federally regulated RCRA "listed" hazardous waste. However, it would likely be identified as a federally regulated RCRA hazardous waste for the following characteristic(s) shown below. See Sections 7 and 8 for information on handling, storage and personal protection and Section 9 for physical/chemical properties. It is possible that the material as produced contains constituents which are not required to be listed in the MSDS but could affect the hazardous waste determination. Additionally, use which results in chemical or physical change of this material could subject it to regulation as a hazardous waste.

Container contents should be completely used and containers should be emptied prior to discard. Container residues and rinseates could be considered to be hazardous wastes.

EPA Waste Number(s)

- D001 - Ignitability characteristic
- D018 - Toxicity characteristic (Benzene)

Section 14: Transport Information

U.S. Department of Transportation (DOT)

Shipping Description: *Aquatic toxicity studies indicate this material may be classified as a Marine Pollutant under IMDG Code. It is not currently regulated as a marine pollutant by the USDOT. If there is not a Shipping Description or other DOT marking, labeling, placarding and packaging references shown in this section, it is not regulated as a hazardous material by the USDOT.*

Non-Bulk Package Marking: UN1203, Gasoline, 3, II
Non-Bulk Package Labeling: Gasoline, UN1203
Bulk Package/Placard Marking: Flammable liquid
Packaging - References: Flammable / 1203
49 CFR 173.150; 173.202; 173.242
(Exceptions; Non-bulk; Bulk)
Hazardous Substance: See Section 15 for RQ's
Emergency Response Guide: 128

Note: Container(s) greater than 5 liters (liquids) or 5 kilograms (solids), shipped by water mode and ALL bulk shipments may require the shipping description to contain the "Marine Pollutant" notation [49 CFR 172.203(l)] and the container(s) to display the [Marine Pollutant Mark] [49 CFR 172.322].

International Maritime Dangerous Goods (IMDG)

Shipping Description: UN1203, Gasoline, 3, II, (FP° C cc), [where FP is the material's flash point in degrees Celsius closed cup]
Non-Bulk Package Marking: Gasoline, UN 1203
Labels: Flammable liquid
Placards/Marking (Bulk): Flammable / 1203
Packaging - Non-Bulk: P001
EMS: F-E, S-E
Note: If container(s) is greater than 5 liters (liquids) or 5 kilograms (solids), shipment may require the shipping description to contain the "Marine Pollutant" description [IMDG 5.4.1.4.3.5] and the container(s) to display the Marine Pollutant mark [IMDG 5.2.1.6]. If transported in bulk by marine vessel in international waters, product is being carried under the scope of MARPOL Annex I.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable

International Civil Aviation Org. / International Air Transport Assoc. (ICAO/IATA)

UN/ID #: UN1203
Proper Shipping Name: Gasoline
Hazard Class/Division: 3
Packing Group: II
Non-Bulk Package Marking: Gasoline, UN1203
Labels: Flammable liquid
ERG Code: 3H
Note: If container(s) is greater than 5 liters (liquids) or 5 kilograms (solids), shipment may require the container to display the "Environmentally hazardous substance" mark [IATA 7.1.6.3].

	LTD. QTY	Passenger Aircraft	Cargo Aircraft Only
Packaging Instruction #:	Y341	353	364
Max. Net Qty. Per Package:	1 L	5 L	60 L

Section 15: Regulatory Information

CERCLA/SARA - Section 302 Extremely Hazardous Substances and TPQs (in pounds):

This material does not contain any chemicals subject to the reporting requirements of SARA 302 and 40 CFR 372.

CERCLA/SARA - Section 311/312 (Title III Hazard Categories)

Acute Health: Yes
Chronic Health: Yes
Fire Hazard: Yes
Pressure Hazard: No
Reactive Hazard: No

CERCLA/SARA - Section 313 and 40 CFR 372:

This material contains the following chemicals subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR 372:

Chemical Name	Concentration ¹	de minimis
Xylenes (o-, m-, p- isomers)	0-21	1.0%
Toluene	0-15	1.0%

Benzene	0-5	0.1%
Benzene, 1,2,4-trimethyl-	0-5	1.0%
Ethylbenzene	0-5	0.1%
Hexane	0-4	1.0%
Cyclohexane	0-2	1.0%

EPA (CERCLA) Reportable Quantity (in pounds):

EPA's Petroleum Exclusion applies to this material - (CERCLA 101(14)).

