FINAL

City of Portland

Sampling and Analysis Plan

Basin-Scale Stormwater Outfalls Monitoring (2021–2026)

City of Portland Outfalls Project

October 28, 2021

ENVIRONMENTAL SERVICES
CITY OF PORTLAND
working for clean rivers

Prepared by:
GSI Water Solutions, Inc.
55 SW Yamhill St., Suite 300, Portland, OR, 97204

This page intentionally left blank.

Contents

Tables

Figures

Appendices

Abbreviations and Acronyms

COP	City of Portland
DEQ	Oregon Department of Environmental Quality
EPA	U.S. Environmental Protection Agency
JSCS	Joint Source Control Strategy
MRL	method reporting limit
OF	outfall
PAHs	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
SAP	Sampling and Analysis Plan
SCD	Source Control Decision
TSS	total suspended solids

SECTION 1: **Introduction**

1.1 Background

This Sampling and Analysis Plan (SAP) outlines the approach for basin-scale stormwater monitoring for the City Outfalls Project being conducted under the oversight of the Oregon Department of Environmental Quality (DEQ) Cleanup Program. The data collected will be used to confirm that the City of Portland's programs, in conjunction with the various state and federal programs, continue to be effective in achieving source control in the Portland Harbor Study Area through collection of new basin-scale stormwater data for City outfalls.

The City completed a stormwater source control evaluation of 39 outfalls into Portland Harbor, 35 of which remain active. This work was initiated in 2003 and was completed in 2021. DEQ issued a Conditional Source Control Decision (SCD) in April 2021. DEQ concluded source control has been effectively achieved for the City's outfalls draining into Portland Harbor. The SCD also requires confirmation monitoring from up to five outfalls per year for the next 5 consecutive years.

This SAP presents the approach and methods to conduct the required confirmation sampling. It is based on previous SAPs approved by DEQ for the City Outfalls Project, including the SAP provided in the Source Control Measure Effectiveness Demonstration technical memorandum submitted to DEQ in 2015 (City of Portland, 2015).

1.2 Monitoring Objectives and Scope

The objective as stated in the Scope of Work (City of Portland Agreement No. 30006994; DEQ Agreement No. R002-20; dated April 16, 2021) is to "satisfy the condition on the source control decision for the City Outfalls Project in Portland Harbor, by verifying that the City's programs, in conjunction with the various state and federal programs, continue to be effective toward achieving source control through collection of new basin-scale stormwater data for City outfalls." The primary purpose of this SAP is to collect additional representative basin-scale stormwater data from stormwater drainage basins, which will be evaluated in conjunction with existing information and data.

Stormwater from up to five outfalls per year will be sampled from the 2021—22 through the 2025—26 wet season (up to 25 outfalls will be monitored in total over the 5-year life of the project). The goal is to sample each outfall four times in the sampling year (i.e., wet season). Outfall basins and respective monitoring locations will be chosen each year following the evaluation of the previous year's data and any other new information or available data for Portland Harbor that may be helpful for decision-making for this monitoring effort. Outfalls for sampling will be chosen collaboratively with DEQ in conjunction with reporting annual analytical results. Sampling will be prioritized in basins in which the majority of source control actions at sites contributing stormwater discharge to City outfalls have been completed, including those under DEQ's Cleanup Program.

The site-wide analytical suite will include polychlorinated biphenyl (PCB) congeners, polycyclic aromatic hydrocarbons (PAHs), bis-2(ethylhexyl)phthalates, total metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), and total suspended solids (TSS). This suite was chosen following the evaluation described in DEQ's 2021 Conditional Source Control Decision (DEQ, 2021), and as a result of conversations with DEQ. This analytical suite is consistent with DEQ's Joint Source Control Strategy (JSCS) (DEQ and EPA, 2005), as amended in 2007 (DEQ, 2007) and previous source control evaluation work conducted by the City and private parties. Measurements of pH, temperature, and conductivity will be made in the field.

Additional analysis, including those of dioxin/furan congeners, may be collected from specific locations, pending a review of potential sources, multiple lines of evidence consistent with the 2021 Conditional Source Control Decision (DEQ, 2021), and available analytical data. The need for dioxin/furan analysis will be decided in consultation with DEQ on a basin-by-basin basis. EPA and DEQ are currently evaluating site-wide dioxin/furan data, including collecting additional upstream dioxin/furan data, with the intent to provide further guidance.

An evaluation of basin-scale stormwater data collected under this work plan will be conducted to demonstrate that the collective effect of site and basin source controls, implemented under City and state stormwater quality programs and state and federal cleanup programs, continue to be effective in preventing contaminant discharges from City and private outfalls to the lower Willamette River at levels that would result in recontamination of the eventual in-water sediment remedy or that could pose an unacceptable risk to river-related receptors.

SECTION 2: **Monitoring Locations – Year 1**

The Portland Harbor hydroboundary for stormwater drainage is shown on Figure 1 and includes the stormwater basins selected for Year 1 monitoring. These stormwater basins were selected in consultation with DEQ, and include OF11, OF22B, OF47, OF50, and OFS-6. These basins were selected because they are subject to source control programs and measures that are complete or substantially complete, and because they represent a variety of basin drainage sizes and land uses throughout the Harbor.

Table 1 lists the Year 1 basins and summarizes the monitoring locations for each outfall basin and the suitability of each monitoring location. Additional characteristics (including source control status, land use, and size of each basin) are summarized in the City of Portland Outfall Basin Completion Summaries (City of Portland, 2014) and Source Control Measures Effectiveness Demonstration (City of Portland, 2015) as well as Table 2 of the DEQ Conditional Source Control Decision (DEQ, 2021). Sampling locations are displayed on Figures 2 through 6.

Stormwater samples will be collected from manholes rather than the end of the outfall to ensure that samples are representative. Many outfalls are often at least partially submerged during the wet season and therefore are not conducive to collecting representative samples. Manhole locations are available within each affiliated stormwater conveyance system that represent the majority of the basin drainage area.

The constructed invert elevations of some outfall trunk storm lines periodically lie lower than the seasonal elevation of the river during the wet season; thus, river water can back up into the system during high-stage conditions and can prevent representative sample collection at some manholes during storm events. Because of the importance of collecting all data from a given basin at the same location for comparability between storm events, the selected manholes in Table 1 represent the best locations where all or most of the drainage area will be represented and which are least likely to be inundated during high river stages. Table 1 also includes an alternative monitoring location for two basins if the preferred location is not accessible.

Table 1. Proposed Sampling Locations

Basin	Sampling Location	Rationale
11	Manhole ABG349 or Manhole ABG247 Outgoing 78” Pipe	• The basin is 949 acres, the majority of which (92%) is West Hills open space, highway drainage, and residential land. A small percentage is Pearl District commercial and residential (8%). • The primary sampling location represents majority of Basin 11 drainage area and is the same location sampled during the 2011 Tanner Creek Water Quality Characterization. • The low elevation of the pipe invert at the primary sampling location presents an inundation risk. An alternative location can be used if the primary sampling location is submerged.
22B	Outfall AAM079 Effluent 60” Pipe	• The basin is 29 acres of industrial land. • The sampling location represents the entire Basin 22B drainage area and has been previously sampled as part of ongoing source control evaluations. • The low elevation of the outfall pipeline presents a low inundation risk. This location best represents the entire basin and still meets monitoring objectives. Water level data will be evaluated to confirm there is no inundation prior to sampling.

47	Manhole AAT620 Outgoing 27” Pipe	• The basin is 9.5 acres of light industrial land. • The sampling location represents the entire Basin 47 drainage area and was sampled during the City’s 2007–08 sampling events (City of Portland, 2010). • No inundation risk exists at this location.
50	Manhole AAE536 Outgoing 30” Pipe	• The basin is 38.6 acres of mixed commercial, residential, industrial, and highway land. • The sampling location represents the entire Basin 50 drainage area and was sampled in the City’s 2007–08 sampling events (City of Portland, 2010). • Inundation is unlikely at this location.
S-6	Manhole AAM118 or AAM124 Outgoing 36” Pipe	• The basin is 22 acres of heavy industrial land. • The sampling location represents the entire Basin S-6 drainage area and was sampled in the City’s 2007–08 sampling events (City of Portland, 2010). • The low elevation of the pipe invert at the primary sampling location presents an inundation risk. An alternative location can be used if the outfall is submerged. This location would represent a smaller portion of the Basin S-6 drainage area but would still include a large portion of the industrial runoff.

SECTION 3: **Sampling Approach and Schedule**

The sampling approach is intended to collect stormwater data sets in general accordance with the JSCS (DEQ and EPA, 2005; DEQ, 2007). Where possible, sampling data can be compared to existing representative data sets to evaluate the significance of concentration trends. Health and safety guidelines will be followed during all sampling activities as presented in Appendix A: Health and Safety Plan.

Previous stormwater data sets collected from City basins by the City, the Lower Willamette Group, and others include a mix of composite and grab samples. The JSCS (DEQ and EPA, 2005; DEQ, 2007) (and subsequent DEQ guidance) supports collection of four stormwater grab samples during the wet season to evaluate stormwater quality. Stormwater grab samples will be collected from the designated basin-scale monitoring locations during a storm event. For basin-scale monitoring, the first flush of stormwater out of the outfall during a storm event may not be representative of contributions from the entire basin. For this sampling approach, the target sampling time period will be defined as within the first 3 hours of observed runoff to ensure that samples represent contributions from the entire basin rather than only the portions closest to the monitoring location.

The JSCS establishes target storm criteria as follows:

- Antecedent dry period at least 24 hours
- Minimum anticipated rainfall >0.2 inches per event
- Expected duration of storm at least 3 hours

Smaller storms or those of shorter duration are less likely to generate runoff that would be representative of entire stormwater basins; therefore, field staff will employ a weather forecasting service to determine whether storm events meet target criteria. The criteria will be used as general guidance to determine when forecasted storms should be targeted for project sampling. While a 24-hour antecedent dry period is the target, in some cases, accepting storms with shorter antecedent dry periods may be necessary to achieve sampling targets. Field crews will use their best professional judgment to determine whether samples are representative and to determine potential storm events for which a shorter antecedent dry period may be acceptable in an effort to collect larger storms and a full data set this winter and spring. Per previous SAPs approved by DEQ, when an antecedent dry period of less than 24 hours occurs before sampling a representative storm, that period will not be shorter than 6 hours. Consultation with the field crew will be made prior to each sampling event to ensure that a variety of types of storms (varying by size and intensity) comprise the four storm events for each basin. Following sample collection, rain gage data, field observations and sample times will be evaluated to assess sample representativeness prior to submitting the samples for laboratory analyses.

Based on an evaluation of seasonal river gage data and storm line elevations for stormwater SAPs, the monitoring locations for some basins (11, 22B, and S-6) have the potential to be impeded by river back-up during high river stages (this risk is low for Basin 22B). This is because they are below elevations of 17 feet City of Portland Datum (COP Datum), where river impacts have been observed. Table 2 summarizes the invert elevations for these basin-scale monitoring locations.

Table 2. Sampling Location Invert Elevations

Basin	Location	Invert Elevation (COP Datum)
11	Manhole ABG349/ABG247	11.15' / 14.63'
22B	Outfall AAM079	16.19'
47	Manhole AAT620	20.37'
50	Manhole AAE536	23.2'
S-6	Manhole AAM118/AAM124	11.61' / 16.11'

Note

Manhole IDs and invert elevations were obtained from the Portland Maps Open Data "Collection System Points" data set (accessed at gis-pdx.opendata.arcgis.com).

As a point of reference, Table 3 provides an indication of the likelihood for the sampling locations to be inundated throughout the rainfall season. Outfalls 47 and 50 are not included because they do not pose an inundation risk due to their high invert elevations.

Table 3. Percent of Days River Above Invert Elevation (Outfalls with Inundation Risk Only)

Basin	Invert Elevation (ft)	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.
11	11.15'	0.4%	9.4%	15.1%	13.9%	15.1%	32.1%	43.9%	26.1%	8.2%
	14.63'	0.0%	0.3%	1.7%	0.6%	5.7%	11.3%	13.2%	4.8%	0.9%
22B	16.19'	0.0%	0.0%	0.0%	0.0%	4.3%	6.4%	10.5%	2.7%	0.0%
S-6	11.61'	0.1%	7.1%	10.8%	11.0%	13.5%	28.2%	37.8%	21.2%	6.2%
	16.11'	0.0%	0.0%	0.0%	0.0%	4.3%	6.6%	10.9%	2.8%	0.1%

Note

Based on U.S. Geological Survey Morrison Bridge Gage Height Daily Means from 6/15/2011 to 6/15/2021, converted to COP Datum, excluding all values from September (accessed at https://waterdata.usgs.gov/nwis/uv?14211720).

To ensure that samples represent only basin stormwater, field crews will check the river stage and make visual observations prior to sampling (such as noting positive flow direction into the outfall) to ascertain whether observed water at the monitoring locations likely represents stormwater flow from the basin or river water. If confirmation cannot be made of storm flow conditions, samples will not be collected at that time without first consulting with DEQ.

Due to the number of basins being sampled, the geographic distance between sampling locations, and the variability of rainfall within different parts of the Portland Harbor Study Area, it is possible that all five basins will not be sampled during the same storm events. For ease of data evaluation and reporting, field crews will aim to minimize the total number of storm events needed to complete the target sampling.

Quality control samples will include a field rinsate blank and a field duplicate grab sample for each sampled event. All grab duplicates will be collected at basin-scale monitoring locations. Grab samples will be collected in accordance with the JSCS Appendix D, Attachment D, Conducting Sampling at Your Facility (DEQ and EPA, 2005; DEQ, 2007).

SECTION 4: **Analytical Approach**

As described in Section 1.2, all stormwater samples will be analyzed for the following analytical suite: PCB congeners, PAHs, bis-2(ethylhexyl)phthalates, total metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, and zinc), and TSS. Measurements of pH, temperature, and conductivity will be made in the field.

In future years of the monitoring program, select outfall basins may be sampled for dioxin/furans, as warranted based on dioxin/furans concentrations above Portland Harbor Remedial Action Levels near City outfall discharge locations and a review of other available information and lines of evidence. The City will prioritize an evaluation of dioxins/furans at OFs 22B and 50 during a subsequent year as part of this five-year sampling effort and prioritize that sampling, if needed. Lines of evidence that are evaluated will be consistent with the JSCS (DEQ and EPA, 2005; DEQ, 2007) and the programmatic, basin-scale approach to source control that has been the foundation of the collaboration between the City and DEQ on the City's Portland Harbor source control program. DEQ has indicated that individual upland properties are evaluating dioxin/furans as part of their source control work (D. Lacey, personal communication, September 16, 2021). Basin-scale source control relies in part on individual properties completing their source control evaluations and subsequent cleanup actions under DEQ's Cleanup Program. The dioxin/furans data from individual properties, as well as from sufficiency assessment work and pre-design investigation work for the in-water Portland Harbor remedial design, could be valuable lines of evidence in evaluating the need for dioxin/furans sampling at a basin scale. Future decision-making regarding the need for dioxin/furans analysis will be made in consultation with DEQ.

Proposed methods and laboratory assignments are listed below, in primary order, to address the unlikely event that sample volume is limited. Target method reporting limits (MRLs) and method detection limits for each analysis are summarized in Table 4 to allow comparison with existing data and DEQ screening levels. As DEQ is aware, readily available commercial laboratories commonly have MRL/MDLs that are greater than applicable screening levels for the following analytes: total PCBs, select PAHs, and total arsenic. Laboratories have been selected to achieve MRL/MDLs that will allow for a comparison, to the extent feasible, to existing data sets and DEQ screening tools, which is the primary purpose of this SAP.

Table 4. Analytical Approach

Analyte Group	MRL	MDL	Method	Laboratory*
PCB congeners	20.0 pg/L for individual congeners	1.21 – 4.98 pg/L for individual congeners	EPA 1668A	Frontier
PAHs and phthalates	0.02 – 0.4 µg/L	0.01 – 0.2 µg/L	EPA 8270-SIM	Apex
Total arsenic	0.40 µg/L	0.074 µg/L	EPA 200.8	Weck
Total cadmium	0.20 µg/L	0.042 µg/L	EPA 200.8	Weck
Total chromium	0.20 µg/L	0.089 µg/L	EPA 200.8	Weck
Total copper	0.50 µg/L	0.23 µg/L	EPA 200.8	Weck
Total lead	0.20 µg/L	0.083 µg/L	EPA 200.8	Weck
Total mercury	0.05 µg/L	0.017 µg/L	EPA 200.8	Weck
Total nickel	2.0 µg/L	0.16 µg/L	EPA 200.8	Weck

Total silver	0.20 µg/L	0.03 µg/L	EPA 200.8	Weck
Total zinc	10 µg/L	0.80 µg/L	EPA 200.8	Weck
TSS	5.0 mg/L	N/A	SM 2450D	Weck

Notes

Apex = Apex Laboratories (Tigard, OR)

EPA = U.S. Environmental Protection Agency

Frontier = Frontier Analytical Laboratories (El Dorado Hills, CA)

MDL = method detection limit

MRL = method reporting limit

N/A = not applicable

PAH = polycyclic aromatic hydrocarbon

PCB = polychlorinated biphenyl

SIM = selective ion monitoring

SM = Standard Method

TSS = total suspended solids

Weck = Weck Laboratories, Inc. (City of Industry, CA)

pg/L = pictograms per liter

µg/L = micrograms per liter

mg/L = milligrams per liter

*Laboratory changes may be required but only laboratories certified by the Environmental Laboratory Accreditation Program (ELAP) will be utilized.

SECTION 5: **Reporting**

Draft and final reports will be prepared to present the data collected after each wet season (i.e., a total of five data reports). Each data report will summarize data collection activities and analytical results and will evaluate and present the data that meet field and lab quality control criteria, including target storm selection (when applicable), and adequate representation of basin stormwater discharge.

Data will be evaluated using a lines of evidence approach consistent with that used in the June 2018 Source Control Measure Effectiveness Monitoring and Assessment Report or as mutually agreed to by DEQ and the City (City of Portland, 2018). This approach includes comparing the data to knee-of-the-curves established by DEQ's Guidance for Evaluating the Stormwater Pathway at Upland Sites, Appendix E: Tool for Evaluating Stormwater Data (DEQ, 2009).

Each annual report shall include recommendations for DEQ-led source tracing or additional source control work, if warranted by sampling results. Outfall selection for the subsequent year will be determined in tandem with the process of reporting results from the previous year to DEQ, and outfall sampling locations will be chosen collaboratively with DEQ. The fifth and final report will include a summary of the 5-year sampling effort.

SECTION 6: **References**

City of Portland. 2010. Stormwater Evaluation Report, City of Portland Outfall Project. February 2010. Prepared by the City of Portland, Bureau of Environmental Services.

City of Portland. 2014. Municipal Stormwater Source Control Report, Appendix A: Closure Report for the City of Portland Outfalls Project, Outfall Basin Completion Summaries, January 2014. Prepared by the City of Portland, Bureau of Environmental Services.

City of Portland. 2015. Source Control Measures Effectiveness Demonstration. September 2015. Prepared by the City of Portland, Bureau of Environmental Services.

City of Portland. 2018. Source Control Measure Effectiveness Monitoring and Assessment Report. June 2018. Prepared by the City of Portland, Bureau of Environmental Services.

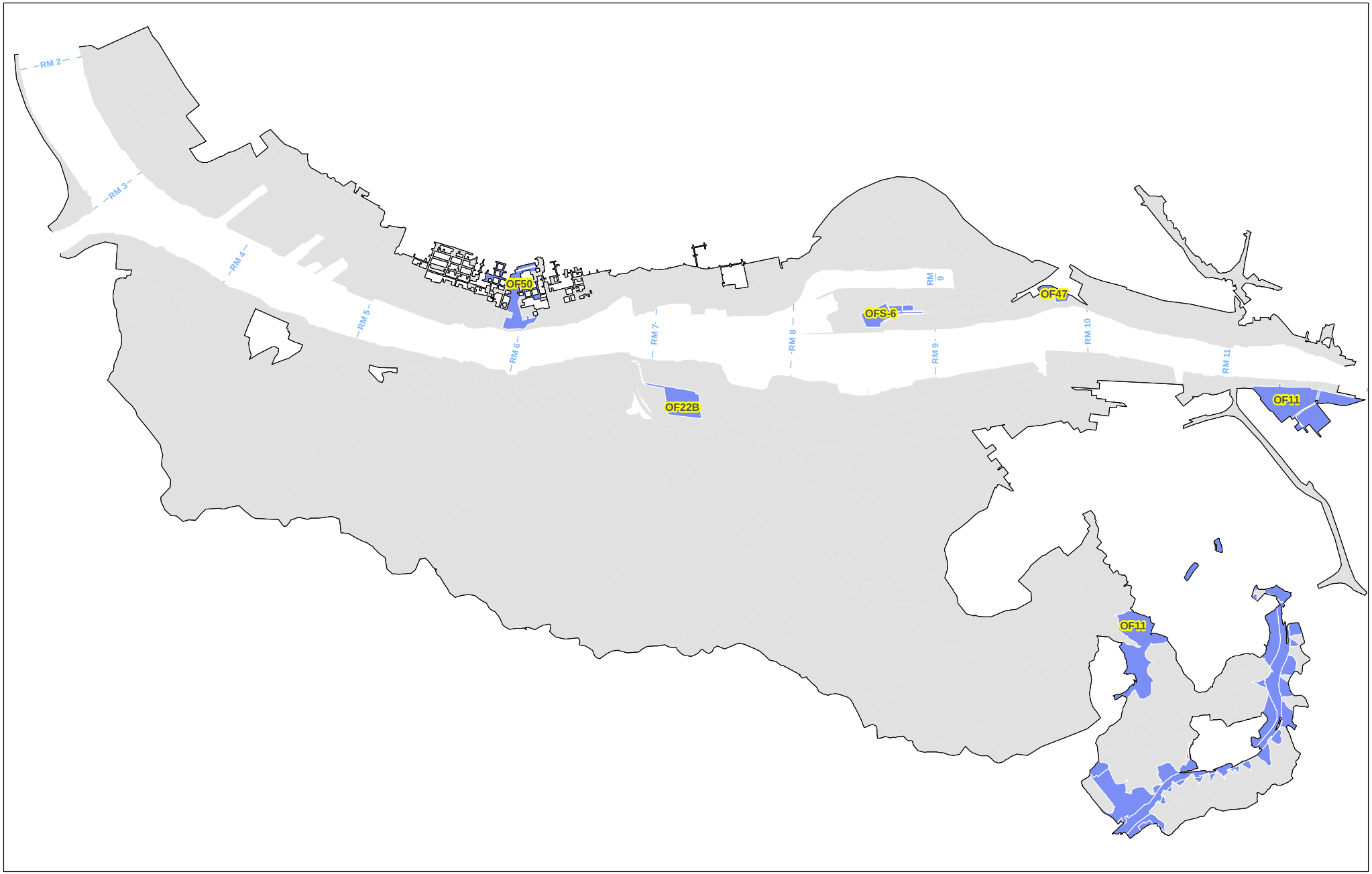
Oregon Department of Environmental Quality. 2009. Guidance for Evaluating the Stormwater Pathway at Upland Sites, January 2009, Updated October 2010 and July 2017. Prepared by the Oregon Department of Environmental Quality.

Oregon Department of Environmental Quality. 2021. Staff Report: Conditional Source Control Decision of Portland Outfalls Project in Portland Harbor, April 2021. Prepared by the Oregon Department of Environmental Quality.

Oregon Department of Environmental Quality and U.S. Environmental Protection Agency. 2005. Portland Harbor Joint Source Control Strategy, Final. December 2005. Prepared by the Oregon Department of Environmental Quality and U.S. Environmental Protection Agency.

Oregon Department of Environmental Quality. 2007. Joint Source Control Strategy, Table 3-1. Amended July 16, 2007. Prepared by the Oregon Department of Environmental Quality.

FIGURES



LEGEND

City Outfall Basin

Non-City Outfall Drainage Area

All Other Features

River Mile (RM)

Portland Harbor Hydroboundary

MAP NOTES: Date: 7/13/2021, Data Sources: City of Portland

FIGURE 1

Current City Outfall Basins

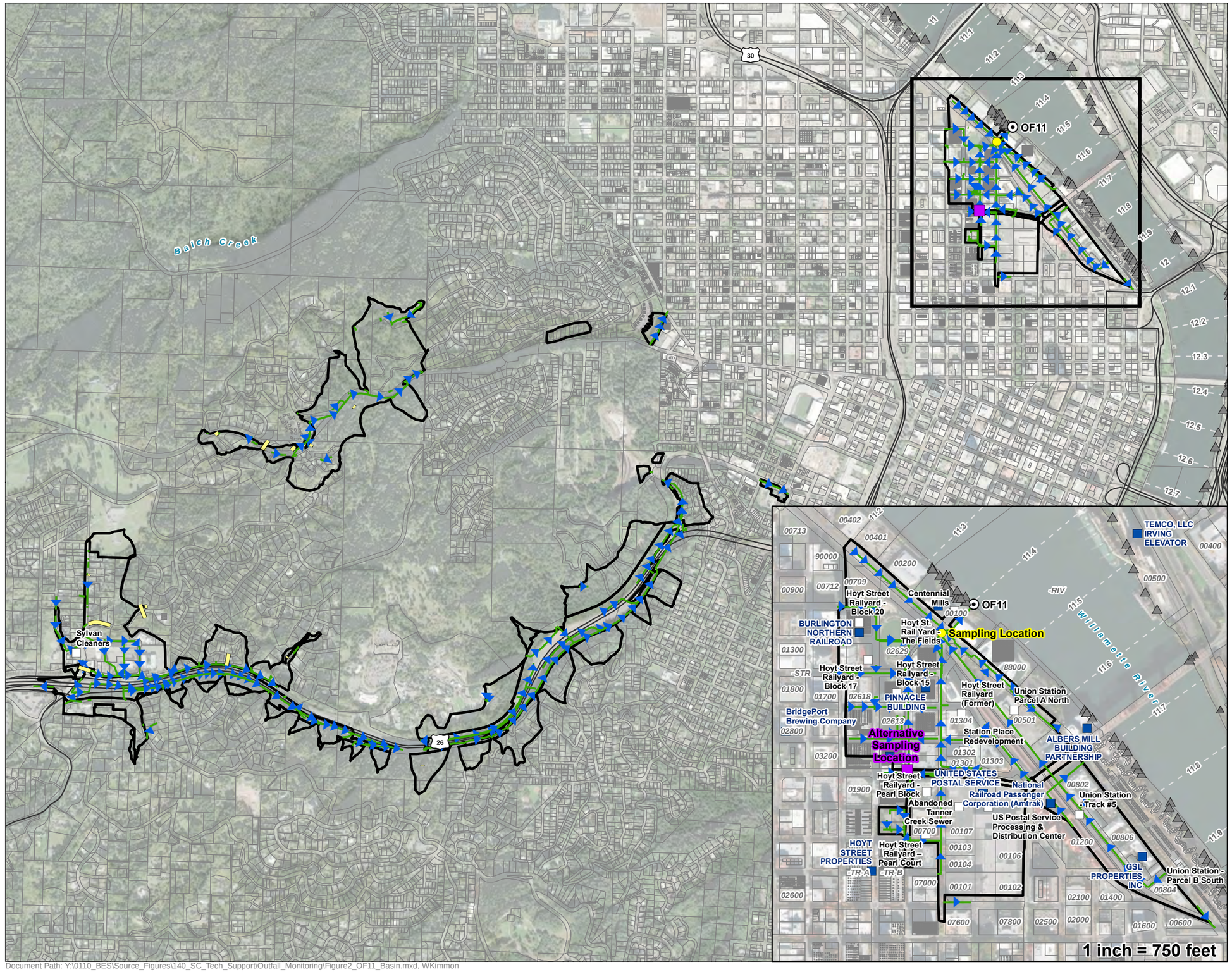
0 2,325 4,650 6,975

Feet

ENVIRONMENTAL SERVICES
CITY OF PORTLAND
1120 SW Fifth Avenue, Room 1000
Portland Oregon, 97204-1912

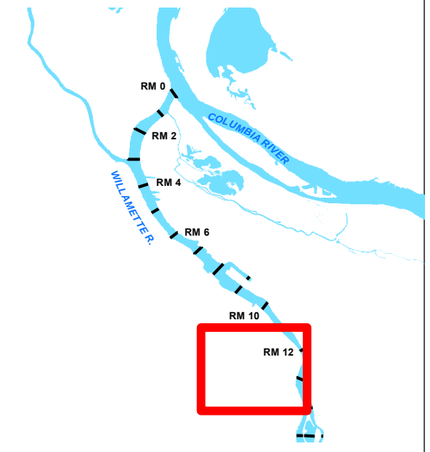
Document Path: Y:\0110_BES\Source_Figures\140_SC_Tech_Support\Outfall_Monitoring\Figure1_Current_City_OF_Basins.mxd

FIGURE 2
Outfall Basin 11



LEGEND

- Sampling Location
- Alternative Sampling Location
- ECSI Site
- NPDES Stormwater Permit
- City Outfall
- Non-City Outfall
- Basin 11
- River Mile
- Storm Main
- Culvert
- Tax Lot



NOTE
Based on current conditions as of date of this work plan.

N

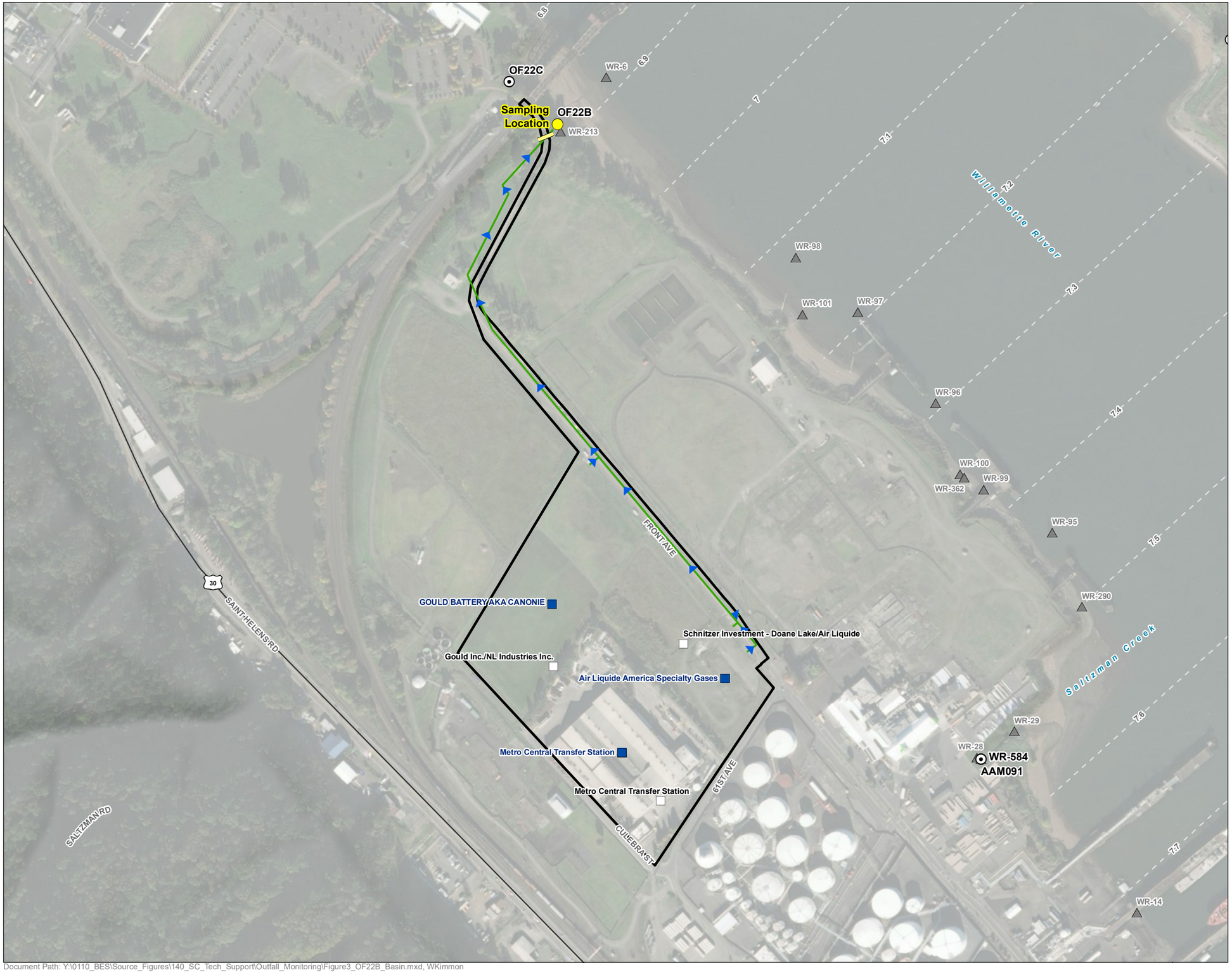
0 500 1,000 1,500
Feet

Date: October 21, 2021
Data Sources: BLM, ESRI, ODOT, USGS, Aerial Photo 2019

GSI Water Solutions, Inc.

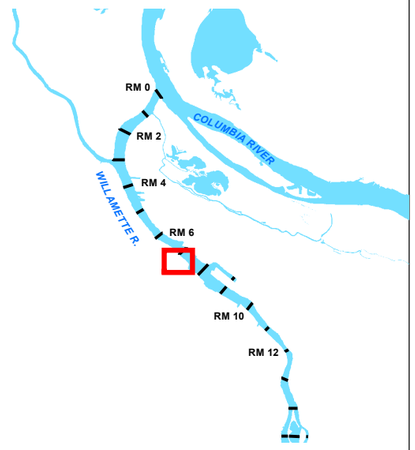
Document Path: Y:\0110_BES\Source_Figures\140_SC_Tech_Support\Outfall_Monitoring\Figure2_OF11_Basin.mxd, WKimmon

FIGURE 3
Outfall Basin 22B



LEGEND

- Sampling Location
- ECSI Site
- NPDES Stormwater Permit
- City Outfall
- Non-City Outfall
- Basin OF22B
- River Mile
- Storm Main
- Culvert
- Tax Lot



NOTE
Based on current conditions as of date of this work plan.

N

0 200 400
Feet

Date: October 25, 2021
Data Sources: BLM, ESRI, ODOT, USGS, Aerial Photo 2019

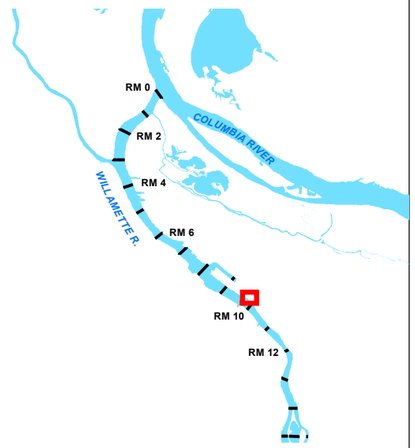
GSI Water Solutions, Inc.

Document Path: Y:\0110_BES\Source_Figures\140_SC_Tech_Support\Outfall_Monitoring\Figure3_OF22B_Basin.mxd, WKimmon

FIGURE 4
Outfall Basin 47

LEGEND

- Sampling Location
- ECSI Site
- NPDES Stormwater Permit
- City Outfall
- Non-City Outfall
- Basin OF47
- River Mile
- Storm Main
- Tax Lot



NOTE
Based on current conditions as of date of this work plan.

N

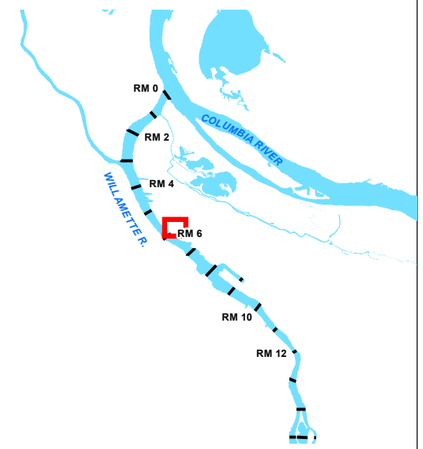
0 100 200
Feet

Date: October 25, 2021
Data Sources: BLM, ESRI, ODOT, USGS, Aerial Photo 2019

GSI Water Solutions, Inc.

Document Path: Y:\0110_BES\Source_Figures\140_SC_Tech_Support\Outfall_Monitoring\Figure4_OF47_Basin.mxd, WKimmon

FIGURE 5
Outfall Basin OF50



LEGEND

- ECSI Site
- NPDES Stormwater Permit
- City Outfall
- Non-City Outfall
- Basin OF50
- River Mile
- Storm Main
- Tax Lot

NOTE
Based on current conditions as of date of this work plan.

N

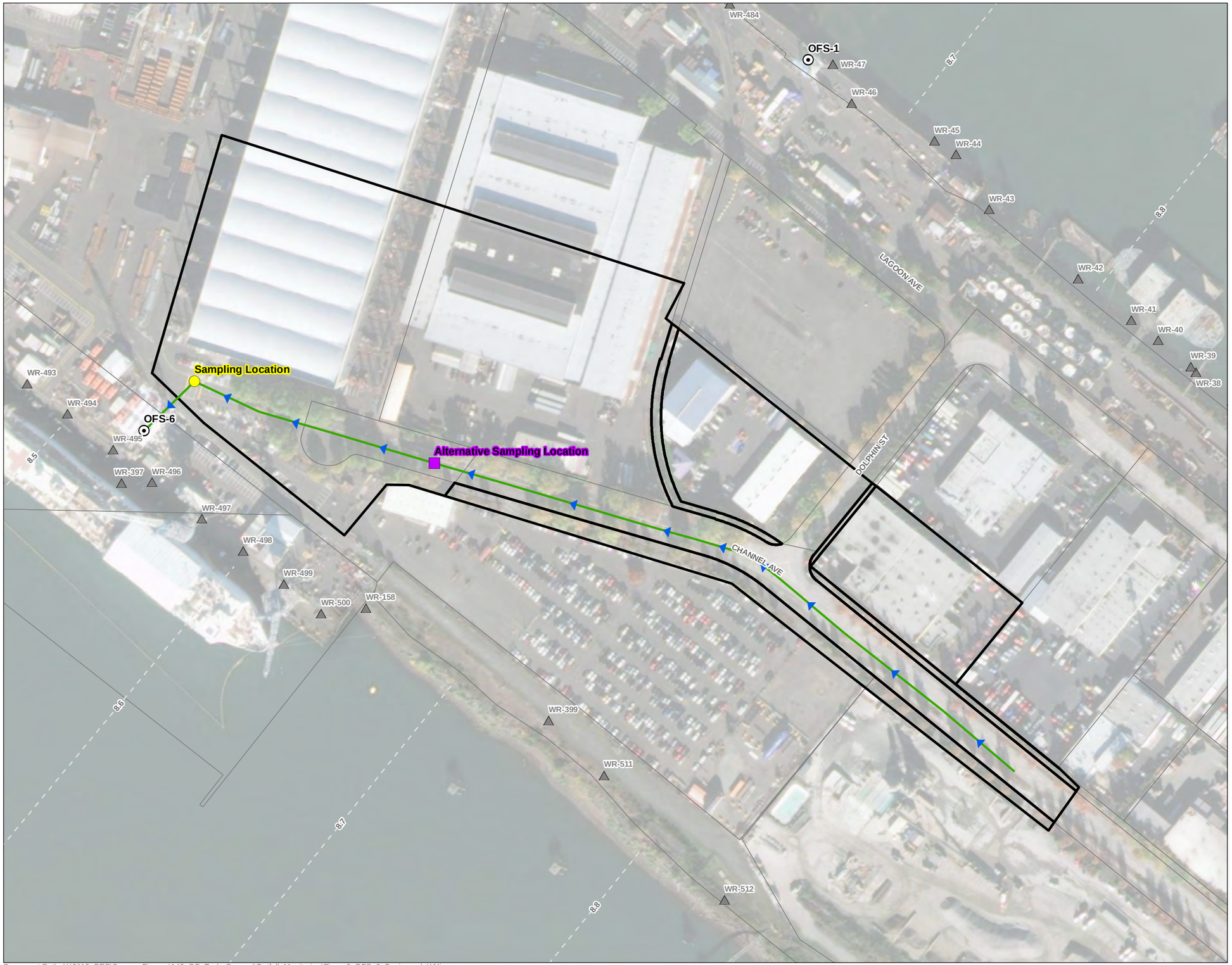
0 100 200 300
Feet

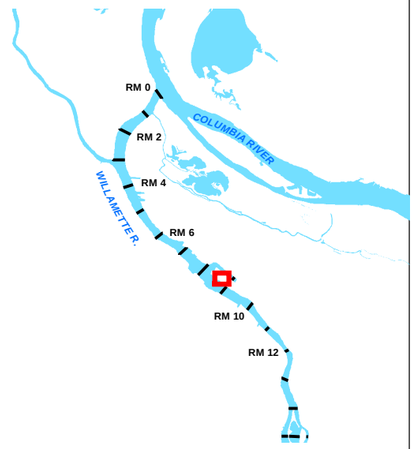
Date: October 25, 2021
Data Sources: BLM, ESRI, ODOT, USGS, Aerial Photo 2019

GSI Water Solutions, Inc.

Document Path: Y:\0110_BES\Source_Figures\140_SC_Tech_Support\Outfall_Monitoring\Figure5_OF50_Basin.mxd, WKimmon

FIGURE 6
Outfall Basin S-6





LEGEND

- Sampling Location
- Alternative Sampling Location
- ECSI Site
- NPDES Stormwater Permit
- City Outfall
- Non-City Outfall
- Basin OFS-6
- River Mile
- Storm Main
- Tax Lot

NOTE
Based on current conditions as of date of this work plan.

N

0 100 200
Feet

Date: October 21, 2021
Data Sources: BLM, ESRI, ODOT, USGS, Aerial Photo 2019

GSI Water Solutions, Inc.

Document Path: Y:\0110_BES\Source_Figures\140_SC_Tech_Support\Outfall_Monitoring\Figure6_OFS_6_Basin.mxd, WKimmon

APPENDIX

FINAL

Appendix A of Sampling and Analysis Plan

GSI Site-Specific Health and Safety Plan

City of Portland, Portland Harbor Study Area

Source Control Effectiveness Monitoring Project

October 22, 2021

Prepared by:

GSI Water Solutions, Inc.

55 SW Yamhill St., Suite 300, Portland, OR, 97204

Page intentionally left blank.

Site-Specific Health and Safety Plan

Prepared for:

City of Portland

Katie Lippard
HASP Preparer

Prepared by:

GSI Water Solutions, Inc.
55 SW Yamhill Street, Suite 300
Portland, Oregon 97204

Genevieve Schutzius
HASP Reviewer

Alison Clements
Supervising Project Manager

Contents

Tables

Figure

Attachments

Abbreviations and Acronyms

°F	degrees Fahrenheit
AED	automated external defibrillator
AHA	activity hazard analysis
CFR	Code of Federal Regulations
COC	contaminant of concern
CPR	cardiopulmonary resuscitation
CRZ	Contamination Reduction Zone
DEQ	Oregon Department of Environmental Quality
EMS	emergency medical services
EPA	U.S. Environmental Protection Agency
EZ	Exclusion Zone
GFCI	ground fault circuit interrupter
GSI	GSI Water Solutions, Inc.
HAZWOPER	Hazardous Waste Operations and Emergency Response
HASP	Health and Safety Plan
LOTO	lockout/tag-out
mph	miles per hour
NRC	National Response Center
OSHA	U.S. Occupational Safety and Health Administration
PAH	polycyclic aromatic hydrocarbon
PCBs	polychlorinated biphenyls
PE	Professional Engineer
PFD	personal flotation device
PM	Project Manager
PPE	personal protective equipment
Site	Portland Harbor
SAIF	State Accident Insurance Fund Corporation
SAP	field sampling plan
SDS	safety data sheets
SSO	Site Safety Officer
STSC	Safety Trained Supervisor - Construction
SZ	Support Zone

SECTION 1: **Emergency Action Plan**

1.1 Emergency Services and Contacts

In case of emergencies, call 911.

Always use an ambulance to go to the closest hospital (Table 1) for life-threatening injuries.