California Proposition 65:

Warning: This material may contain detectable quantities of the following chemicals, known to the State of California to cause cancer, birth defects or other reproductive harm, and which may be subject to the warning requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

Chemical Name	Type of Toxicity
Toluene	Developmental Toxicant Female Reproductive Toxicant
Benzene	Cancer Developmental Toxicant Male Reproductive Toxicant
Ethylbenzene	Cancer
Unleaded Gasoline (Wholly Vaporized)	Cancer

Gasoline engine exhaust is on the Proposition 65 list of chemicals known to the State of California to cause cancer.

International Hazard Classification

Canada:

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the Regulations.

WHMIS Hazard Class:

B2 - Flammable Liquids

D2A

D2B

National Chemical Inventories

All components are either listed on the US TSCA Inventory, or are not regulated under TSCA

All components are either on the DSL, or are exempt from DSL listing requirements.

U.S. Export Control Classification Number: EAR99

Section 16: Other Information

Date of Issue:	Previous Issue Date:	SDS Number:	Status:
04-Mar-2013	16-Jan-2013	251720	FINAL

Revised Sections or Basis for Revision:

Identified Hazards (Section 2); Environmental hazards (Section 12)

Guide to Abbreviations:

ACGIH = American Conference of Governmental Industrial Hygienists; CASRN = Chemical Abstracts Service Registry Number; CEILING = Ceiling Limit (15 minutes); CERCLA = The Comprehensive Environmental Response, Compensation, and Liability Act; EPA = Environmental Protection Agency; GHS = Globally Harmonized System; IARC = International Agency for Research on Cancer; INSHT = National Institute for Health and Safety at Work; IOPC = International Oil Pollution Compensation; LEL = Lower Explosive Limit; NE = Not Established; NFPA = National Fire Protection Association; NTP = National Toxicology Program; OSHA = Occupational Safety and Health Administration; PEL = Permissible Exposure Limit (OSHA); SARA = Superfund Amendments and Reauthorization Act; STEL = Short Term Exposure Limit (15 minutes); TLV = Threshold Limit Value (ACGIH); TWA = Time Weighted Average (8 hours); UEL = Upper Explosive Limit; WHMIS = Worker Hazardous Materials Information System (Canada)

Disclaimer of Expressed and implied Warranties:

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APPENDIX F

**DRAFT SEDIMENT INVESTIGATION WORK PLAN
COMMENTS AND RESPONSES**

Date: 30 September 2013
Project Location: US Government Moorings
Reviewer: Sharon Gelinias, Geologist
Document Name: Sediment Investigation Work Plan, dated September 27, 2013
S&W RESPONSES: Provided in Appendix F to Final Work Plan, dated October 11, 2013

Comments:

1. General – Past tense verbs are used in some sections of the workplan. Please correct to future tense where necessary.

S&W Response: *Past tense in Paragraph 3.2 corrected.*

2. Section 4.1. It is stated that 3 concurrent days are needed for logging, but in Section 2.0 it is stated that 2 days are needed. Please correct the inconsistency.

S&W Response: *Section 2.0 text corrected to indicate 3 days.*

3. Section 4.3.3. Is a subcontractor performing air monitoring during logging? If yes, please state what their duties will be and what duties Shannon & Wilson representatives will have.

S&W Response: *Yes. EHS International (EHSI) will be completing air monitoring. Text revised to specify roles: S&W will collect cores (with Marine Sampling Systems [MSS]), cut cores longitudinally, develop photographic documentation, collect samples, and coordinate IDW disposal; EHSI will complete air monitoring and implementation of engineering controls.*

4. Section 7.1. Please revise so that USACE is only responsible for potentially hazardous IDW (i.e. sediment). All non-hazardous materials (such as PPE, etc.) should still be the responsibility of Shannon & Wilson.

S&W Response: *Paragraph 7.1 text revised. S&W and MSS will transfer drums from sampling vessel to dock, and then to temporary storage location. Paragraph 7.5 clarifies responsibilities for offsite disposal (hazardous versus non-hazardous).*

5. Section 7.2. Non-hazardous drums can be stored in the parking area. All hazard or potentially hazardous drums will be stored at the USM Hazardous Storage Area. Please update section with this information.

S&W Response: *Paragraph 7.2 text revised to include temporary storage in the Hazardous Storage Area.*

6. Section 7.5. Only drums confirmed to be hazardous will be disposed of by USACE. If analytical results indicate that the drums are non-hazardous, then Shannon & Wilson will be responsible for disposal. Please update this section to clarify the distinction.

S&W Response: Paragraph 7.5 text revised for clarification.

7. HASP, Section 7.2. Please describe what type of engineering controls may be used during sediment core logging.

S&W Response: Paragraph 7.2 revised to reference Paragraph 11.3, where engineering controls are further described.