Table 1. Emergency Contacts

Emergency Service or Contact	Name	Phone Number
Local Police	Multnomah County Sheriff's Office	911 (emergency) 503.988.5300 (non-emergency)
Local Ambulance	American Medical Response	911 (emergency)
Local Fire Department	Portland Fire & Rescue Station 1	911 (emergency) 503.823.3700 (non-emergency)
Local Hospital	East Side of Harbor: **Legacy Emanuel** 2801 N Gantenbein Ave Portland, OR 97227 West Side of Harbor: **Legacy Good Samaritan** 1015 NW 22nd Ave. Portland, OR 97210	911 (emergency) 503.413.2200 (non-emergency) 503.413.7711 (non-emergency)
Local Urgent Care	East Side of Harbor: **Legacy-GoHealth Urgent Care** West Side of Harbor: **Legacy-GoHealth Urgent Care**	971.202.2910 971.232.8620
GSI Safety Officer	Josh Bale (GSI Water Solutions, Inc.)	Office: 971.200.8502 Cell: 530.276.4188
GSI Incident Intervention (WorkCare)	WorkCare	888.449.7787
Poison Control Center	—	1.800.222.1222

Oregon Emergency Response System (to report a hazardous spill to the state agency)	—	911 emergency 1.800.452.0311
National Response Center (NRC) (to report a hazardous spill)	—	1.800.424.8802
State Reporting Agency (Oregon Occupational Safety and Health [OSHA])	—	1.800.321.6742 (Oregon)
Consultant Project Manager	Alison Clements (GSI Water Solutions, Inc.)	Cell: 503.801.5565
Site Safety Officer	Genevieve Schutzius (GSI Water Solutions, Inc.)	Cell: 970.420.5869
Client Group Name Project Coordinator	Kyle Haggart (City of Portland)	Cell: 503.865.6887

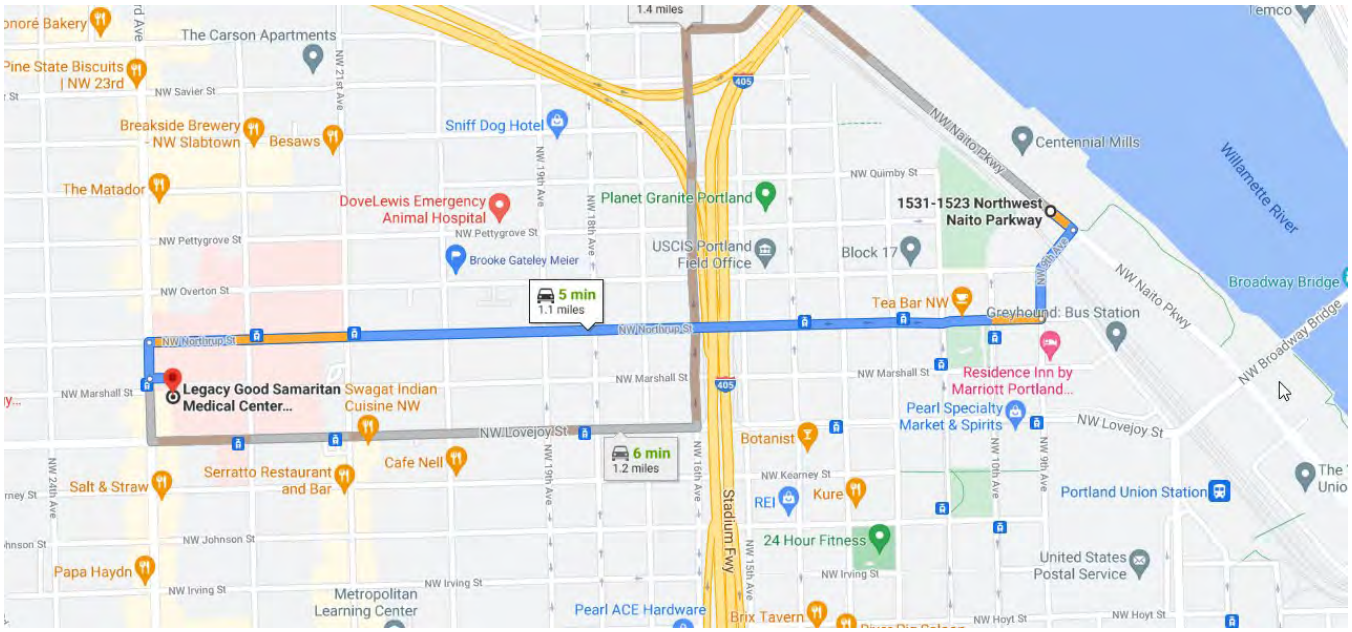
1.2 Hospital Location and Directions Map

1.2.1 From Basin 11 Sampling Location

The muster point for Basin 11 sampling work will be the parking lot to the southeast of Centennial Mills (located on NW Naito Parkway). Emergency medical services (EMS) should be directed to meet personnel at the parking lot just southeast of Centennial Mills at 1362 NW Naito Parkway, Portland, Oregon 97209.

Driving directions to the nearest emergency medical facility (1.1 miles) from the parking lot southeast of Centennial Mills to Legacy Good Samaritan Medical Center (1015 NW 22nd Ave, Portland OR 97210):

1. Head southeast on NW Naito Parkway toward NW 9th Ave (177 feet).
2. Turn right onto NW 9th Ave (0.1 mi).
3. Turn right onto NW Northrup St (0.9 mi).
4. Turn left onto NW 23rd Ave (190 ft).
5. Turn left (115 ft).



The trip from the Centennial Mills adjacent parking lot to Legacy Good Samaritan Medical Center can take 5 to 10 minutes, depending on time of day and traffic conditions. Personnel should check road conditions on a map application immediately prior to transport to hospital.

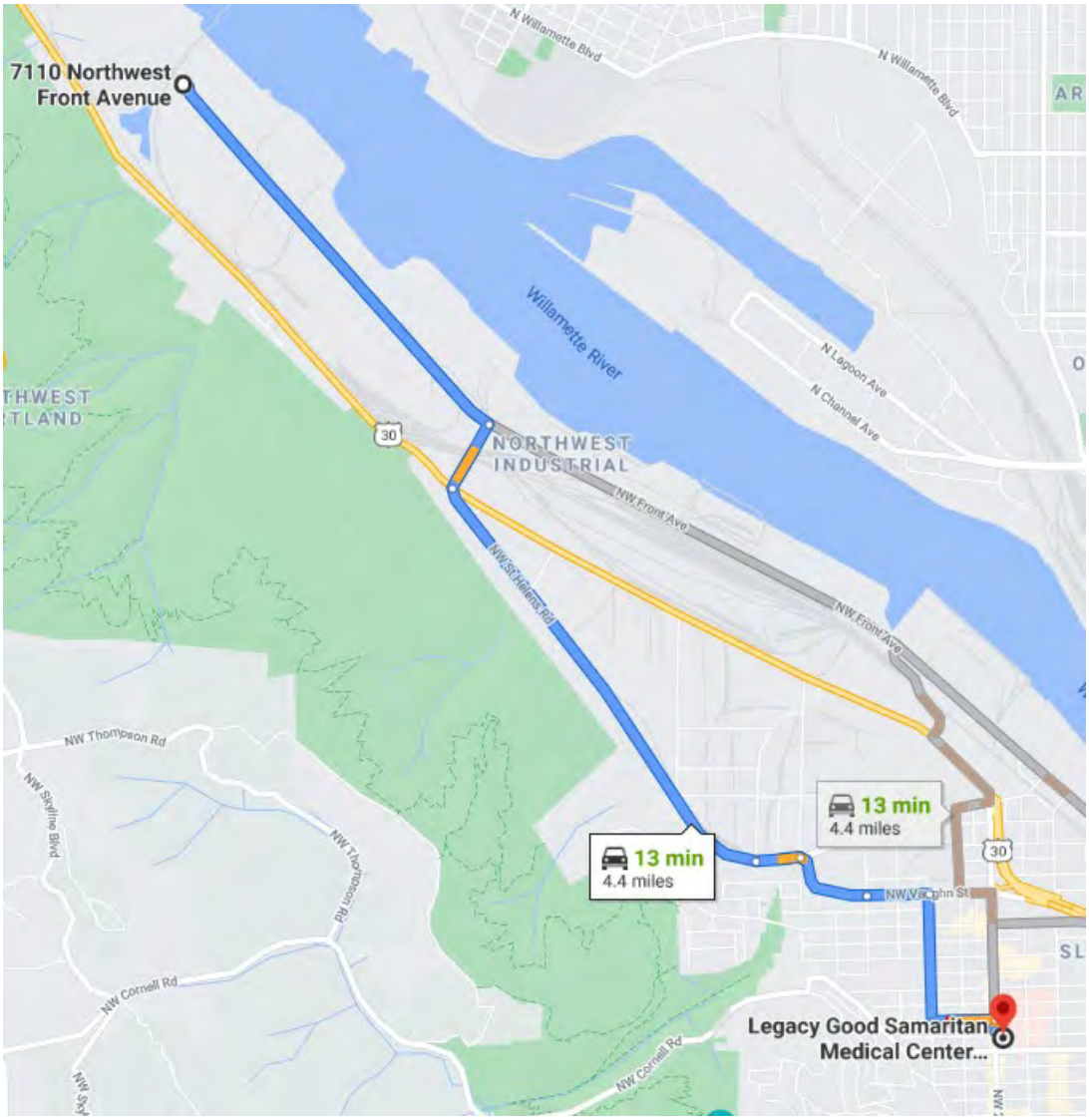
To facilitate EMS in locating the Centennial Mills adjacent parking lot, one person (when available) should meet EMS at the entrance to the parking lot on NW Naito Parkway.

1.2.2 From Basin 22B Sampling Location

The muster point for Basin 22B sampling work will be the parking lot adjacent to the utility building approximately 750 feet south of the sampling location on the west side of NW Front Ave. EMS should be directed to meet personnel at 7110 NW Front Ave, Portland, Oregon 97210.

Driving directions to the nearest emergency medical facility (4.4 miles) from the utility building parking lot to Legacy Good Samaritan Medical Center (1015 NW 22nd Ave, Portland, Oregon 97210):

1. Head south on NW Front Ave toward NW 61st Ave (1.4 mi).
2. Take NW Saint Helens Road to NW 25th Ave (2.4 mi).
3. Continue on NW 25th Ave to NW 23rd Ave (0.6 mi).
4. Turn right onto NW 23rd Ave (190 ft).
5. Turn left (115 ft).



The trip from the utility parking lot to Legacy Good Samaritan Medical Center can take 13 to 18 minutes, depending on time of day and traffic conditions. Personnel should check road conditions on a map application immediately prior to transport to hospital.

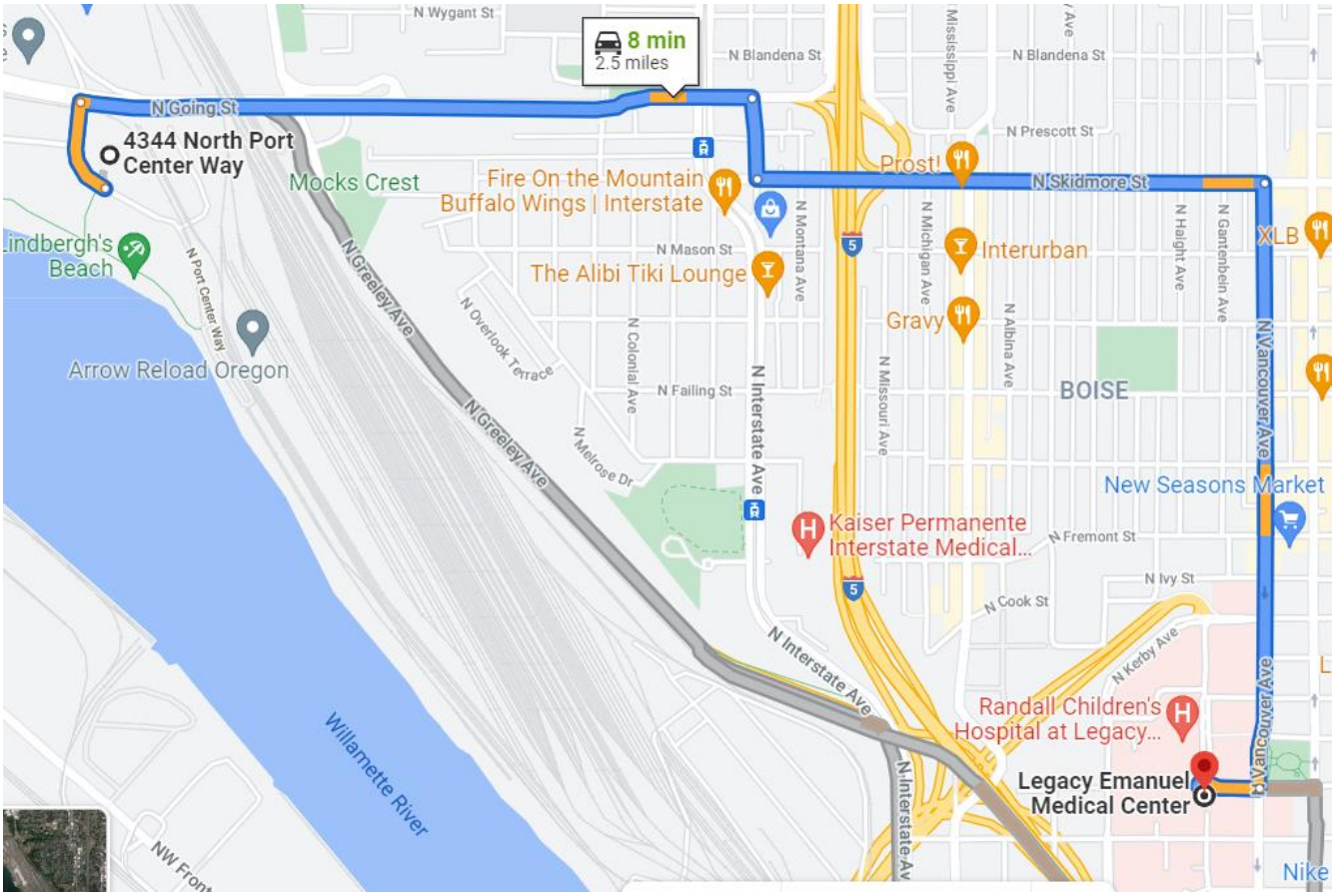
To facilitate EMS in locating the utility parking lot, one person (when available) should meet EMS at the entrance to the parking lot at NW Front Ave.

1.2.3 From Basin 47 Sampling Location

The muster point for Basin 22B sampling work will be the southeast parking lot at the FedEx Ship Center to the northwest of the sampling location. EMS should be directed to meet personnel at the southeast parking lot at 4344 N Port Center Way.

Driving directions to the nearest emergency medical facility (2.5 miles) from the FedEx parking lot to Legacy Emanuel Medical Center (2801 N Gantenbein Ave, Portland, Oregon 97227):

1. Head north on N Port Center Way toward N Channel Ave/N Going St (289 ft).
2. Turn right onto N Going St (0.8 miles).
3. Turn right onto N Maryland Ave (0.1 mi).
4. Turn left onto N Skidmore St (0.6 mi).
5. Turn right onto N Vancouver Ave (0.7 mi).
6. Turn right onto N Stanton St (492 ft).



The trip from the utility parking lot to Legacy Emanuel Medical Center can take 8 to 13 minutes, depending on time of day and traffic conditions. Personnel should check road conditions on a map application immediately prior to transport to hospital.

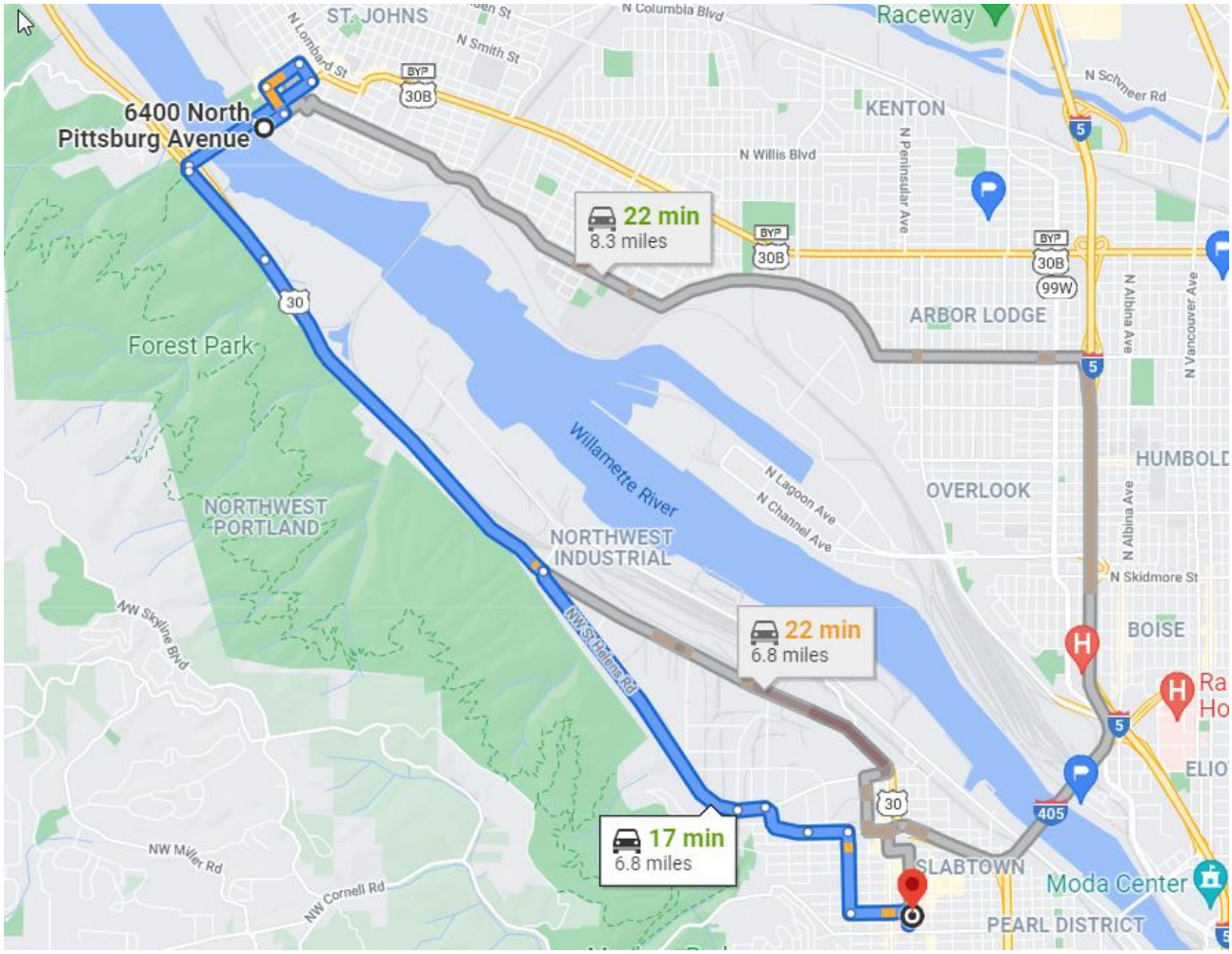
To facilitate EMS in locating the parking lot, one person (when available) should meet EMS at the entrance to the parking lot at N Port Center Way.

1.2.4 From Basin 50 Sampling Location

The muster point for Basin 50 sampling work will be the turnaround/parking area adjacent to Cathedral Park approximately 150 feet west of the sampling location. EMS should be directed to meet personnel at 6400 N Pittsburg Ave, Portland, Oregon 97203.

Driving directions to the nearest emergency medical facility (6.8 miles) from the Cathedral Park parking lot to Legacy Good Samaritan Medical Center (1015 NW 22nd Ave, Portland, Oregon 97210):

1. Take N Pittsburg Ave to N Philadelphia Ave (via N Edison St, N Alta Ave, and N Syracuse St) (0.5 mi).
2. Continue to NW St Helens Road (via NW St Johns Bridge and NW Bridge Ave) (3.3 mi).
3. Continue on NW St Helens Road (turns into NW Nicolai St) (1.6 mi).
4. Turn slight right onto NW Wardway (turns into NW Vaughn St) (0.5 mi).
5. Turn right onto NW 25th Ave (0.4 mi).
6. Turn left onto NW Northrup St (0.2 mi).
7. Turn right onto NW 23rd Ave (190 ft).
8. Turn left (115 ft).



The trip from the parking area to Legacy Good Samaritan Medical Center can take 17 to 25 minutes, depending on time of day and traffic conditions. Personnel should check road conditions on a map application immediately prior to transport to hospital. If travel time is shorter to Legacy Emanual Medical Center (2801 N Gantenbein Avenue, Portland, Oregon 97227), then personnel should route to that location instead.

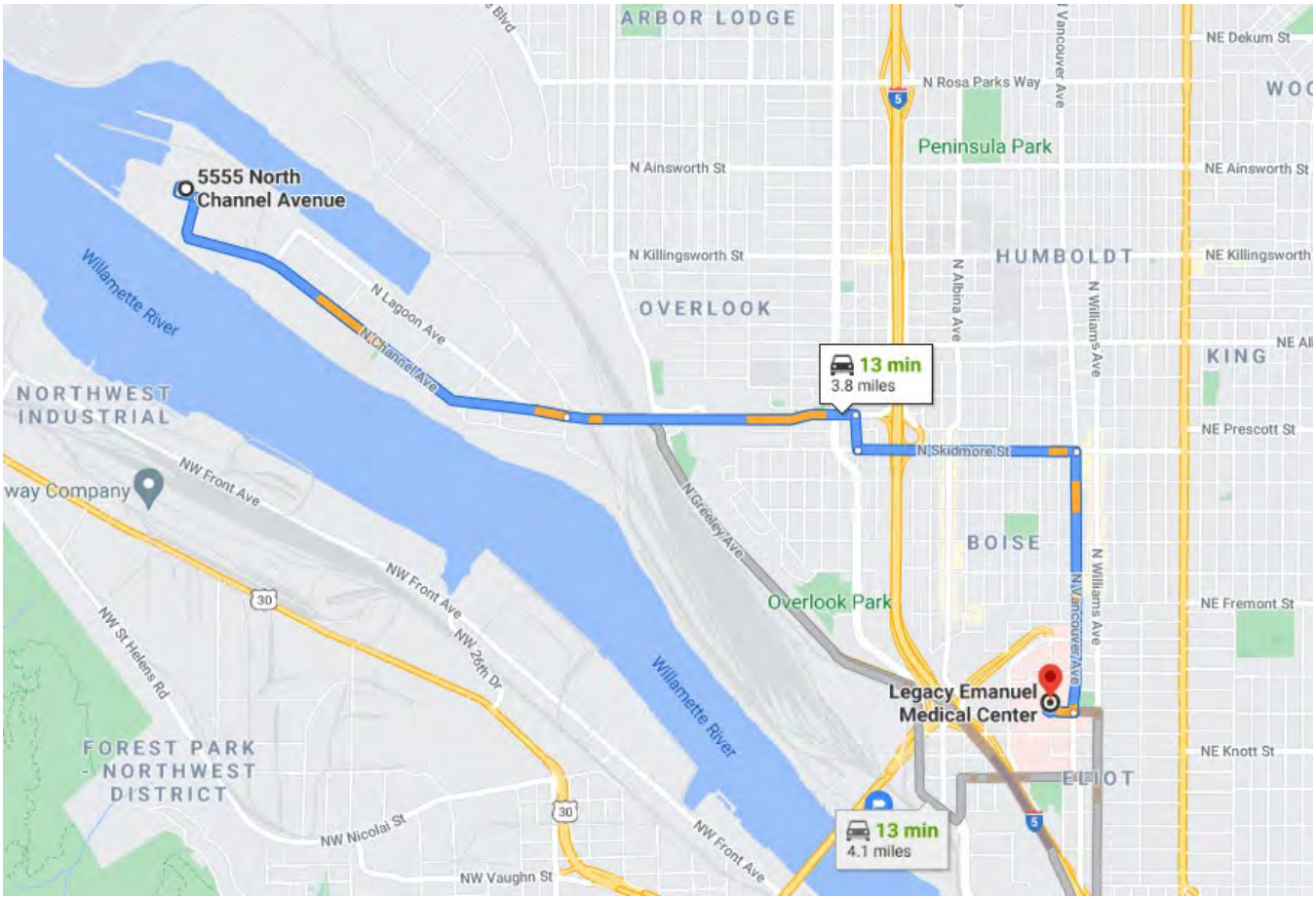
To facilitate EMS in locating the parking area, one person (when available) should meet EMS at the entrance to the parking area at N Pittsburg Ave and/or N Crawford St.

1.2.5 From Basin S-6 Sampling Location

The muster point for Basin S-6 sampling work will be the parking lot at the corner of N Channel Ave and N Going St. EMS should be directed to meet personnel at the lot across from 5555 N Channel Ave, Portland, Oregon 97217.

Driving directions to the nearest emergency medical facility (3.8 miles) from the utility building parking lot to Legacy Emanuel Medical Center (2801 N Gantenbein Ave, Portland, Oregon 97227):

9. Continue on N Channel Ave (turns into N Going St) (2.2 mi).
10. Turn right onto N Maryland Ave (0.1 mi).
11. Turn left onto N Skidmore St (0.6 mi).
12. Turn right onto N Vancouver Ave (0.7 mi).
13. Turn right onto N Stanton St (492 feet).



The trip from the parking lot to Legacy Emanuel Medical Center can take 13 to 18 minutes, depending on time of day and traffic conditions. Personnel should check road conditions on a map application immediately prior to transport to hospital.

To facilitate EMS in locating the utility parking lot, one person (when available) should meet EMS at the entrance to the parking lot at N Channel Ave.

1.3 Emergency Procedures

In the event of emergency, personnel will be instructed to leave the area immediately and the Site Safety Officer (SSO) will contact the appropriate emergency response providers listed in Table 1 in Section 1.1 of this Health and Safety Plan (HASP). Directions to the nearest medical facility from the evacuation dock location for overwater work and the muster point for upland work are provided in Section 1.2 of this HASP. An Incident Report Form will be completed when there is an accident (see Section 13 and Attachment 1).

Field personnel will be trained in first aid procedures (including cardiopulmonary resuscitation [CPR]) and will have access to a first aid kit. Consistent with U.S. Occupational Safety and Health Administration (OSHA) recommendations, an automated external defibrillator (AED) will be available onsite. All field staff will be trained to administer the AED. The AED and first aid kit will be located to sampling activities in an unlocked location. The AED will include a procedures diagram for use. The SSO will check the AED periodically for sufficient battery charge.

In the event of an occupational accident or incident, please indicate to the medical facility that this is a Workers' Compensation case, that your employer is GSI Water Solutions, Inc. (GSI), and that the insurance administrator for Workers' Compensation claims is State Accident Insurance Fund (SAIF) Corporation. Subcontractors should follow their company policies related to injury reporting. All subcontractors must follow company protocols for occupational injury and accident reporting.

1.4 Emergency Supplies and Equipment List

Table 2 lists needed equipment, locations, and notes for use.

Table 2. Safety and Other Equipment Locations

Equipment	Location and Notes
First aid kit	Required for all work.
Class ABC fire extinguisher	Required for all work. Fire extinguisher is the responsibility of marine contractor for overwater work and drilling contractor for shoreline work.
Whistle/air horn	Required for overwater work. Recommended for upland work.
Spill equipment (sorbent pads, booms, etc.)	Responsibility of marine contractor for overwater work and drilling contractor for shoreline work.
Eye wash station	Required for all work.
Wheel chocks	Required on vehicles parked in areas on steep slopes. Emergency brake must be used at all times.
Flashlights, head lamps	Required when working between dusk and dawn. Lighting support also required when visibility is less than 5 foot-candles within 3 feet of worker.

SECTION 2: **Organizational Structure**

This site-specific HASP has been developed for conducting stormwater monitoring at City outfall basins in the Portland Harbor Study Area on behalf of the City of Portland in accordance with OSHA 29 Code of Federal Regulations (CFR) 1910 and 1926, and the GSI Health and Safety Policy (GSI, 2020). This HASP covers potential field hazards associated with the tasks necessary to complete the Scope of Work for all Site support activities, including sampling, surveying, technical field support to the client, and field reconnaissance.

Site Name and Address	Porland Harbor Study Area, Portland, OR		
Project Name	Source Control Effectiveness Monitoring Project	**Project Number**	0110.162
Date	October 2021	**Revision Number**	0

2.1 Project Team Organization and Authorities

Table 3 provides project roles and responsibilities for field staff members and subcontractors relative to this HASP.

Table 3. Project Roles and Responsibilities

Name	Role	Responsibility
Josh Bale (GSI Water Solutions, Inc.)	Project Manager (PM)	The PM has overall responsibility for the delivery of the project and management of all members of the team, including external advisors and subcontractors. The PM is the point of contact for the client and regulatory agencies with respect to implementation of this HASP. The PM has the responsibility and authority to direct all work operations, oversee and coordinate safety and health functions with the Site Safety Officer and ensures the implementation of HASP requirements and procedures in the field.
Genevieve Schutzius	Site Safety Officer (SSO)	The SSO has full responsibility and authority to develop and implement this HASP and to verify compliance. The SSO is at the Site or readily accessible to the Site during all work operations and has the authority to halt work if unsafe conditions are observed or suspected.
Subcontractors	Field Activities	With the exception of subcontractors specifically identified above as part of the management team, subcontractors will be responsible for their own HASPs. However, even sampling support subcontractors are required to maintain a corporate-level or site-specific HASP that covers field sampling and investigation activities. HASPs must meet or exceed the minimum requirements identified by OSHA 29 CFR 1910 and 1926. Subcontractors must ensure the developed HASP complies with the minimum requirements associated with this HASP, including using the proper personal protective equipment (PPE), reporting unsafe acts and conditions, and following the work and safety and

Name	Role	Responsibility
		health instructions of the PM, SSO, and site-specific HASP and protocols

Note
All personnel requiring access to controlled work areas must have completed the appropriate training. If field personnel change, substitutions will be made with similarly qualified personnel.
TBD: To be determined
CFR: Code of Federal Regulations
HASP: Health and Safety Plan

Any modifications to this HASP will be recorded in Section 2.4, Table 4, of this HASP.

2.2 Stop Work Authority

All workers have "Stop Work Authority" to immediately stop work if they believe that a particular task is being performed in an unsafe manner. This authority may be exercised at any time by anyone working at the Site without repercussions or retribution. If individuals observe hazards for which they are unprepared, they will withdraw from the area to reevaluate the task and develop appropriate safety precautions before proceeding. The GSI Site Safety Officer will be contacted to determine next steps and this HASP will be revised accordingly.

2.3 Limitations

This HASP was prepared exclusively for the City of Portland by GSI in accordance with OSHA 29 CFR 1910 and 1926, and the GSI Health and Safety Policy (GSI, 2020). This HASP covers known field hazards associated with the tasks necessary to conduct stormwater monitoring at City outfall basins in the Portland Harbor Study Area. The quality of information herein is consistent with the level of effort required for GSI services and is based on (1) information available at the time of preparation; (2) data supplied by outside sources; and (3) the assumptions, conditions, and qualifications set forth in this HASP. This HASP is intended to be used by field personnel for sampling, surveying, technical field support to the client, and site reconnaissance only. Any other use of, or reliance on, this HASP by GSI or any third party is at that party's sole risk.

The information contained herein is relevant to Site conditions known at the time of the HASP development. In the event that changes in the nature, usage, or layout of the property or nearby properties are made, the information contained in this HASP may not be valid. If additional information becomes available, it should be provided to GSI to modify the HASP as necessary.

2.4 Approvals and Modifications

City of Portland or a designated representative is responsible for the approval of this plan and any future modifications after preparation. Modifications will be documented in Table 4.

Table 4. Record of Modifications and Version Control

Section Revised	Page #	Description of Changes	Author	Date Issued	Reviewed By

SECTION 3: **Site Description and Scope of Work**

3.1 Site Description

The Site is located along Portland Harbor, Portland, Oregon 97227. Figure 1 shows the entire Site and points for access and emergency evacuation.

Staff will not enter the Portland Harbor Study Area without pre-approval from the City of Portland. The PM will coordinate access with designated site representatives, prior to commencing work.

3.2 Scope of Work

This HASP covers actions to be taken for conducting stormwater monitoring at City outfall basins in the Portland Harbor Study Area. Stormwater grab samples will be collected from the designated basin-scale monitoring locations during a storm event (ideally early in the rainy season).

3.3 Locations of Nearest Facilities

The locations of facilities such as restrooms are noted in Table 5.

Table 5. Locations of Nearest Facilities

Facility	Notes
Telephone	Employees should keep fully charged cell phones on-site. For remote sites or extended field days, it is recommended that a car charger or fully charged power block be available. For overwater work, radios will be used as a backup communication method.
Water Source	Employees will be provided access to clean drinking water. The SSO will ensure that a sufficient water supply is maintained.
Restroom[1]	Location will vary and will be identified in the field before work commences. Public restrooms are available at some parks near to muster locations.
Personal Hygiene[1]	Hand wash stations, hand washing water and soap, and/or hand wipes will be supplied at all times. Personnel must not eat food, drink, or smoke around work areas.

[1] Note that Attachment 10, Novel Coronavirus Guidelines, includes specific protocols to follow for sanitation and hygiene to prevent the spread of Coronavirus Disease 2019 (COVID-19). These protocols must be followed until the Consultant Project Manager or designee indicates otherwise.

SSO: Site Safety Officer

3.4 Site Access

Vehicle access to the Site varies as sampling points are located at several locations along the east and west sides of the Williamette River in the Portand Harbor Study Area. The Portland Harbor Study Area and access points are shown on Figure 1.

3.4.1 Operational Hours

Operations at each sampling points along the river will be determined during the scheduling of work activities and in coordination with the City of Portland. Operations will generally occur during daylight hours between 7 a.m. and 6 p.m. for general employee safety considerations.

3.4.2 Non-Operational Hours

Non-operational hours will be established upon prior approval by the Consultant Project Manager (PM) only.

3.4.3 Visitor Access and Safety

All field employees and project-area visitors must check in with the PM, participate in a brief safety overview (if new to the facility), sign off that they have received the safety overview, and sign in and out on the visitor log before proceeding to the field. A central location for the visitor log will be established prior to commencing work.

SECTION 4: **Safe Work Practices**

As much as possible, all field activities will be conducted during daylight hours. However, as it is possible some of the work may occur during periods of short daylight hours during the year, support lighting will be required when work is conducted between dusk and dawn. Work hours should be limited to no more than 60 hours per week with at least one day off per week and no more than 12 hours per day worked without pre-approval by the PM.

4.1 Accident Prevention

The SSO and all employees will inspect the work area and/or Site daily to identify and correct any unsafe conditions. Field personnel and subcontractors should inspect the work area thoroughly before leaving the Site. Adherence to the safe work practices and procedures outlined in this HASP and attachments will assist with accident prevention.

Access will be limited to all controlled areas via the prescribed administrative (certifications) and engineering (barricades) controls, as described above. All project-area staff and visitors will note arrival and departure times on a field log maintained by the SSO.

- All unsafe conditions will be corrected immediately. All unsafe conditions not in the scope of the project will be reported to the SSO and the condition corrected.
- Loose-fitting clothing and loose long hair are prohibited near moving machinery.
- Where portable electric tools and appliances can be used (where there is no potential for flammable or explosive conditions), they will be equipped with three-wire grounded power and extension cords to prevent electrical shock. Use of a ground-fault circuit interrupter (GFCI) to prevent electrical shock is required.
- Store tools in clean, secure areas so that they will not be damaged, lost, or stolen.
- All equipment, tools, and property will be secured, as needed, at the end of each day.
- Maintain good housekeeping practices to prevent slips, trips, and falls.

4.2 Personal Conduct

- Unauthorized personnel are not allowed at the Site.
- A high standard of personal hygiene will be observed. Smoking, eating, drinking, chewing gum or tobacco, taking medication, and applying cosmetics will not be permitted within the Exclusion Zone (EZ) or Contamination Reduction Zone (CRZ).
- Personnel under the obvious influence of alcohol or controlled substances are not allowed at the Site; those taking medications that could impact ability to safely perform work must notify the SSO before beginning work.
- All Site personnel will familiarize themselves with Site safe work practices and the emergency procedures during daily tailgate and pre-work safety meetings.
- No “horseplay” or unsafe actions or activities will be allowed.

4.3 Vehicular Use

The following requirements shall be observed when operating and in the vicinity of motor vehicles:

- On public roads, adhere to traffic regulations and speed limits.
- Within the Site boundaries, comply with site requirements for motor vehicles.

- Inspect the driving area for access, soft ground, and obstacles or sharp objects that may damage the vehicle.
- Where possible, move the vehicle to be close to the sampling location.
- If possible, drive in and out of the location, rather than reversing. If reversing is necessary, use a spotter as a guide.
- Use wheel chocks when parked on steep slopes.
- Before exiting a vehicle, shift into park, set the parking/emergency brake, and shut off the engine.
- Never leave a running vehicle UNATTENDED.
- Do not fuel engines while the vehicle is running.
- Install adequate roads, signs, lights, and devices, where applicable.
- Cell phone use while driving is not permitted.
- Employees who are passengers or drivers of vehicles will wear their seat belts any time the vehicle is in motion.

4.4 Slips/Trips/Falls

Good housekeeping practices should be used at all times to minimize trip hazards and falls. Extra caution should be taken when work on unstable surfaces, uneven terrain, steep grades, and elevated surfaces cannot be avoided. Fall protection must be provided when working on heights of 6 feet or more. Refer to OSHA fall protection requirements for varying heights and conditions. Refer to the Information on Slips, Trips, and Falls fact sheet for further information (Attachment 3).

4.5 Blood-borne Pathogens

First aid responders have the potential to be exposed to blood-borne pathogens. The potential for exposure to blood-borne pathogens exclusive of an emergency response is not anticipated. When rendering first aid in situations where exposure to bodily fluids or blood may occur, responders will wear, at a minimum, latex or nitrile gloves, and a face shield or safety glasses. Employees are not required to administer first aid. Employees are required to immediately assess any emergency situation and seek professional assistance as appropriate.

4.6 Subsurface Utilities

Check for the location of underground services before beginning ground-penetrating work. OSHA regulations require the estimated location of utility installations (sewer, telephone, fuel, electric, water lines or any other underground installations that reasonably may be expected to be encountered during excavation work) will be determined before opening an excavation.

Use a service locator and the following cues to assist in identifying possible underground services: (1) signs of patched or missing of pavement; (2) service boxes, pits, and manholes (as they may indicate the presence or alignment of services); and (3) services coming into or out of the ground, such as power lines and downspouts. When possible, shut off utilities in the area while ground-penetrating work is taking place. Consider less-intrusive boring methods for shallow soil, such as using a vacuum truck/air knife or hand auguring to a given depth below surface for physical confirmation of absence/presence of utilities. Ensure upland drilling complies with the client's or adjacent property owner's intrusive work requirements, when policy exists.

4.7 Machinery/Mechanical Equipment/Heavy Equipment

Stand clear of operating machinery and be familiar with emergency stop devices, if applicable. No loose clothing shall be worn and all long hair (extending below the shoulders) shall be tied back. If safety vests are worn, they must be fastened at the front. Stay clear of hoisting operations (drill rod attachment and detachment). Be aware of all pinch points and provide guarding where possible. Be aware that heavy equipment activity may change daily or hourly, with differing potential hazards to be identified and addressed. Maintain eye contact with operator and wait for clearance before entering an active work zone.

4.8 Overhead Hazards

Look up to determine the location of hazard(s). If overhead hazards exist, change the location of the work to be performed where possible, otherwise, secure the overhead hazard(s) (e.g., de-energize live electrical lines). Stand clear of drill rig and facility operations. Do not walk under a raised load or a load supported by a winch. Stand uphill from drilling activities (if possible), as falling drill strings may roll.

4.9 Manually Lifting Hazards

Assess the load to be lifted, loaded, pushed, or pulled. Solicit help if the load cannot be safely moved by one person or if handling the load is too awkward. Consider breaking loads into pieces and taking multiple trips. Lift with the knees and hold load close to body. Make sure footing is firm, the path is clear, and avoid twisting. Use these techniques when setting a load down.

4.10 Sharp Objects

Sharp objects are broadly defined; the potential hazards are specific to each work area. Sharp objects may include, but are not limited to, nails, exposed metal edges, metal shards, exposed rebar, broken glass, and sharps. Employees should look for and scan the work area for the presence of sharp objects to avoid contact (such as stepping or sitting on the sharp objects) and potential injury. Remove or protect other workers from exposure to hazards from sharps, where possible and safe to perform. Particular care should be taken in areas where debris is present. If sharps are present, steel-shanked boots should be considered where they provide increased worker protection. Leather gloves should be worn at all times when moving or coming into contact with materials that pose a cut or puncture risk. When possible, use tools such as rakes and shovels to avoid direct handling of debris when moving it.

4.11 Noise Reduction

Project-area activities in proximity to welding, construction, and heavy equipment often expose workers to excessive noise. It is anticipated that situations may arise in which noise levels may exceed the OSHA Action Level of 85 decibels (A-weighted scale) in an 8-hour time-weighted average. For example, working in close proximity to the subcontractor during drilling or trenching activities at the Site may pose this risk. If excessive noise levels occur, earplugs with the appropriate Noise Reduction Ratings will be issued to all personnel and a system of hand signals understood by all will be implemented (see Section 11). Refer to Preventing Hearing Loss Caused by Chemical (Ototoxicity) and Noise Exposure (Attachment 4).

4.12 Sanitation

Potable drinking water will be supplied in tightly closed containers and will be clearly marked for its intended use. If vehicles are available for use by field crews, restrooms and a field washing area with potable water will be available within a reasonable distance from the Site. If sanitary facilities are not located within a reasonable distance, portable facilities will be installed for use by field employees.

Note that Attachment 10, Novel Coronavirus Guidelines, includes specific protocols to follow for sanitation and hygiene to prevent the spread of Coronavirus Disease 2019 (COVID-19). These protocols must be followed until the Consultant Project Manager or designee indicates otherwise.

4.13 Illumination

When fieldwork is to be conducted before dawn or after dusk, or when light conditions are less than 5 foot-candles, illumination in all Sites and access pathways to those areas will be maintained with facility lighting, temporary light plants, equipment-mounted lighting systems, or similar equipment, such that illumination at 5 foot-candles or above is provided. When and where possible, walking and working surfaces should be cleared before engaging in low-light activities.

4.14 Weather Conditions

Weather is always a potential safety factor in performing work in outdoors. To ensure worker safety, the minimum safety rules outlined in Sections 4.16.1 through 4.16.4 will be implemented. Modification of work limitations due to weather can only be approved by the SSO or PM.

4.14.1 Lightning

The 30-30 rule is a common rule used for lightning safety and is defined as follows: If lighting is seen, count to 30 seconds. If thunder is heard within 30 seconds (assumes lighting is within 6 miles), workers will shelter in place. Workers in the uplands will shelter in buildings or vehicles. Workers performing overwater work will shelter in the cabs of overwater platforms, tugs, or vessels. Sheltering in place will end 30 minutes after the last lighting with thunder occurring within 30 seconds. Weather apps such as Spark can also be used to determine whether lightning is within 6 miles of the Site. Refer to Lightning Safety When Working Outdoors (Attachment 5).

4.14.2 High Winds

Work will be stopped when sustained winds of more than 15 miles per hour (mph) and/or gusts of over 25 mph occur, unless prior approval is provided by the SSO.

4.14.3 Heat Stress/Heat Stroke

Workers must drink plenty of fluids (not caffeinated), and wear clothing and sunblock as appropriate for the weather conditions. The SSO or designee will monitor workers for signs of heat stress. The heat index may be verified using a wet-bulb thermometer in high-humidity conditions. Remember that humidity on the water may be higher than weather station humidity reports. Refer to Protecting Workers from the Effects of Heat (Attachment 6).

4.14.3.1 Training

The SSO is responsible for implementing the Thermal Stress Prevention Program, monitoring project- area heat conditions and worker physiological parameters, and for ensuring that employees are trained to recognize the signs and symptoms of heat stress illnesses or injury and understand what to do if these occur.