Date: 30 September 2013
Project Location: US Government Moorings
Reviewer: Lynn Daniels (via email)
Document Name: Sediment Investigation Work Plan, dated September 27, 2013
S&W RESPONSES: Provided in Appendix F to Final Work Plan, dated October 11, 2013

Comments on the Sed Sampling Plan:

There are some editorial things that I did not cite here. May want to have someone not associated with the project do a quick editorial review.

S&W Response: Noted.

Section 3.1 - end, can we get an estimate of the size of the structure that the cores will be transported and stored in? (i.e. is it a meter by a meter, or...? Assume over 4' tall) Will the cores and waste remain on the vessel until a) the that core is complete, b) until end of the day, or c) until the end of the operation? (the fewer times we have to call on the facility to operate their crane, the better, but don't know space on this vessel.)

S&W Response: Paragraph 3.1 revised to: include temporary storage in 35-gallon garbage cans and their approximate size. Clarified the method and timing of materials transfer from overwater to onshore.

Section 3.2 - last part of the paragraph - has two past tense sentences.

S&W Response: Tense corrected.

Section 3.3 - the government intends to have observers on board - how many can the vessel accommodate? Each will bring their own life vest, steel toes & hard hat.

S&W Response: Vessel can accommodate six people. Marine Sampling Systems will provide two people, S&W will provide two people. Two government representatives may be on site provided they supply their own PPE and have appropriate HAZWOPER training.

Section 4.0 - using the term "uplands" is somewhat confusing because there is another part of the Moorings clean-up that is called the uplands. Could it be "on shore" instead of Uplands?

S&W Response: Term "uplands" globally replaced with "onshore".

4.1 - (Sharon this is yours, not really S&W's issue) Wondering if we have a plan for when to log – perhaps on Thursday & Friday since all parties will be in Portland.

S&W Response: S&W scheduled core logging to occur Monday November 4, 2013, through Wednesday November 6, 2013.

4.4.3 - for clarity and completeness, may want to add "including breathing area" after "Air Monitoring..." in the first sentence.

S&W Response: *Text added.*

5.2 - from a double negative standpoint, wouldn't it be clearer to say "only disposable sampling equipment"

S&W Response: *Text revised as suggested.*

5.3 - any estimate of the quantity of decon liquids?

S&W Response: *Estimated quantity added.*

7.1 - again, saying "upland sampling" is confusing. We aren't actually doing any sampling "upland" - more accurately it is "overwater sampling and on-shore analyses" (even if it is only observational analyses). When I first read it I wondered what Uplands Sampling we were doing...

S&W Response: *Text revised to read "overwater sampling and onshore core logging activities".*

7.1 - "IDW generated... will be stored on the boat until coring is complete, or if full,..." until what is full? The boat, the drum? Will use of the facility crane be necessary to move it? Specify here if assistance from others is required.

S&W Response: *Text revised to clarify IDW transfer/use of facility crane. S&W and MSS will transfer drums from sampling vessel to dock, and then to temporary storage location. If needed, facility crane may be used at the end of the sampling program.*

7.1 - would like an estimate of the number of drums we'll need to handle included here.

S&W Response: *Estimated number of drums added.*

7.2 – see above for an estimated number of drums

S&W Response: *Noted.*

7.2 – add to the sentence: "drums will remain on site until completion of core logging, characterization, and disposal facility acceptance".

S&W Response: *Text added as suggested.*

7.3 – awkward sentence "... concurrent with upland (core logging). Suggest saying "concurrent with on shore core logging".

S&W Response: *Text revised as suggested.*

7.3 – will there be other IDW, other than the cores? If, so indicate where they are, their sampling protocol, etc. If the cores will simply be added to existing drums of IDW, so state.

S&W Response: *IDW type is listed in Paragraph 7.1 (e.g, PPE, water). No sampling protocols are specified – they will be disposed of as non-hazardous. Sediment investigation drums will not be combined with Geotechnical Investigation drums.*

7.5 – this is where I learn what will be included in IDW – might be better stated earlier – along with quantity expected – earlier in the document. (You don't have to be accurate, just close!) And since we are doing disposal, we'd like to minimize the quantity as much as reasonable.

***S&W Response:** IDW is specified in Paragraph 7.1. Estimated quantity is provided in Paragraph 7.2.*

8.2 – this section discusses non-disposable equipment, but 5.2 says you'll use disposable equipment. What do you expect to have to Decon?

***S&W Response:** Paragraph 8.2 deleted.*

Thanks Andy!

--Lynn
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