4.14.3.2 Program Implementation Criteria

Work activities will be limited, reduced, or halted when humidity is greater than 80 percent and temperatures are greater than 90 degrees Fahrenheit (°F), or when temperatures are greater than 100 °F, regardless of humidity. Above 85°F, a cooling shelter (i.e., a location out of direct sunlight) shall be provided,

and additional rest cycles and personnel monitoring must be considered. Final direction on work and work support will be provided by the SSO. Refer to Protecting Workers from the Effects of Heat (Attachment 6) and Protecting Workers from Heat Stress (Attachment 7).

4.14.3.3 Heat Stress Management

Work practices and exposure controls are used to reduce the risk of elevating an employee's core body temperature. These work practices and exposure controls include the following:

- Defining and adjusting employee work/rest intervals
- Monitoring for physiological signs of heat stress
- Providing cool liquids
- Establishing and implementing acclimatization schedules
- Using warm-weather cooling garments

4.14.3.4 Employee Work/Rest Intervals

Work/rest intervals are based on the personal protective equipment (PPE) worn, employee work loads, environmental conditions (temperature, humidity, air movement), and the results of physiological monitoring. Work/rest intervals are determined by the SSO and communicated to employees. Work/rest intervals are adjusted throughout the work shift as needed and communicated to each employee at the conclusion of an applicable rest period, prior to reentry into the work zone.

4.14.3.5 Monitoring

Physiological monitoring is conducted to alert employees and their supervisors to potential heat stress illness. Initial monitoring is conducted and documented by the SSO at the beginning of the work shift, prior to entry into the work zone, when required. Additional physiological monitoring is performed at the beginning and end of each rest cycle. Reentry intervals and readjustment of the work/rest cycle are determined based on the state and federal guidelines. Physiological monitoring may include measuring the heart rate, recovery heart rate, oral or ear-canal temperature, or percentage water loss.

Physical signs and symptoms of heat stress are discussed with employees at the start of the project and reviewed as necessary. Employees monitor each other's actions, speech, and appearance for signs and symptoms of heat-related illnesses. Symptoms of heat-related illnesses are described in Protecting Workers from the Effects of Heat (Attachment 6) and Protecting Workers from Heat Stress (Attachment 7). Employees exhibiting signs or symptoms of heat exhaustion should be moved to shade or air conditioning, given cold water, and monitored by another employee. Heat stroke is a life-threatening emergency. If heat stroke is suspected, emergency services should be called immediately.

4.14.3.6 Liquid Replacement Program

Since dehydration is a primary cause of heat-related illness, employees should ensure regular hydration is performed prior to and during workdays with elevated temperature conditions as described in Section 4.16.3.2, Program Implementation Criteria. A liquid replacement regime is not based on thirst. Employees need enough liquid and electrolytes to maintain their normal body weight throughout the day. Some sports drinks may exacerbate problems for some employees with certain medical conditions. Carbonated beverages are not recommended as a primary beverage for replacing body fluid because many contain caffeine and/or the carbonation makes the beverages difficult to drink in large quantities.

4.14.3.7 Acclimatization Program

Acclimatization increases physical tolerance to warm climates by improving the circulatory system and balance of salt in the body. Employees that are newly hired, have not worked in a comparable environment during the previous week, or have been away from the Site (due to vacation or sickness) should ensure they are properly acclimated prior to excessive exertion. Employees need time to become acclimatized—usually about 7 days. Acclimatization may start to decline in as little as 4 days. Alcohol or other drugs may affect the body's ability to acclimatize.

4.14.4 Cold Stress/Hypothermia

Drink plenty of fluids (not caffeinated), wear clothing appropriate for the weather conditions, and wear multiple layers. Avoid cotton clothing when possible. Monitor workers for signs of cold stress. Refer to Protecting Workers from Cold Stress (Attachment 8).

Freezing temperatures as defined as <35°F, as some areas freeze at higher air temperatures higher than 32°F. Check local weather for wind chill ("real-feel") conditions. No overwater work will be performed when temperatures are below freezing without prior approval by the SSO. If work occurs in conditions of below-freezing temperatures, salt or ice melt should be used on overwater platform, barge, and vessel decks and extreme care must be taken to prevent slips, trips, and falls. Upland work will be performed with pre-approval by the SSO only.

4.15 Hazardous Insects/Plants/Animals

Project-area hazards may include bees, snakes, spiders, and ticks. Workers should do the following: (1) avoid contact or seek medical attention if necessary; (2) wear insect repellent, as appropriate; and (3) survey the area for poison oak and use appropriate caution.

4.16 Electrical Hazards

Electrical equipment should be inspected to ensure it is in safe working order before use. Equipment should be grounded and operated under dry conditions. Where portable electric tools and appliances can be used (in areas where there is no potential for flammable or explosive conditions), they will be equipped exclusively with three-wire grounded power and extension cords to prevent electrical shock. Use of a GFCI is required to prevent electrical shock.

4.17 Unknown Chemical Exposure

Work will be stopped if visual or olfactory observations indicate unanticipated conditions. Worker PPE will be reassessed and the SSO will determine whether additional personnel monitoring is required before resuming work.

4.18 Hot Work

No hot work shall be performed in the Site. Contact the SSO or PM if hot work is required.

4.19 Lockout/Tagout

Lockout/tagout (LOTO) is a safety procedure to ensure that hazardous energy sources or machines are properly shut off and locked so they cannot be started again before maintenance or repair work are completed. Hazardous energy sources include electrical, mechanical, hydraulic, pneumatic, chemical, radioactive, and thermal.

If a worker encounters a hazardous energy source or machine that requires LOTO, they shall stop work and immediately notify the Linn Economic Development Group Project Coordinator (listed in Table 1 [Emergency Contacts] in Section 1.1 of this HASP) to ensure that energy sources are de-energized or made safe before proceeding.

4.20 Trenches/Vaults/Confined Spaces

OSHA defines a confined space as (1) being large enough for an employee to enter and perform work (2) having limited or restricted means for entry or exit; and (3) not designed for continuous occupancy. This describes many areas that a worker may encounter on a daily basis, such as vaults or trenches.

It is against GSI policy for field personnel to enter confined spaces. No field personnel shall enter a confined space or trench for any reason without prior approval and completion of an OSHA-compliant confined space entry training.

SECTION 5: **Training Program**

All GSI employees and subcontractors performing work under GSI's HASP or a HASP consistent with GSI requirements are required to have the following training to be working in the Site (Table 6). Copies of training certificates and training records will be kept at GSI's Portland office. Field projects will not be approved to take place in the absence of adequate documentation.

Table 6. Training Requirements

Type of Current Certificate	Yes	No	Trained Field Employees
HAZWOPER 40-Hour	X		Required for all GSI and subcontractor field personnel working on HAZWOPER projects. Any other subcontractors performing limited work efforts must be escorted by trained employees and/or avoid contact with potentially impacted materials. See the GSI SSO to determine minimum training for limited work efforts.
HAZWOPER Annual 8-Hour Refresher	X		Required for all GSI and subcontractor field personnel working on HAZWOPER projects. (The annual 8-hour training is required after a worker has had the 40-hour certification for one year). Same requirements as the 40-hour training for subcontractors performing limited work efforts.
HAZWOPER Supervisor Training	Employee-Specific		Supervisors and the SSO will have completed the above and an additional 8 hours of OSHA Management and Supervisory Training.
First Aid/CPR/AED	X		Required for all field personnel. First aid/CPR/AED training is provided to allow employees to voluntarily administer first aid or medical assistance to family, friends, or coworkers as Good Samaritans.[1] Field employees are not required to administer first aid. Field employees are required to immediately assess any emergency situation and seek professional assistance as appropriate.

Notes

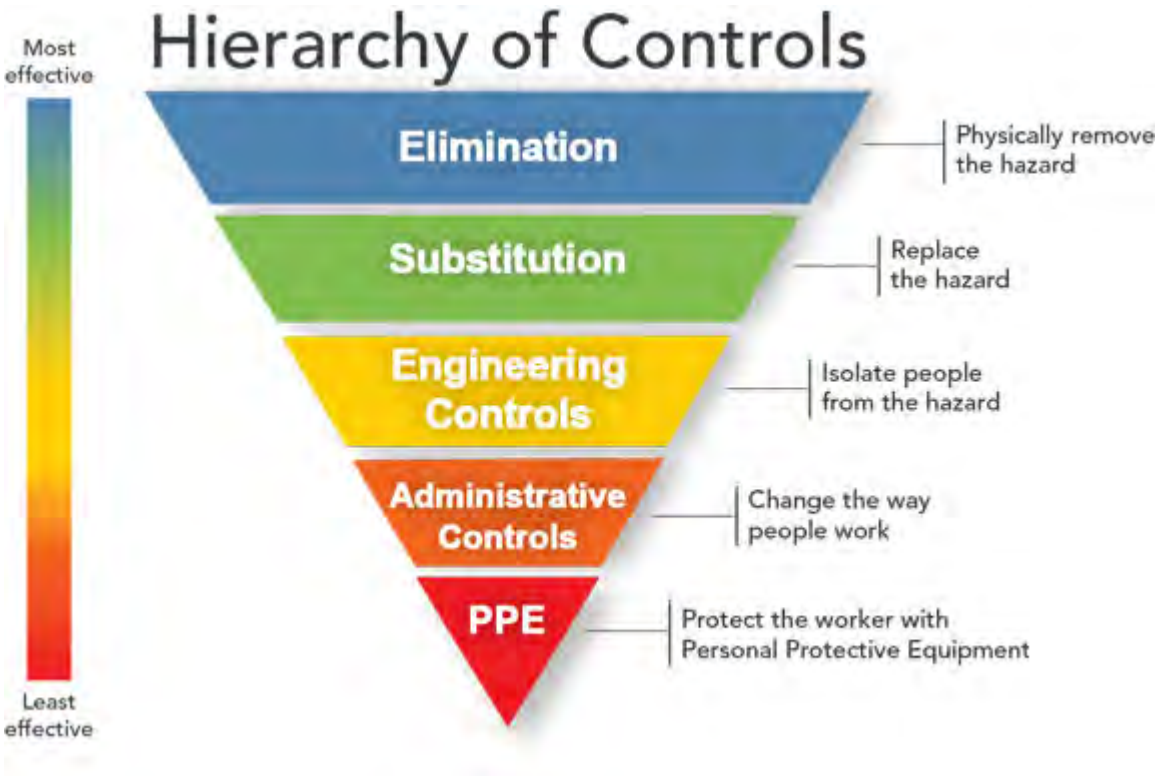
[1] The "Good Samaritan" law in Oregon (Oregon Revised Statute 30.800) maintains that people who provide emergency medical assistance without the expectation of compensation (i.e., acting as Good Samaritans) are not liable for damages for providing the emergency medical assistance.

AED: automated external defibrillator
CPR: cardiopulmonary resuscitation
GSI: Groundwater Solutions, Inc.
HAZWOPER: Hazardous Waste Operations and Emergency Response
OSHA: U.S. Occupational Safety and Health Administration
SSO: Site Safety Officer

SECTION 6: **Site Controls**

6.1 Hierarchy of Controls

Best practices for safe working environments include implementing a hierarchy of controls that, when used together, can provide redundant and/or complementary layers of protection for workers. Controls at the top of the hierarchy, such as elimination of the hazard, are potentially more effective and protective than controls at the bottom (see below).



In some cases, using controls closer to the top of the hierarchy may reduce the intensity of the controls at the bottom, thus reducing the possibility of corollary risks. For example, eliminating an exposure risk may reduce the requirement for a Tyvek[1] coverall—the use of which requires monitoring for thermal stress.

Because elimination or substitution of hazards may not be feasible at the Site, engineering controls (such as barriers and additional ventilation) may be needed to reduce exposure. Thermal control measures are an example of administrative control over how a task is done. PPE, while most common, is the least effective control in some cases and should be the LAST OPTION for minimizing exposure to hazards.

6.2 Management of Change

This HASP is intended to be site-specific and therefore responsive to actual site conditions, contract requirements, regulatory requirements, hazards, scope of work, and related conditions. For any number of reasons, it may be necessary to re-assess and revise plans. GSI detects changing, unrecognized, or new conditions through key processes such as project-area monitoring, employee observations, and inspections. Routine changes in conditions are addressed through hazard analysis and revised plans.

[1] Tyvek is a registered trademark of DuPont.

6.3 Work Zones

Work zones are defined below. In the case of limited space, the CRZ and EZ may be combined. Work zones will be defined and labeled once work areas have been confirmed.

All project-area visitors (except OSHA inspectors) must receive prior approval from the SSO or PM and may do so only for the purposes of observing project-area conditions or operations.

6.3.1 Support Zone (SZ)

6.3.1.1 Upland SZ

The support zone (SZ) will be located away from the contaminated area. Vehicles, emergency equipment, the telephone and break area, and any non-essential personnel will be located in this area. SZ areas include all paved areas of the site additional areas once field work begins will be defined in the field by the SSO.

6.3.2 Contamination Reduction Zone (CRZ)

6.3.2.1 Upland CRZ

Decontamination boundaries will be established for personnel and sampling equipment in the CRZ using caution tape or ropes. The boundaries will isolate personnel allowed in the SZ from workers in the EZ. Only one or two points of egress from the EZ (see Section 6.3.3) should be established to control access and limit the locations where potential decontamination is required. Decontamination supplies must be established at the CRZ prior to starting work. Personnel and equipment will pass from the EZ through the CRZ to the SZ. Coolers in this zone will be protected from contamination and decontaminated before leaving the CRZ.

6.3.3 Exclusion Zone (EZ)

The EZ is defined around intrusive activities or located in the immediate hazard area. The EZ is often identified by cones, caution tape, or other means to notify unauthorized individuals of the presence of potential hazards. Access should be restricted to field sampling crews and necessary equipment operators.

6.4 Barriers and Signs

Barricades, traffic cones, and/or markings or caution tape will be used at a safe distance from excavations, pits, hazardous areas, driller working areas, and moving equipment to prevent unauthorized access to work areas from vehicular and pedestrian traffic. Barriers will be appropriate for the level of work activity and anticipated traffic. Signage or work boundary delineation will be installed as necessary.

6.5 Potential Chemical Hazards and Controls

Based on potential activities to be conducted at the Site or adjacent to the Site, chemicals or classes of contaminants of concern (COCs) identified onsite or anticipated to be present onsite in storm water include the following:

- Metals
- Polycyclic aromatic hydrocarbons (PAHs) and phthalates
- Polychlorinated biphenyls (PCBs)

Chemicals used on this project for decontamination purposes include:

- Alconox detergent or similar

Nearly all COCs that personnel may potentially contact are bound in a damp/saturated matrix (sediment) or in liquid form (stormwater). Nonetheless, these compounds are potentially hazardous and exposure by all routes should be minimized.

Hazardous material container(s) must be properly labeled with the identity of the hazardous chemical(s) and appropriate hazardous warning information. The SSO will obtain copies of safety data sheets (SDSs) for any hazardous materials in use at the Site. The SDSs will be attached to this HASP as Attachment 9. The SSO will orient GSI employees and subcontractors to the potential hazards posed by chemicals used and present onsite.

6.6 Potential Chemical Exposure Pathways

The primary routes of exposure for Site chemicals include skin contact with contaminated materials and ingestion of materials from hand-to-mouth contact due to inadequate personal hygiene. To minimize these exposure pathways, all required PPE—as determined by the activity hazard analyses (AHAs)—will be worn and personal hygiene will be carefully monitored. AHAs will be developed by the SSO upon approval of the Pre-Design Investigation Work Plan and prior to commencing work. AHAs will be attached to this HASP. See Section 12.1 for more information.

SECTION 7: **Medical Monitoring**

Field employees anticipated to spend more than 29 days at Hazardous Waste Operations and Emergency Response (HAZWOPER) sites or required to wear an air-purifying respirator are enrolled in a HAZWOPER Medical Monitoring Program. The use of air-purifying respirators is not anticipated. If required, field personnel must be fit-tested and approved by an occupational health physician (see next section) for respirator use prior to donning in the field.

7.1 Periodic Comprehensive Exam

All personnel requiring access to controlled work areas will have completed a baseline medical examination and a periodic (usually annual) medical examination before assignment, in accordance with the OSHA 29 CFR 1910.120(f). The exam must be performed by an occupational health physician, who will provide written clearance for air-purifying respirator usage and hazardous waste site work. Protocols for the baseline, periodic, and exit exams must be at least as stringent as those defined in the GSI's Medical Monitoring Program.

7.2 Medical Clearance Record Keeping

Medical clearance documents are on file at GSI's office in Portland, Oregon. To ensure confidentiality, results of the medical exams or treatment records are maintained at the medical care provider's clinical offices.

7.3 Exposure Monitoring

No specific personnel exposure monitoring is required at this time. This HASP will be modified, as needed to discuss exposure monitoring.

SECTION 8: **Personal Protective Equipment**

8.1 Levels of Protection

Initial levels of protection for the Site may vary depending on the task. All personnel entering controlled work zones initially will be required to wear the U.S. Environmental Protection Agency (EPA)/OSHA-approved level of protection as specified in this plan in Table 7.

Protection may be upgraded or downgraded depending on monitoring data (compared with action levels) and project-area conditions, as determined by the SSO. Table 7 and the following sections outline the minimum guidelines for each level of protection that is assigned or potentially assigned.

Table 7. PPE to be Used at the Site

Personal Protective Equipment[1]	Field Work	Sample Processing
Steel-toed boots (leather or neoprene safety, slip- and chemical-resistant, waterproof)	X	X
Steel-shanked boots should be considered where they provide increased worker protection against a cut or puncture risk	X	X
Gloves (such as leather or nitrile)	X	X
Eye/face protection (safety glasses, goggles, or face shield)	X	X
Hard hat	X	X
Splash protection (polyvinyl chloride [PVC] bibs/aprons, or Tyvek coverall)		As necessary
Hearing protection	As necessary	As necessary
Clothing (long pants and shirts with sleeves; cold-weather gear, rain gear, as appropriate)	As necessary	As necessary
Heavyweight rain gear (if raining)	As necessary	As necessary
Personal flotation device (Type II)		

Note
[1]During sampling activities, workers will wear gloves and personal protective equipment (PPE) appropriate for the expected contaminants that may be encountered. When selecting PPE, consider potential exposure routes associated with the contaminant (e.g., inhalation, ingestion, skin contact).

8.2 Chemical Splashing

Care should be taken during sample collection activities to prevent liquids from splashing onto skin, clothing, and face. Sampling equipment should be handled carefully (e.g., placed, opened, moved) to prevent splashing. If splashing occurs, the area should be rinsed with clean water and dried, when possible. Safety glasses should be worn during sampling activities and during any activities with splash potential. Consider goggles or face shields and aprons where hazardous liquids are used, if applicable.

8.3 PPE Failure/Chemical Exposure

In the event of PPE failure, the worker and/or buddy will cease work, perform personal decontamination procedures (Section 9), and exit to the SZ/CRZ. Refer to the SDS (Attachment 9) and Section 1 if emergency medical response is needed. If chemicals contact the eyes, irrigate for 15 minutes and consult a physician.

8.4 PPE Inspection, Storage, and Maintenance

Reusable PPE will be decontaminated, inspected, and maintained, as necessary after each use. Personal equipment (e.g., hard hat, steel-toed boots) will be properly stored by the employee/subcontractor. The SSO will periodically inventory the disposable and reusable PPE at the Site and will replenish stocks in a timely manner.

SECTION 9: **Decontamination and Disposal Procedures**

Procedures for the decontamination of sampling tools and other related equipment will be specified in Field Sampling Plans (FSPs) and/or Quality Assurance Project Plans developed. General procedures are summarized in Table 8 below. Note that separate areas should be established for personnel, sampling, and heavy equipment decontamination (discussed in Section 6.3).

9.1 Personnel Decontamination Procedures

Field personnel will wash hands and face after removing PPE. Steps for personnel decontamination in defined EZs and CRZs are listed in Table 8.

Table 8. Equipment and Procedures for Personnel Decontamination

Equipment	Decontamination Solution	Procedures	
		Intermediate[1]	Final[2]
• Long-handled, soft-bristled brushes • Galvanized wash tubs or equivalent • Pump-activated sprayer • Garbage cans with plastic liners and drums with liners • Plastic sheeting • Paper towels • Duct tape	• Alconox or similar • Tap water for rinsing	1. Dispose of or wash outer boots and gloves with Alconox solution. 2. Rinse outer boots and gloves. 3. Remove outer gloves. 4. Enter CRZ for sample management. 5. Return to EZ wearing new or cleaned outer gloves.	1. Segregate equipment (for instruments and equipment requiring special decontamination; see the FSP). 2. Dispose of or wash outer boots and gloves with Alconox solution. 3. Rinse outer boots and gloves. 4. Remove and dispose of outer boots. 5. Remove and dispose of outer gloves (if not cleaned to “like new” condition). 6. Remove and dispose of coverall. 7. Remove and dispose of inner gloves in designated receptacle. 8. Field wash for personal hygiene. 9. Exit to SZ.

Notes
[1]Intermediate decontamination is for periodic exits from the EZ during sample transport and management or for short breaks.
[2]Final decontamination is performed before eating, when taking cool-down breaks, and when exiting the Site.
CRZ: Contamination Reduction Zone
EZ: Exclusion Zone
FSP: Field Sampling Plan
SZ: Support Zone

9.2 Equipment Decontamination

All equipment that will potentially contact samples will be decontaminated before and after sampling events according to procedures specified in the FSP. Heavy equipment in direct contact with sediments, soil, and/or water, such as the drill rig augers and backhoe buckets, will be decontaminated by the subcontractor.

9.3 Emergency Decontamination

In the event of an accident or incident in which work must cease and staff must exit the EZ, emergency decontamination should be performed to the greatest extent feasible. In an emergency, the primary concern is to prevent the loss of life or severe injury. If immediate medical attention is required to save a life, decontamination should be delayed until the victim is stabilized. If the decontamination can be performed without interfering with essential life-saving techniques or first aid, or if a worker has been contaminated with an extremely toxic or corrosive material that could cause severe illness or loss of life, decontamination must be performed immediately. If an emergency resulting from a heat-related illness develops, protective equipment should be removed carefully from the victim as soon as possible.

Any time emergency decontamination methods must be used, an incident report (see Attachment 1) must be completed by the SSO and submitted to GSI's Safety Committee.

9.4 Disposal Procedures

Soils and wastes generated from sampling events will be characterized in advance to determine appropriate disposal procedures. Waste PPE, including used nitrile gloves, will be contained in garbage bags and disposed with common waste. All visibly impacted soil or sediments and water generated during drilling and sampling will be contained in 55-gallon drums and drummed materials will be profiled to evaluate disposal options. Construction of temporary waste collection stations, when required, will be the responsibility of the SSO.

SECTION 10: **Spill and/or Discharge of Hazardous Materials**

10.1 Training

Responses to incidental releases or spills of hazardous substances that can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area are not considered to be emergency responses under 29 CFR 1910.120(l) and do not require additional specialized training.

10.2 Spill Control and Response

There is a potential for incidental spillage/leakage of hazardous materials, if present. Store these materials properly and maintain the appropriate spill response equipment in the area where the materials are used/stored. In case of incidental spills or leaks, follow these steps:

1. Notify the SSO as soon as possible.
2. Select appropriate PPE and response equipment.
3. Contain the spill to the extent possible.
4. Neutralize or solidify the liquid per the SDS.
5. Transfer the material to an appropriate compatible container.
6. Document with an incident report (see Attachment 1).
7. PM will notify the client.

10.3 Discharge Control and Response

In the event of an uncontrollable discharge of hazardous material from a structure (e.g., impoundment or tank), the PM will immediately contact the client to coordinate implementation of the client's Emergency Response Plan. Field personnel shall not assist in emergency response activities but will evacuate to the upland SZ or the emergency evacuation point for in-water work (see Figure 1).

10.4 Spill Response Reporting

Although spills in reportable quantities are not anticipated, field personnel will be instructed on the requirements and procedures for reporting to state emergency response agencies and the National Response Center (NRC) (contact information is in Table 1 in Section 1.1 of this HASP). Spills will be reported immediately after the safety of onsite personnel has been secured. Potentially reportable spills include any amount of oil/diesel/gas spilled in water, or more than 42 gallons of oil spilled on land. When reporting to the NRC, include the following information:

1. Your name and company
2. Your telephone number
3. Type of incident and the materials involved
4. Location/time of incident
5. Background/how the incident occurred
6. On-scene contact and how to reach them
7. Severity of incident—threat to people, property, or the environment
8. Actions taken, such as containment and/or evacuation
9. Responsible party and telephone number

10.5 Evacuation Procedures

Expeditious evacuation routes to the SZ will be established daily for all work areas. Evacuation notification will be one long blast on a canned siren, vehicle horn, or direct verbal communication (see Table 9 in Section 11.4 below for nonverbal communication signals). Emergency drills should be performed periodically. Any additions to evacuation procedures require an update to this HASP.

In the unlikely event that an evacuation is necessary, all personnel will immediately proceed to the upland SZ or the emergency evacuation point for overwater work, decontaminating to the extent possible for personal safety based on the emergency.

SECTION 11: **Communications**

11.1 Kickoff Meeting

A project kickoff meeting will be conducted prior to the start of any project work.

11.2 Daily Tailgate Safety Meetings

Tailgate safety meetings will be conducted by the SSO each morning before work begins, or before the following:

- A change of work tasks or conditions
- When new employees join the crew
- If project-area conditions change unexpectedly
- When a specific task or location poses a safety hazard
- To review proper use of PPE

Topics of discussion will include work tasks and designated PPE, emergency procedures, evacuation routes, instruction in the use of safety equipment (as required), prior safety problems, and similar topics. These meetings must be documented in the field notebook or a Tailgate Safety Meeting Checklist (to be developed based on field efforts planned).

11.3 Buddy System

The "buddy system" will be used during field activities that involve potential exposure to hazardous or toxic materials, for overwater or near-water work and during any work within the EZ. Each person will observe his/her buddy for symptoms of chemical exposure, cold stress/hypothermia, or heat stress, and will assess any emergency situation and seek professional assistance as appropriate. A cell phone will be maintained at the Site for emergency use.

11.4 Emergency Communications

Table 9 presents emergency hand and horn signals that will be used, as necessary, where verbal communication is limited.

Table 9. Emergency Signals

Hand and Horn Signal	Meaning
Thumbs up	OK; understand
Thumbs down	No; negative
Grasping buddy's wrist	Leave Site now
Hands on top of head	Need assistance
Horn - one long blast	Evacuate Site
Horn - two short blasts	All clear; return to Site

SECTION 12: **Safety Planning and Observation**

12.1 Activity Hazard Identification and Analysis

GSI's AHA focuses on the relationship between the worker, the task, the tools, and the work environment. Once those relationships have been identified, project controls are implemented to eliminate or reduce job hazards to an acceptable risk level.

The AHA begins with an assessment of the environment in which the work will be performed and the tasks to be conducted. Tasks are reviewed or observed to identify hazards. Hazard identification is the product of a root cause analysis combined with a risk analysis. GSI's AHA examines the problems that could occur and assesses the likelihood that the problem will occur. The AHAs for the planned upcoming efforts will be attached to this HASP.

All employees will be expected to assess emergency conditions and have the authority to issue stop-work or evacuation instructions based on the situation and their best professional judgment. Emergency procedures will be discussed during daily safety briefings. Emergency evacuation may occur as the result of a medical emergency (life-threatening) or site condition (e.g., seismic event, spills, nearby train derailment

12.2 Behavior-Based Safety

The purpose of GSI's behavior-based safety observation procedure is to build the company's safety culture by exercising a process of making observations, reinforcing exemplary behaviors, and correcting unsafe conditions and at-risk behaviors.

SECTION 13: **Accident Reporting and Record Keeping**

13.1 In Case of Emergency Injury or Illness

IN CASE OF EMERGENCY: CALL 911 AS SOON AS POSSIBLE

13.2 In Case of Non-Emergency Injury or Illness

At the onset of a non-emergency employee work-related injury or illness, GSI employees should first notify the supervisor on duty, then notify WorkCare at (888) 449-7787. GSI management will be contacted by WorkCare following the initial report. The employee is required to report (to the GSI SSO) all work-related and all non-work-related injuries that may affect their ability to safely perform their job.

After the initial report, the SSO or other designated GSI employee will immediately contact the PM, SSO, or GSI Health and Safety Manager to conduct an investigation jointly with the PM. The SSO or PM will complete the Incident Report Form (Attachment 1). These completed reports must be transmitted to the Safety Committee within 24 hours of an occurrence; a PDF file is acceptable. The Safety Committee will submit the appropriate reports to GSI's Human Resources Manager (for Workers' Compensation), and OSHA (as applicable).

13.3 In Case of Near-Miss Incident

All "near-miss" incidents (incidents with high likelihood of resulting in injury, illness, significant spill, or property damage), even in the absence of a resultant incident, should be reported to GSI management using the Near-Miss Report Form (Attachment 2). This provides safety tracking metrics to improve project safety in the future.

13.4 Subcontractor Accident Reporting

The foreman or field supervisor of subcontracting crews will investigate and complete an injury/illness report (similar in content to either the GSI Incident Report Form or the Near-Miss Report Form [Attachments 1 and 2, respectively]) in accordance with their internal company policy. This report must be transmitted to GSI within 24 hours of an incident.

13.5 Environmental Incidents and Property Damage

In case of environmental incidents or property damage, an Incident Report Form (Attachment 1) will be prepared by the SSO. Any damage, loss, or theft of property (items/tools/equipment) will be reported to the PM.

SECTION 14: **References**

GSI. 2020. Health and Safety Policy. Prepared by the GSI Safety Committee for GSI Water Solutions, Inc.

SECTION 15: **GSI Safety Committee Members and Contact Information**

Table 10. GSI Oregon Safety Committee Members

Person	Role	Contact Information
Josh Bale	Chair (Employee Representative), H&S Manager, and HASP Administrator (Employee Representative)	Work: 971.200.8502 Cell: 530.276.4188
Kathy Roush	Management Representative	Work: 971.200.8527 Cell: 919.605.6644
Molly Monroe	Recorder	Work: 541.257.9002 Cell: 541.230.0578
Andrew Wentworth	Employee Representative	Work: 971.200.8534 Cell: 510.593.0120
John Gauthier	Employee Representative	Work: 971.200.8529 Cell: 805.816.3823
Laura Burgess	Employee Representative	Work: 971.200.8504 Cell: 503.544.0879
Owen McMurtrey	Employee Representative	Work: 541.257.9005 Cell: 541.740.5619
Jessica Letteney	Employee Representative	Work: 971.200.8524 Cell: 503.410.4431

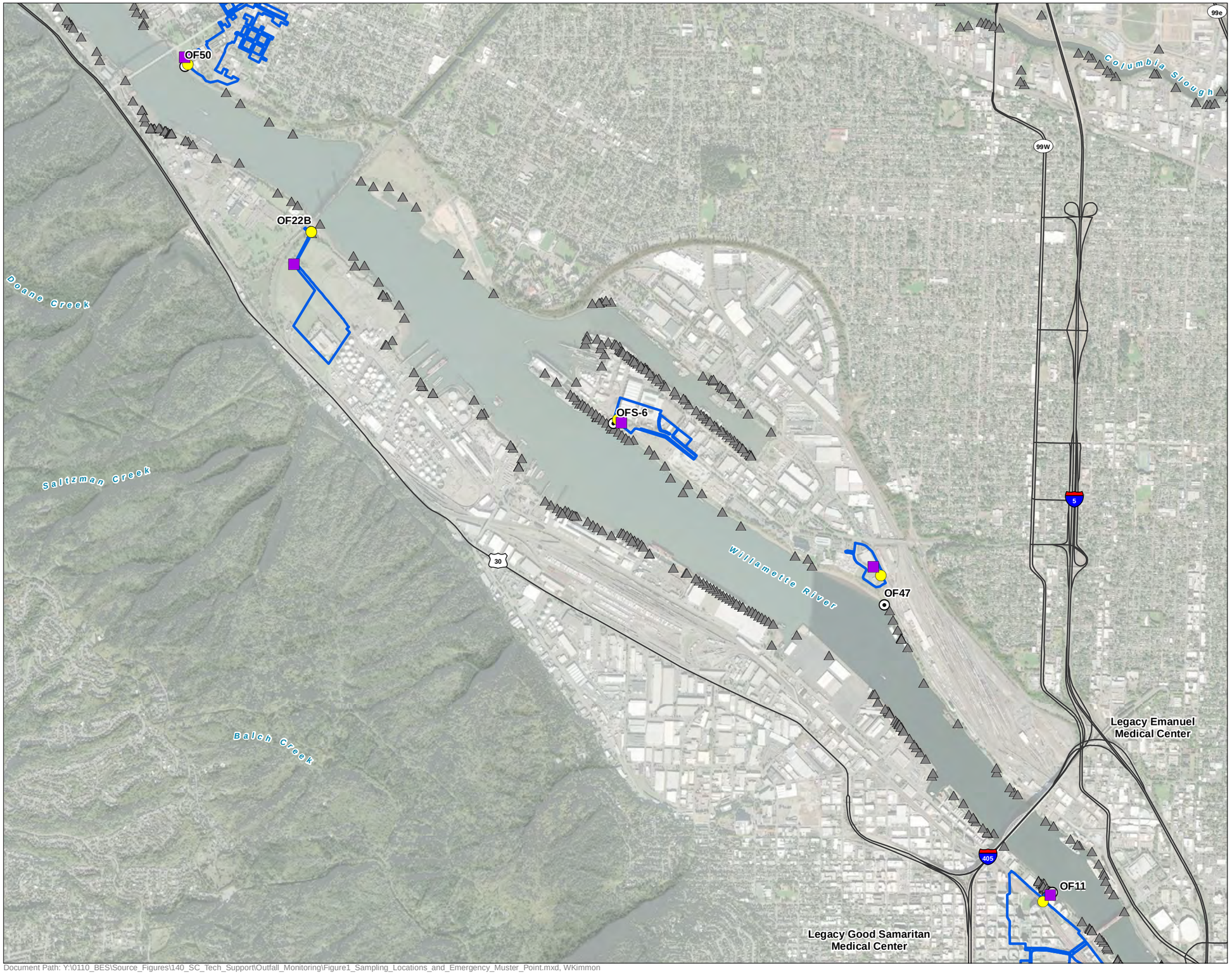
Note
HASP: Health and Safety Plan

SECTION 16: **Signatures**

I have read, understood, and agree to abide by, the requirements presented in this Health and Safety Plan. I understand that if I recognize an unsafe condition affecting my work, I have the absolute right to stop work until the condition is corrected.

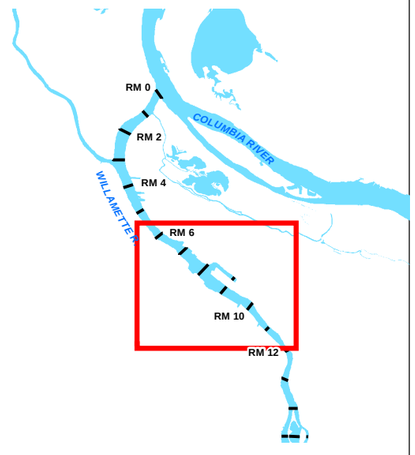
Name Printed	Signature	Date

FIGURE 1
Sampling Locations and Emergency Muster Points



LEGEND

- Sampling Location
- Emergency Muster Location
- City Outfall
- Non-City Outfall
- Basin OF47



NOTE
Based on current conditions as of date of this work plan.

N

0 750 1,500 2,250
Feet

Date: July 13, 2021
Data Sources: BLM, ESRI, ODOT, USGS, Aerial Photo 2019

GSI Water Solutions, Inc.

Document Path: Y:\0110_BES\Source_Figures\140_SC_Tech_Support\Outfall_Monitoring\Figure1_Sampling_Locations_and_Emergency_Muster_Point.mxd, WKimmon

ATTACHMENTS

ATTACHMENT 1

Incident Report Form

Incident Report

Use this form to document information about an accident or incident. Fill out an investigation report as soon as possible. Note: this form is for use within your company. It is not intended to replace DCBS Form 801: *Worker's and Employer's Report of Occupational Injury or Disease*.

Employee(s) name(s): .....

Time & date of accident/incident: .....

Job title(s) and department(s): .....

Supervisor or lead person: .....

Witnesses: .....

Brief description of the accident or incident: .....

.....

Body part affected: .....

Did the injured employee(s) contact WorkCare? ( ) Yes ( ) No

Did WorkCare recommend the employee seek medical attention? ( ) Yes ( ) No

Did the injured employee(s) see a doctor? ( ) Yes ( ) No

If yes, did you file an employer's portion of a worker's compensation form? ( ) Yes ( ) No

Did the injured employee(s) go home during their work shift? ( ) Yes ( ) No

If yes, list the date and time injured employee(s) left job(s): .....

Supervisor's Comments: .....

.....

What could have been done to prevent this accident/incident? .....

.....

Have the unsafe conditions been corrected? ( ) Yes ( ) No

If yes, what has been done? .....

If no, what needs to be done? .....

Employer or Supervisor's signature:

Date:

Additional comments/notes: .....

.....

GSI Water Solutions, Inc.
NEAR-MISS REPORT

1. Name of Employee Involved	**2. Date of Near-Miss**	**3. Time of Near-Miss**

4. Location/Site of Near-Miss Event

5. Other witnesses present at time of near-miss

6. Length of time employed by GSI	**7. Employment Category**
☐ < 6 months ☐ 6 months – 1 year ☐ 1 – 2 years ☐ 2 – 5 years ☐ Greater than 5 years	☐ Regular, Full-Time ☐ Regular, Part-Time ☐ Temporary/Seasonal Employee ☐ Non-Employee
8. Familiarity with Activities related to Near-Miss	**9. Phase of Work Day when Near-Miss Occurred**
☐ First Time performing ☐ Observed but never performed ☐ Limited to some familiarity ☐ Regularly perform	☐ Performing Duties during Standard Hours ☐ During meal/rest period ☐ Prior to Starting or At End of Work Day ☐ Working Overtime/Long hours

10. Describe the near-miss:
Description of Event: What was employee doing just before and at the time of the near-miss?

11. What happened or what work conditions contributed to the near miss (e.g., Object/Equipment/Substance)

12. Outcome of near-miss:

13. Task and Activity at Time of Near-Miss:

General type of task:_____

Specific activity:_____

Employee was working:

☐ Alone ☐ With crew or fellow worker ☐ Other: _____

14. Was proper Ergonomic support utilized? Explain

15. Supervision at time of accident

☐ Unsupervised ☐ Supervised

☐ Limited Supervision

16. Factors that contributed to near-miss – Please check all that apply

Hazard

- ☐ Not recognized/identified
- ☐ Identified, but not addressed
- ☐ Inadequately addressed

Work Procedures

- ☐ None developed
- ☐ Not followed
- ☐ Partially followed
- ☐ Not understood
- ☐ Not appropriate
- ☐ Not communicated
- ☐ Other

Training & Certification

- ☐ Insufficient training
- ☐ Circumstances not covered
- ☐ Ineffective training
- ☐ Worker not authorized
- ☐ Outdated Training

Communication

- ☐ Breakdown in verbal communication
- ☐ Breakdown in written communication
- ☐ Confusion after communication
- ☐ Other_____

Other

- ☐ Weather/temperature
- ☐ Extended work hours
- ☐ Worker fatigue
- ☐ Physical overexertion
- ☐ Work in elevated area
- ☐ Chemical Use
- ☐ Biological agent
- ☐ Radiation
- ☐ Electricity
- ☐ Mechanical
- ☐ Animals

Facilities/Equipment

- ☐ Personal protective equipment
- ☐ Faulty equipment
- ☐ Poor/inadequate maintenance
- ☐ Inappropriate use
- ☐ Missing guards
- ☐ Obsolete/antiquated
- ☐ Inadequate design
- ☐ Ergonomic factors
- ☐ Equipment failure
- ☐ Trip hazard
- ☐ Slip hazard
- ☐ Struck by
- ☐ Other_____

Additional Comments:

ATTACHMENT 2

Near-Miss Report Form

GSI Water Solutions, Inc.
NEAR-MISS REPORT

1. Name of Employee Involved	**2. Date of Near-Miss**	**3. Time of Near-Miss**

4. Location/Site of Near-Miss Event

5. Other witnesses present at time of near-miss

6. Length of time employed by GSI	**7. Employment Category**
☐ < 6 months ☐ 6 months – 1 year ☐ 1 – 2 years ☐ 2 – 5 years ☐ Greater than 5 years	☐ Regular, Full-Time ☐ Regular, Part-Time ☐ Temporary/Seasonal Employee ☐ Non-Employee
8. Familiarity with Activities related to Near-Miss	**9. Phase of Work Day when Near-Miss Occurred**
☐ First Time performing ☐ Observed but never performed ☐ Limited to some familiarity ☐ Regularly perform	☐ Performing Duties during Standard Hours ☐ During meal/rest period ☐ Prior to Starting or At End of Work Day ☐ Working Overtime/Long hours

10. Describe the near-miss:
Description of Event: What was employee doing just before and at the time of the near-miss?

11. What happened or what work conditions contributed to the near miss (e.g., Object/Equipment/Substance)

12. Outcome of near-miss:

13. Task and Activity at Time of Near-Miss:

General type of task:_____

Specific activity:_____

Employee was working:

☐ Alone ☐ With crew or fellow worker ☐ Other: _____

14. Was proper Ergonomic support utilized? Explain

15. Supervision at time of accident

☐ Unsupervised ☐ Supervised

☐ Limited Supervision

16. Factors that contributed to near-miss – Please check all that apply

Hazard

- ☐ Not recognized/identified
- ☐ Identified, but not addressed
- ☐ Inadequately addressed

Work Procedures

- ☐ None developed
- ☐ Not followed
- ☐ Partially followed
- ☐ Not understood
- ☐ Not appropriate
- ☐ Not communicated
- ☐ Other

Training & Certification

- ☐ Insufficient training
- ☐ Circumstances not covered
- ☐ Ineffective training
- ☐ Worker not authorized
- ☐ Outdated Training

Communication

- ☐ Breakdown in verbal communication
- ☐ Breakdown in written communication
- ☐ Confusion after communication
- ☐ Other_____

Other

- ☐ Weather/temperature
- ☐ Extended work hours
- ☐ Worker fatigue
- ☐ Physical overexertion
- ☐ Work in elevated area
- ☐ Chemical Use
- ☐ Biological agent
- ☐ Radiation
- ☐ Electricity
- ☐ Mechanical
- ☐ Animals

Facilities/Equipment

- ☐ Personal protective equipment
- ☐ Faulty equipment
- ☐ Poor/inadequate maintenance
- ☐ Inappropriate use
- ☐ Missing guards
- ☐ Obsolete/antiquated
- ☐ Inadequate design
- ☐ Ergonomic factors
- ☐ Equipment failure
- ☐ Trip hazard
- ☐ Slip hazard
- ☐ Struck by
- ☐ Other_____

Additional Comments:

ATTACHMENT 3

Information on Slips, Trips, and Falls

To protect workers from falls, OSHA issued a final rule on Walking-Working Surfaces and Personal Fall Protection Systems on November 17, 2016. According to OSHA "fall hazards from heights and on working surfaces are one of the leading causes of serious workplace injuries and deaths, and the new rule more closely aligns general industry requirements with those in construction."

The rule updates and clarifies the walking-working surface standards, and adds clear training and inspection requirements.

In addition, all employees need to be aware of how to prevent slips, trips, and falls by following good housekeeping procedures and safe practices when they work on or around scaffolds, ladders, unprotected ledges or platforms, rooftops, open shafts, trapdoors, poles, towers, bridges, trestles, pits, or open tanks.

Below is information from OSHA, and although it doesn't pertain to GSI's line of work, you may find yourself in a situation in which knowing about this rule might be helpful.

Please read this the OSHA information and the summary from J.J. Keller so you are aware of the Walking-Working Standards and Slips-Trips-Falls.

The final rule will allow employers to select a fall protection system that works best for them from a range of accepted options that OSHA has permitted in construction since 1994, including:

- *Guardrail Systems*
- *Safety Net Systems*
- *Personal Fall Arrest Systems*
- *Positioning Systems*
- *Travel Restraint Systems*
- *Ladder Safety Systems*

One of the most significant changes will be to fixed and portable ladders and the safety requirements surrounding them. Cages and wells will no longer be acceptable forms of fall protection on fixed ladders higher than 24 feet, although employers will have a generous timeframe – up to 20 years in some cases – to phase in ladder safety systems or personal fall arrest systems (PFAS).

Alignment with Construction Standards

Because many employers perform activities that fall under both general industry and construction standards, the new final rule eases compliance by bringing many of the general industry standards in line with current construction standards.

More specifically, construction standards (29 CFR part 1926) are referred to in the following parts of the new Walking-Working Surfaces standard (29 CFR part 1910, subpart D):

- ***27(a) Scaffolds –*** *Scaffolds used in general industry must meet the requirements in construction 29 CFR part 1926, subpart L (Scaffolds).*

- ***28(b)(1)(ii) Unprotected sides and edges*** *– When the employer can demonstrate that it is not feasible or creates a greater hazard to use guardrail, safety net, or personal fall protection systems on residential roofs, the employer must develop and implement a fall protection plan that meets the requirements of construction 29 CFR 1926.502(k) and training that meets the requirements of 29 CFR 1926.503(a) and (c).*
- ***28(b)(12) Scaffolds and rope descent systems –*** *The employer must ensure: (i) Each employee on a scaffold is protected from falling in accordance 29 CFR part 1926, subpart L; and (ii) Each employee using a rope descent system 4 feet (1.2 m) or more above a lower level is protected from falling by a personal fall arrest system.*
- ***29(b) Guardrail systems Note to paragraph (b) of this section:*** *The criteria and practices requirement for guardrail systems on scaffolds are contained in 29 CFR part 1926, subpart L.*
- ***29(c) Safety net systems –*** *The employer must ensure each safety net system meets the requirements in 29 CFR part 1926, subpart M.*

Slips, Trips, and Falls and Walking Working Surface
An Overview provided by J.J. Keller

Overview

Slips, trips, and falls account for many industry accidents, and are responsible for 10 percent of all accidental deaths. They are also the fourth leading cause of fatalities (following motor vehicles, homicides, and being struck by objects or equipment).

Slips

Slips can be caused by wet surfaces, spills, or weather hazards such as ice or snow. Slips are more likely to occur when you hurry or run, wear the wrong kind of shoes, or don't pay attention to where you're walking.

You can help avoid slips by following these safety precautions:

- Practice safe walking skills. Take short steps on slippery surfaces to keep your center of balance under you, and point your feet slightly outward.
- Clean up or report spills right away. Even minor spills can be dangerous.
- Don't let grease accumulate at your work place.
- Be extra cautious on smooth surfaces such as newly waxed floors. Also be careful walking on loose carpeting.

Trips

Trips occur whenever your foot hits an object and you are moving with enough momentum to be thrown off balance. You can help avoid trips when you:

Make sure you can see where you are walking. Don't carry loads that you cannot see over.

Keep walking and working areas well lit, especially at night.

Keep the workplace clean and tidy. Store materials and supplies in the appropriate storage areas.

Properly maintain walking areas, and alert appropriate authorities regarding potential maintenance-related hazards.

Arrange furniture and office equipment so that it doesn't interfere with walkways or pedestrian traffic in your area.

Falls

To avoid falls consider the following measures:

- Don't jump off landings or loading docks. Use the stairs.
- Repair or replace stairs or handrails that are loose or broken.
- Keep passageways and aisles clear of clutter and well lit.
- Wear shoes with appropriate non-slip soles.

Hazards involved with using walking-working surfaces

The main hazards involved with walking and working surfaces include slips, trips, and falls. Stairways are taken for granted, and so become a source for accidents in the workplace.

What must my employer do?

Your employer is responsible for providing a safe working environment. That includes reducing or eliminating hazards in walking and working areas by doing the following:

Keep all employment, passageway, storerooms, and service rooms clean, orderly, and sanitary.

Maintain floors in clean, dry condition. If wet processes are used, drainage will be maintained. Gratings, mats, or raised platforms must be provided.

Keep floors, working places, and passageways free from protruding nails, splinters, or loose boards.

Keep aisles and passageways clear and in good repair with no obstructions that could create hazards.

Appropriately mark permanent aisles and passageways.

Maintain proper aisle width so passage or egress is not limited.

Provide covers and/or guardrails to protect employees from open pits, vats, tanks, ditches, and other hazards.

Follow load rating limits for all floors or roofs.

Maintain adequate lighting in areas to illuminate walking surfaces.

Provide handrails as required.

For GSI Field Work *(added in June 2019):*

Slips/Trips/Falls

Maintain good housekeeping standards and avoid leaving items on the ground where they could present a trip hazard. Set up adequate staging areas for all equipment needed. Inspect work area and level ground surface where possible.

Unstable/Uneven Terrain/Steep Grades/Elevated Surfaces

If there is a potential for falls because of unstable, steep surface, the buddy system and additional safety precautions should be developed and discussed with the GSI Health and Safety Coordinator. Before field work, perform reconnaissance and develop a plan for safe ingress and egress. Wear sturdy work boots.

ATTACHMENT 4

OSHA Bulletin: Preventing Hearing Loss Caused by Chemical (Ototoxicity) and Noise Exposure

Preventing Hearing Loss Caused by Chemical (Ototoxicity) and Noise Exposure

Safety and Health Information Bulletin

SHIB 03-08-2018
DHHS (NIOSH) Publication No. 2018-124

Introduction

Millions of workers are exposed to noise in the workplace every day and when uncontrolled, noise exposure may cause permanent hearing loss. Research demonstrates exposure to certain chemicals, called ototoxicants, may cause hearing loss or balance problems, regardless of noise exposure. Substances including certain pesticides, solvents, and pharmaceuticals that contain ototoxicants can negatively affect how the ear functions, causing hearing loss, and/or affect balance.

Source/Copyright: OSHA

The risk of hearing loss is increased when workers are exposed to these chemicals while working around elevated noise levels. This combination often results in hearing loss that can be temporary or permanent, depending on the level of noise, the dose of the chemical, and the duration of the exposure. This hearing impairment affects many occupations and industries, from machinists to firefighters.

Effects on Hearing

Harmful exposure to ototoxicants may occur through inhalation, ingestion, or skin absorption. Health effects caused by ototoxic chemicals vary based on exposure frequency, intensity, duration, workplace exposure to other hazards, and individual factors such as age. Effects may be temporary or permanent, can affect hearing sensitivity and result in a standard threshold shift. Since chemicals can affect central portions of the auditory system (e.g., nerves or nuclei in the central nervous system, the pathways to the brain or in the brain itself), not only do sounds need to be louder to be detected, but also they lose clarity. Specifically, speech discrimination dysfunction, the ability to hear voices separately from background noise, may occur and involve:

- Compressed loudness: sound distortion.
- Frequency resolution: the inability to differentiate two sounds with similar frequency.
- Temporal resolution: the inability to detect time gaps between sounds.
- Spatial resolution: the inability to localize sound.

Speech discrimination dysfunction can also make working in noisy environments difficult and increase the risk of workplace injuries due to an inability to hear co-workers, environmental sounds and warning signals.

There is growing concern among occupational health and safety professionals that ototoxicant-induced hearing loss may go unrecognized since the measure for hearing loss does not indicate the cause. For example, audiometric tests are powerful tools that show hearing impairments (i.e., threshold shifts); however, they do not differentiate between noise and ototoxic causes.

Combined exposure: health effects below the noise PEL

OSHA standards require employers to maintain exposure to the specific substance at or below the PEL. However, synergistic effects from the combined ototoxicant and noise exposure could result in hearing loss when exposures are below the PEL.

Hearing loss can be even greater with exposure to both ototoxic chemicals and noise than exposure to either noise or the ototoxic chemical alone.[1] Many ototoxic substances have a greater-than-additive (e.g., synergistic) effect on hearing loss with noise exposure and in particular with impulse noise.[2] Several studies have suggested that some ototoxic chemicals, such as certain solvents, might exacerbate noise-induced hearing loss even though the noise level is below OSHA's Permissible Exposure Limit (PEL).[3]

What are ototoxic chemicals and substances that contain ototoxicants?

Ototoxic chemicals are classified as neurotoxicants, cochleotoxicants, or vestibulotoxicants based on the part of the ear they damage, and they can reach the inner ear through the blood stream and cause injury to inner parts of the ear and connected neural pathways.[4] Neurotoxicants are ototoxic when they damage the nerve fibers that interfere with hearing and balance. Cochleotoxicants mainly affect the cochlear hair cells, which are the sensory receptors, and can impair the ability to hear. Vestibulotoxicants affect the hair cells on the spatial orientation and balance organs.[5] The research on ototoxicants and their interactions with noise is limited. The dose-response, lowest observed effect level (LOEL) and no observed effect level (NOEL) have been identified in animal experiments for only a few substances.[6]

The following table includes examples of ototoxic chemicals grouped by substance class.[7]

Substance Class	Chemicals
Pharmaceuticals ***Ototoxicity at therapeutic doses is limited***	Aminoglycosidic antibiotics (e.g. streptomycin, gentamycin) and some other antibiotics (e.g. tetracyclines), Loop diuretics* (e.g. furosemide, ethacrynic acid) Certain analgesics* and antipyretics* (salicylates, quinine, chloroquine) Certain antineoplastic agents (e.g. cisplatin, carboplatin, bleomycin).
Solvents	Carbon disulfide, n-hexane, toluene, p-xylene, ethylbenzene, n-propylbenzene, styrene and methylstyrene, trichloroethylene.
Asphyxiants	Carbon monoxide, hydrogen cyanide and its salts, tobacco smoke
Nitriles	3-Butenenitrile, cis-2-pentenenitrile, acrylonitrile, cis-crotononitrile, 3,3'-iminodipropionitrile.
Metals and Compounds	Mercury compounds, germanium dioxide, organic tin compounds, lead.

Table: Selected Ototoxicants

The table does not identify all known toxicants and, in addition, there is limited evidence that supports the ototoxicity of other chemicals including cadmium, arsenic, bromates, halogenated hydrocarbons, insecticides, alkylic compounds, and manganese.

The exposure threshold for ototoxicity varies for each chemical based on its compound family, properties, exposure route, exposure concentration and duration, synergy with noise, and noise exposure, along with an individual's risk factors.

Which industries are more likely to have ototoxicants?

Industries that use potential ototoxicants include manufacturing, mining, utilities, construction, and agriculture. Manufacturing industry subsectors may include:

- Fabricated metal
- Machinery
- Leather and Allied Product
- Textile and Apparel
- Petroleum
- Paper
- Chemical (including Paint)
- Furniture and Related Product
- Transportation Equipment (e.g. Ship and Boat Building)
- Electrical Equipment, Appliance and Component (e.g., Batteries)
- Solar Cell

Occupational activities that often have high noise exposure and could add synergistic effects when combined with ototoxicant exposure (i.e., occurring in the above industries) may include:

- Printing
- Painting
- Construction
- Manufacturing occupations in the subsectors listed above
- Firefighting
- Weapons firing
- Pesticide spraying

When specific ototoxicity information is not available, information on the chemical's general toxicity, nephrotoxicity, and neurotoxicity may provide clues about the potential ototoxicity. Most chemicals that are known to affect the auditory system are also neurotoxic and/or nephrotoxic. Information on whether a chemical produces reactive free radicals could also give some clues about the agent's potential ototoxicity.

Prevention

The first step in preventing exposure to ototoxicants is to know if they are in the workplace. One way to identify ototoxicants in the workplace is by reviewing Safety Data Sheets (SDS) for ototoxic substances and/or chemicals, and ototoxic health hazards associated with ingredients in the product. For example, Figure 1 shows an SDS where ototoxicants may be in a product.

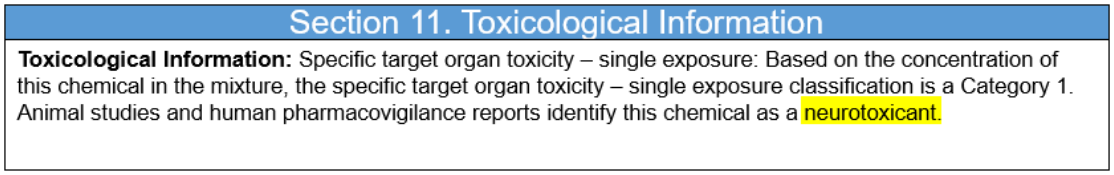


Figure 1: Check the SDS.

Source/Copyright: OSHA

Employers must provide health and safety information as well as training to workers exposed to hazardous materials, including ototoxic chemicals (see OSHA's hazard communication standard at 29 CFR 1910.1200). The training must be in a language and vocabulary that the worker understands. Additionally, complaints from workers about hearing loss should include investigating SDSs for ototoxicants.

Controlling Exposure

Replacing a hazardous chemical with a less toxic chemical is an effective way to reduce exposure when ototoxicants are identified in the workplace.

If eliminating ototoxicants from the workplace is not possible, using engineering controls, such as isolation and enclosures to control exposure to ototoxicants and noise, may reduce risk for adverse health effects. Ventilation is also a recommended control method for ototoxicants.

Some administrative controls to consider include eliminating unnecessary tasks that cause noise or ototoxicant exposure, or operating noisy equipment when workers are not near.

Personal Protective Equipment (PPE)

Employers must assess and determine the appropriate PPE according to the general requirements in 29 CFR 1910.132, the respiratory protection requirements in 29 CFR 1910.134, and the hand protection requirements in 29 CFR 1910.138.

Since many ototoxic substances can be absorbed through the skin, chemical-protective gloves, arm sleeves, aprons and other appropriate clothing can assist in reducing dermal exposure.

OSHA's occupational noise exposure standard at 29 CFR 1910.95 only requires audiometric testing at the noise action level (i.e., an 85-decibel 8-hour time-weighted average). However, wearing hearing protection and using audiometric testing to detect early signs of hearing loss, even in workers exposed below the action level and ototoxic chemicals below the PEL, may prevent hearing loss from their synergistic effects.

Information on Hearing Loss Prevention programs and their effectiveness is available online from the National Institute for Occupational Safety and Health (NIOSH) at www.cdc.gov/niosh/topics/noise/preventhearingloss/hearlosspreventprograms.html.

Additional Information

OSHA can provide compliance assistance through a variety of programs, including technical assistance about effective safety and health programs, workplace consultations, and training and education. OSHA's On-Site Consultation Program offers free, confidential occupational safety and health services to small and medium-sized businesses in all states and several territories across the country, with priority given to high-hazard worksites. On-Site consultation services are separate from enforcement and do not result in penalties or citations. To locate the OSHA On-Site Consultation Program nearest you, visit www.osha.gov/consultation.

Workers' Rights

Workers have the right to:

- Working conditions that do not pose a risk of serious harm.
- Receive information and training (in a language and vocabulary the worker understands) about workplace hazards, methods to prevent them, and the OSHA standards that apply to their workplace.

- Review records of work-related injuries and illnesses.
- File a complaint asking OSHA to inspect their workplace if they believe there is a serious hazard or that their employer is not following OSHA's rules. OSHA will keep all identities confidential.
- Exercise their rights under the law without retaliation, including reporting an injury or raising health and safety concerns with their employer or OSHA. If a worker has been retaliated against for using their rights, they must file a complaint with OSHA as soon as possible, but no later than 30 days.

For additional information, see OSHA's Workers page.

Contact OSHA

Under the Act, employers are responsible for providing safe and healthful workplaces for their employees. OSHA's role is to ensure these conditions for America's working men and women by setting and enforcing standards, and providing training, education and assistance. For more information, visit www.osha.gov or call OSHA at 1-800-321- OSHA (6742), TTY 1-877-889-5627.

Contact NIOSH

To receive documents or more information about occupational safety and health topics, please contact NIOSH at 1-800-CDC-INFO (1-800-232-4636), TTY 1-888-232-6348, email: cdcinfo@cdc.gov or visit the NIOSH website at: www.cdc.gov/niosh.

---

[1] European Agency for Safety and Health at Work. Combined Exposure to Noise and Ototoxic Substances. 2009. p 27.

[2] Campo P., Venet T., Thomas A., Cour C., Brochard C., Cosnier F. Neuropharmacological and cochleotoxic effects of styrene. Consequences on noise exposures. Neurotoxicol Teratol. 2014 Jul-Aug; 44:113-20.

[3] Occupational Safety and Health Administration. OSHA Technical Manual. Appendix D-3.

[4] European Agency for Safety and Health at Work. Combined Exposure to Noise and Ototoxic Substances. 2009. p 9.

[5] Johnson, A.C. and T.C. Morata. Occupational exposure to chemicals and hearing impairment, in Arbete och Hälsa, The Nordic Expert Group, Editor. 2010: Gothenburg. p. 1. Available at http://hdl.handle.net/2077/23240

[6] European Agency for Safety and Health at Work. Combined Exposure to Noise and Ototoxic Substances. 2009. p 17.

[7] Morata T.C., Dunn D.E., Sieber W.K. Occupational exposure to noise and ototoxic organic solvents. Archives of Environmental Health, 1994; 49(5):359-365.

ATTACHMENT 5

OSHA Fact Sheet: Lightning Safety When Working Outdoors

FactSheet

Lightning Safety When Working Outdoors

Lightning strikes can severely injure or kill workers whose jobs involve working outdoors. Lightning is often overlooked as an occupational hazard, but employers need awareness about lightning hazards to ensure their workers' safety. This fact sheet provides employers and workers at outdoor worksites with lightning safety recommendations from the Occupational Safety and Health Administration (OSHA) and the National Oceanic and Atmospheric Administration (NOAA).

Introduction

Lightning is a dangerous natural force. Annually in the United States, cloud-to-ground lightning occurs 20 to 25 million times and over 300 people are struck by lightning. During the past 30 years, about 50 people, on average, have been killed by lightning strikes every year, and many more suffer permanent disabilities.

Precautions should be taken to prevent worker exposure to lightning. Employers should recognize lightning as an occupational hazard. Supervisors and workers at outdoor worksites should take lightning safety seriously.

Workers whose jobs involve working outdoors in open spaces, on or near tall objects, or near explosives or conductive materials (e.g., metal) have significant exposure to lightning risks. Worker activities at higher risk for lightning hazards include:

- Logging
- Explosives handling or storage
- Heavy equipment operation
- Roofing
- Construction (e.g., scaffolding)
- Building maintenance
- Power utility field repair
- Steel erection/telecommunications
- Farming and field labor
- Plumbing and pipe fitting
- Lawn services/landscaping
- Airport ground personnel operations
- Pool and beach lifeguarding

Photo: NOAA

Figure 1: Lightning strikes tall tree.

Reducing Lightning Hazards When Working Outdoors

Employers, supervisors, and workers should understand lightning risks, characteristics, and precautions to minimize workplace hazards. Lightning is unpredictable and can strike outside the heaviest rainfall areas or even up to 10 miles from any rainfall.

Many lightning victims are caught outside during a storm because they did not act promptly to get to a safe place, **or they go back outside too soon after a storm has passed**. If signs of approaching thunderstorms occur, workers should not begin any task they cannot quickly stop. Proper planning and safe practices can easily increase lightning safety when working outdoors.

When thunder roars, go indoors!

If you hear thunder, even a distant rumble, get to a safe place immediately.

Thunderstorms always include lightning. Any thunder you hear is caused by lightning!

NOAA advises that nowhere outside is safe when thunderstorms are in your area.

OSHA and NOAA recommend that employers and supervisors follow these lightning safety best practices for workers whose jobs involve working outdoors:

Check NOAA Weather Reports: Prior to beginning any outdoor work, employers and supervisors should check NOAA weather reports (weather.gov) and radio forecasts for all weather hazards. OSHA recommends that employers consider rescheduling jobs to avoid workers being caught outside in hazardous weather conditions. When working outdoors, supervisors and workers should continuously monitor weather conditions. Watch for darkening clouds and increasing wind speeds, which can indicate developing thunderstorms. Pay close attention to local television, radio, and Internet weather reports, forecasts, and emergency notifications regarding thunderstorm activity and severe weather.

Photo: NOAA

Figure 2: Lightning strikes a communications tower.

Seek Shelter in Buildings: Employers and supervisors should know and tell workers which buildings to go to after hearing thunder or seeing lightning. NOAA recommends seeking out fully enclosed buildings with electrical wiring and plumbing. Remain in the shelter for at least **30 minutes** after hearing the last sound of thunder.

Vehicles as Shelter: If safe building structures are not accessible, employers should guide workers to hard-topped metal vehicles with rolled up windows. Remain in the vehicle for at least **30 minutes** after hearing the last sound of thunder.

Phone Safety: After hearing thunder, do not use corded phones, except in an emergency. Cell phones and cordless phones may be used safely.

Emergency Action Plan

Employers should have a written Emergency Action Plan (EAP), as outlined in 29 CFR 1910.38 or 29 CFR 1926.35. The EAP should include a written lightning safety protocol for outdoor workers. This lightning safety protocol should:

- Inform supervisors and workers to take action after hearing thunder, seeing lightning, or perceiving any other warning signs of approaching thunderstorms.
- Indicate how workers are notified about lightning safety warnings.
- Identify locations and requirements for safe shelters.
- Indicate response times necessary for all workers to reach safe shelters.
- Specify approaches for determining when to suspend outdoor work activities, and when to resume outdoor work activities.
- Account for the time required to evacuate customers and members of the public, and the time needed for workers to reach safety.

Employers should also post information about lightning safety at outdoor worksites. All employees should be trained on how to follow the EAP, including the lightning safety procedures.

Photo: NOAA

Figure 3: Cranes are especially vulnerable to lightning.

What is lightning?

Lightning is a giant spark of electricity in the atmosphere between clouds or between a cloud and the ground.

Lightning can occur:

- Between the cloud and the ground (cloud-to-ground lightning)
- Within and between thunderstorm clouds (intra- and inter-cloud lightning)

For more information, see: www.nssl.noaa.gov/education/svrwx101/lightning/faq

Lightning Safety Training

Employers should adequately train all workers on lightning safety. Training should be provided for each outdoor worksite, so that supervisors and workers know in advance where a worksite's safe shelters are and the time it takes to reach them. Employers should train supervisors and workers to provide lightning safety warnings in sufficient time for everyone to reach a worksite's safe shelters and take other appropriate precautions.

Lightning Warning Systems

An employer's EAP may include lightning warning or detection systems, which can provide advance warning of lightning hazards. However, no systems can detect the "first strike," detect all lightning, or predict lightning strikes. NOAA recommends that employers first rely on NOAA weather reports, including NOAA Weather Radio All Hazards: www.nws.noaa.gov/nwr.

Photo: NOAA

Figure 4: Preparedness reduces lightning risks.

(For NOAA toolkits for organizations and large venues see: www.lightningsafety.noaa.gov/toolkits.shtml)

Commercial lightning detection and notification services are available to monitor for lightning activity. These notification services can send alerts when lightning activity develops or moves to within a certain range of a work site. In addition, these commercial systems can provide mapped locations of lightning strikes from an approaching storm. However, these systems cannot predict the first lightning strike. Consequently, it is important to watch the sky for storms developing overhead or nearby and get to a safe place prior to the first lightning strike.

Portable and hand-held lightning detectors function by detecting the electromagnetic signal from a nearby lightning strike and then processing the signal to estimate the distance to the lightning strike. These devices typically do not detect all strikes, cannot predict the first strike, cannot provide the location of a strike, and are less accurate than the commercial detection and notification systems. In some cases, simply listening for thunder or watching the sky may be a better indication of a developing or nearby storm.

For situations which require advance notice of thunderstorms, NOAA recommends monitoring forecasts and radar observations from either commercial weather services or NOAA to stay informed of changing weather conditions.

If Caught Outside in a Thunderstorm

If you find yourself caught outside during a thunderstorm, there may be nothing you can do to prevent being struck by lightning. There simply is no safe place outside in a thunderstorm. This is why it is very important to get to a safe place at the first signs of a thunderstorm. If you are caught outside follow NOAA's recommendations to decrease the risk of being struck.

- Lightning is likely to strike the tallest objects in a given area—you should not be the tallest object.
- Avoid isolated tall trees, hilltops, utility poles, cell phone towers, cranes, large equipment, ladders, scaffolding, or rooftops.
- Avoid open areas, such as fields. Never lie flat on the ground.
- Retreat to dense areas of smaller trees that are surrounded by larger trees, or retreat to low-lying areas (e.g., valleys, ditches) but watch for flooding.
- Avoid water, and immediately get out of and away from bodies of water (e.g., pools, lakes).

Water does not attract lightning, but it is an excellent conductor of electricity. For boating safety see NOAA PA 200252.

- Avoid wiring, plumbing, and fencing. Lightning can travel long distances through metal, which is an excellent conductor of electricity. Stay away from all metal objects, equipment, and surfaces that can conduct electricity.
- Do not shelter in sheds, pavilions, tents, or covered porches as they do not provide adequate protection from lightning.
- Seek fully-enclosed, substantial buildings with wiring and plumbing. In modern buildings, the *interior* wiring and plumbing will act as an earth ground. A building is a safe shelter as long as you are not in contact with anything that can conduct electricity (e.g., electrical equipment or cords, plumbing fixtures, corded phones). Do not lean against concrete walls or floors (which may have metal bars inside).

OSHA Standards

Under the General Duty Clause, Section 5(a)(1) of the *Occupational Safety and Health Act of 1970* (OSH Act), employers are required to provide their employees with a place of employment that "is free from recognizable hazards that are causing or likely to cause death or serious harm to employees." The courts have interpreted OSHA's general duty clause to mean that an employer has a legal obligation to provide a workplace free of conditions or activities that either the employer or industry recognizes as hazardous and that cause, or are likely to cause, death or serious physical harm to employees when there is a feasible method to abate the hazard. This includes lightning hazards that can cause death or serious bodily harm.

During storms or high winds, OSHA prohibits:

- work on or from scaffolds (29 CFR 1926.451(f)(12));
- crane hoists (29 CFR 1926.1431(k)(8)); and
- work on top of walls (29 CFR 1926.854(c)).

In these situations, scaffold work may continue only if a qualified person determines it is safe and personal fall protection or wind screens are provided. Crane hoists may continue only if a qualified person determines it is safe.

Helpful Resources

- NOAA Lightning Safety on the Job, www.lightningsafety.noaa.gov/job.shtml
- National Fire Protection Association (NFPA):
- *NFPA 780: Standard for the Installation of Lightning Protection Systems*, 2014 Edition, www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=780
- National Lightning Safety Institute, lightningsafety.com
- National Aeronautics and Space Administration (NASA), Global Hydrology Resource Center, Lightning and Atmospheric Electricity Research, thunder.msfc.nasa.gov
- Transportation Research Board of the National Academies,a*Protecting Airport Personnel from*
- *Lightning Strikes,* onlinepubs.trb.org/onlinepubs/acrp/acrp_iop_004.pdf

Contact NOAA

For information on lightning safety, or to obtain data, educational and outreach materials, and posters, visit NOAA's lightning safety website: www.lightningsafety.noaa.gov or the wrn program at noaa.gov/wrn. Contact NOAA at wrn.feedback@noaa.gov. Examples of data available from NOAA are provided below.

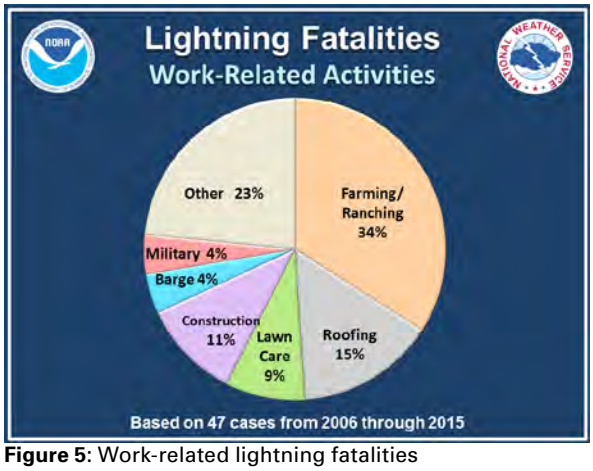


Figure 5: Work-related lightning fatalities

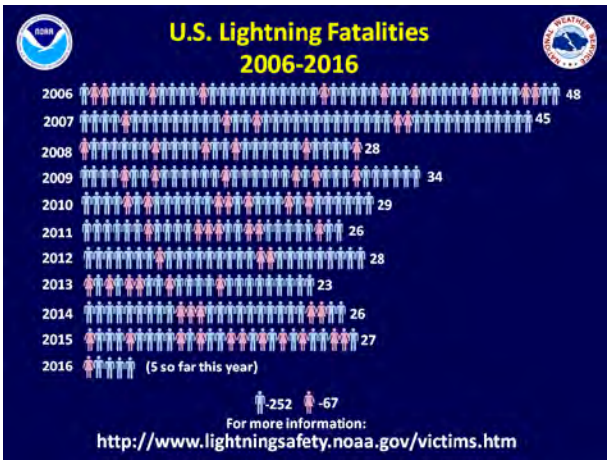


Figure 6: Annual lightning fatalities

Contact OSHA

For more information, to report an emergency, fatality, inpatient hospitalization, amputation, or loss of an eye, or to file a confidential compliant, or to request OSHA's free On-site Consultation Program services for small and medium-sized businesses, contact your nearest OSHA office, visit www.osha.gov, or call OSHA at 1-800-321-OSHA (6742), TTY 1-877-889-5627.

Workers' Rights

Workers have the right to:

- Working conditions that do not pose a risk of serious harm.
- Receive information and training (in a language and vocabulary the worker understands) about workplace hazards, methods to prevent them, and the OSHA standards that apply to their workplace.
- Review records of work-related injuries and illnesses.
- File a complaint asking OSHA to inspect their workplace if they believe there is a serious hazard or that their employer is not following OSHA's rules. OSHA will keep all identities confidential.
- Exercise their rights under the law without retaliation, including reporting an injury or raising health and safety concerns with their employer or OSHA. If a worker has been retaliated against for using their rights, they must file a complaint with OSHA as soon as possible, but no later than 30 days.

For more information, see OSHA's Workers page.

U.S. Department of Labor

Occupational Safety and Health Administration

OSHA - DTSEM FS-3863 05/2016

ATTACHMENT 6

OSHA Fact Sheet: Protecting Workers from the Effects of Heat

OSHA® FactSheet

Protecting Workers from the Effects of Heat

At times, workers may be required to work in hot environments for long periods. When the human body is unable to maintain a normal temperature, heat illnesses can occur and may result in death. It is also important to consider that hot work environments may exist indoors. This fact sheet provides information to employers on measures they should take to prevent worker illnesses and death caused by heat stress.

What is Heat Illness?

The following are illnesses that may result from exposure to heat in the workplace.

Heat Stroke is the most serious heat-related health problem. Heat stroke occurs when the body's temperature regulating system fails and body temperature rises to critical levels (greater than 104°F). ***This is a medical emergency that may result in death!*** The signs of heat stroke are confusion, loss of consciousness, and seizures. Workers experiencing heat stroke have a very high body temperature and may stop sweating. If a worker shows signs of possible heat stroke, ***get medical help immediately***, and call 911. Until medical help arrives, move the worker to a shady, cool area and remove as much clothing as possible. Wet the worker with cool water and circulate the air to speed cooling. Place cold wet cloths, wet towels or ice all over the body or soak the worker's clothing with cold water.

Occupational Factors that May Contribute to Heat Illness

- High temperature and humidity
- Low fluid consumption
- Direct sun exposure (with no shade) or extreme heat
- Limited air movement (no breeze or wind)
- Physical exertion
- Use of bulky protective clothing and equipment

Heat Exhaustion is the next most serious heat-related health problem. The signs and symptoms of heat exhaustion are headache, nausea, dizziness, weakness, irritability, confusion, thirst, heavy sweating and a body temperature greater than 100.4°F. Workers with heat exhaustion should be removed from the hot area and given liquids to drink. Cool the worker with cold compresses to the head, neck, and face or have the worker wash his or her head, face and neck with cold water. Encourage frequent sips of cool water. Workers with signs or symptoms of heat exhaustion should be taken to a clinic or emergency room for medical evaluation and treatment. Make sure that someone stays with the worker until help arrives. If symptoms worsen, call 911 and get help immediately.

Heat Cramps are muscle pains usually caused by the loss of body salts and fluid during sweating. Workers with heat cramps should replace fluid loss by drinking water and/or carbohydrate-electrolyte replacement liquids (e.g., sports drinks) every 15 to 20 minutes.

Heat Rash is the most common problem in hot work environments. Heat rash is caused by sweating and looks like a red cluster of pimples or small blisters. Heat rash may appear on the neck, upper chest, groin, under the breasts and elbow creases. The best treatment for heat rash is to provide a cooler, less humid work environment. The rash area should be kept dry. Powder may be applied to increase comfort. Ointments and creams should ***not*** be used on a heat rash. Anything that makes the skin warm or moist may make the rash worse.

Prevention Made Simple: Program Elements

Heat Illness Prevention Program key elements include:

- A Person Designated to Oversee the Heat Illness Prevention Program
- Hazard Identification
- Water. Rest. Shade Message
- Acclimatization
- Modified Work Schedules
- Training
- Monitoring for Signs and Symptoms
- Emergency Planning and Response

Designate a Person to Oversee the Heat Stress Program

Identify someone trained in the hazards, physiological responses to heat, and controls. This person can develop, implement and manage the program.

Hazard Identification

Hazard identification involves recognizing heat hazards and the risk of heat illness due to high temperature, humidity, sun and other thermal exposures, work demands, clothing or PPE and personal risk factors.

Identification tools include: OSHA's Heat Smartphone App; a Wet Bulb Globe Thermometer (WBGT) which is a measure of heat stress in direct sunlight that takes into account temperature, humidity, wind speed, sun and cloud cover; and the National Weather Service Heat Index. Exposure to full sun can increase heat index values up to 15°F.

Water.Rest.Shade

Ensure that cool drinking water is available and easily accessible. (Note: Certain beverages, such as caffeine and alcohol can lead to dehydration.)

Encourage workers to drink a liter of water over one hour, which is about one cup every fifteen minutes.

Provide or ensure that fully shaded or air-conditioned areas are available for resting and cooling down.

Acclimatization

Acclimatization is a physical change that allows the body to build tolerance to working in the heat. It occurs by gradually increasing workloads and exposure and taking frequent breaks for water and rest in the shade. Full acclimatization may take up to 14 days or longer depending on factors relating to the individual, such as increased risk of heat illness due to certain medications or medical conditions, or the environment.

New workers and those returning from a prolonged absence should begin with 20% of the workload on the first day, increasing incrementally by no more than 20% each subsequent day.

During a rapid change leading to excessively hot weather or conditions such as a heat wave, even experienced workers should begin on the first day of work in excessive heat with 50% of the normal workload and time spent in the hot environment, 60% on the second day, 80% on day three, and 100% on the fourth day.

Modified Work Schedules

Altering work schedules may reduce workers' exposure to heat. For instance:

- Reschedule all non-essential outdoor work for days with a reduced heat index.
- Schedule the more physically demanding work during the cooler times of day;
- Schedule less physically demanding work during warmer times of the day;
- Rotate workers and split shifts, and/or add extra workers.
- Work/Rest cycles, using established industry guidelines.
- Stop work if essential control methods are inadequate or unavailable when the risk of heat illness is very high.

Keep in mind that very early starting times may result in increased fatigue. Also, early morning hours tend to have higher humidity levels.

Training

Provide training in a language and manner workers understand, including information on health effects of heat, the symptoms of heat illness, how and when to respond to symptoms, and how to prevent heat illness.

Monitoring for Heat Illness Symptoms

Establish a system to monitor and report the signs and symptoms listed on the previous page to improve early detection and action. Using a buddy system will assist supervisors when watching for signs of heat illness.

Emergency Planning and Response

Have an emergency plan in place and communicate it to supervisors and workers. Emergency plan considerations include:

- What to do when someone is showing signs of heat illness. This can make the difference between life and death.
- How to contact emergency help.
- How long it will take for emergency help to arrive and training workers on appropriate first-aid measures until help arrives.
- Consider seeking advice from a healthcare professional in preparing a plan.

Engineering Controls Specific to Indoor Workplaces

Indoor workplaces may be cooled by using air conditioning or increased ventilation, assuming that cooler air is available from the outside. Other methods to reduce indoor temperature include: providing reflective shields to redirect radiant heat, insulating hot surfaces, and decreasing water vapor pressure, e.g., by sealing steam leaks and keeping floors dry. The use of fans to increase the air speed over the worker will improve heat exchange between the skin surface and the air, unless the air temperature is higher than the skin temperature. However, increasing air speeds above 300 ft. per min. may actually have a warming effect. Industrial hygiene personnel can assess the degree of heat stress caused by the work environment and make recommendations for reducing heat exposure.

Additional information

For more information on this and other issues affecting workers or heat stress, visit: www.osha.gov/heat; www.cdc.gov/niosh/topics/heatstress; and www.noaa.gov/features/earthobs_0508/heat.html.

Workers have the right to working conditions that do not pose a risk of serious harm, to receive information and training about workplace hazards and how to prevent them, and to file a complaint with OSHA to inspect their workplace without fear of retaliation.

For more information about workers' rights, see OSHA's workers page at www.osha.gov/workers.html.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.

For assistance, contact us. We can help. It's confidential.

OSHA® Occupational Safety and Health Administration

www.osha.gov (800) 321-OSHA (6742)

U.S. Department of Labor

DTSEM FS-3743 08/2014

ATTACHMENT 7

OSHA Quick Card: Protecting Workers from Heat Stress

OSHA® QUICK CARD™

Protecting Workers from Heat Stress

Heat Illness

Exposure to heat can cause illness and death. The most serious heat illness is heat stroke. Other heat illnesses, such as heat exhaustion, heat cramps and heat rash, should also be avoided.

There are precautions that can be taken any time temperatures are high and the job involves physical work.

Risk Factors for Heat Illness

- High temperature and humidity, direct sun exposure, no breeze or wind
- Heavy physical labor
- No recent exposure to hot workplaces
- Low liquid intake
- Waterproof clothing

Symptoms of Heat Exhaustion

- Headache, dizziness, or fainting
- Weakness and wet skin
- Irritability or confusion
- Thirst, nausea, or vomiting

Symptoms of Heat Stroke

- May be confused, unable to think clearly, pass out, collapse, or have seizures (fits)
- May stop sweating

To Prevent Heat Illness:

- Establish a complete heat illness prevention program.
- Provide training about the hazards leading to heat stress and how to prevent them.
- Provide a lot of cool water to workers close to the work area. At least one pint of water per hour is needed.

U.S. Department of Labor

For more information:

OSHA® Occupational Safety and Health Administration

www.osha.gov (800) 321-OSHA (6742)

OSHA 3154-06R 2017

OSHA® QUICK CARD™

- Modify work schedules and arrange frequent rest periods with water breaks in shaded or air-conditioned areas.
- Gradually increase workloads and allow more frequent breaks for workers new to the heat or those that have been away from work to adapt to working in the heat (acclimatization).
- Designate a responsible person to monitor conditions and protect workers who are at risk of heat stress.
- Consider protective clothing that provides cooling.

How to Protect Workers

- Know signs/symptoms of heat illnesses; monitor yourself; use a buddy system.
- Block out direct sun and other heat sources.
- Drink plenty of fluids. Drink often and BEFORE you are thirsty. Drink water every 15 minutes.
- Avoid beverages containing alcohol or caffeine.
- Wear lightweight, light colored, loose-fitting clothes.

What to Do When a Worker is Ill from the Heat

- Call a supervisor for help. If the supervisor is not available, call 911.
- Have someone stay with the worker until help arrives.
- Move the worker to a cooler/shaded area.
- Remove outer clothing.
- Fan and mist the worker with water; apply ice (ice bags or ice towels).
- Provide cool drinking water, if able to drink.

IF THE WORKER IS NOT ALERT or seems confused, this may be a heat stroke. CALL 911 IMMEDIATELY and apply ice as soon as possible.

U.S. Department of Labor

For more information:

OSHA® Occupational Safety and Health Administration

www.osha.gov (800) 321-OSHA (6742)

ATTACHMENT 8

OSHA Quick Card: Protecting Workers from Cold Stress

OSHA® QUICK CARD™

Protecting Workers from Cold Stress

Cold temperatures and increased wind speed (wind chill) cause heat to leave the body more quickly, putting workers at risk of cold stress. Anyone working in the cold may be at risk, e.g., workers in freezers, outdoor agriculture and construction.

Common Types of Cold Stress

Hypothermia

- Normal body temperature (98.6°F) drops to 95°F or less.
- **Mild Symptoms:** alert but shivering.
- **Moderate to Severe Symptoms:** shivering stops; confusion; slurred speech; heart rate/breathing slow; loss of consciousness; death.

Frostbite

- Body tissues freeze, e.g., hands and feet. Can occur at temperatures above freezing, due to wind chill. May result in amputation.
- **Symptoms**: numbness, reddened skin develops gray/white patches, feels firm/hard, and may blister.

Trench Foot (also known as Immersion Foot)

- Non-freezing injury to the foot, caused by lengthy exposure to wet and cold environment. Can occur at air temperature as high as 60°F, if feet are constantly wet.
- **Symptoms**: redness, swelling, numbness, and blisters.

Risk Factors

- Dressing improperly, wet clothing/skin, and exhaustion.

For Prevention, Your Employer Should:

- Train you on cold stress hazards and prevention.
- Provide engineering controls, e.g., radiant heaters.
- Gradually introduce workers to the cold; monitor workers; schedule breaks in warm areas.

For more information:

OSHA® Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov (800) 321-OSHA (6742)

OSHA 3156-02R 2014

WORKPLACE SOLUTIONS

From the National Institute for Occupational Safety and Health

Preventing Cold-related Illness, Injury, and Death among Workers

Summary

Workers, both indoors and outdoors, in services, transportation, agriculture, construction, and other industries may be exposed to environmental cold stress that can lead to thermal discomfort and in some cases even severe injuries, illnesses, or death. The National Institute for Occupational Safety and Health (NIOSH) recommends that employers implement a cold-related illness and injury prevention program that includes preventive measures such as using engineering controls, establishing work/rest schedules, training workers about the hazards of working in cold environments, and providing appropriate cold-weather gear.

Description of Exposure

Workers who work in cold environments may be at risk of cold stress. Exposure to cold can be an uncomfortable and potentially dangerous situation. Health emergencies can occur in people who work outdoors or in an area that is purposefully kept cold, poorly insulated, or without heat. People who have previously experienced frostbite, sedentary workers, and those with poor circulation may be especially susceptible. For indoor workers, work in cold, damp conditions can be uncomfortable and may lead to declining work performance (i.e., a decline in cognitive function and dexterity) or result in cold-related illness or injury. Cold-related conditions can also worsen musculoskeletal injuries and vascular disorders. For outdoor workers, what constitutes cold stress can vary across different areas of the country. In regions where workers are unaccustomed to winter weather, near freezing temperatures are considered factors for cold stress. Whenever outdoor temperatures drop substantially and wind speed increases, heat leaves the body more rapidly. According to the American Conference of Governmental Industrial Hygienists (ACGIH®) Threshold Limit Values (TLV®), workers should be protected from exposure to cold so that the deep core temperature does not fall below 96.8°F (36°C) and to prevent frostbite to body extremities [ACGIH 2019]. Serious health problems can occur when the body is unable to stay warm enough.

Photo by MarianVejcik/Getty Images

Cold-related Illnesses and Injuries

Cold-related illnesses and injuries include chilblains, trench foot, frostbite, and hypothermia.

Chilblains. Chilblains are the painful inflammation of small blood vessels in the skin that occur in response to repeated exposure to cold but nonfreezing temperatures. Small blood vessels in the skin may become permanently damaged by cold temperatures, resulting in redness and itching during additional exposures. Symptoms of chilblains include redness, itching, possible blistering, inflammation, and possible ulceration in severe cases.

Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

Trench Foot. Trench foot is an injury of the feet after prolonged exposure to wet and cold-related conditions. Trench foot occurs because wet feet lose heat faster than dry feet. To prevent heat loss, the body constricts blood vessels in the feet, and then the skin tissue begins to die. Symptoms of trench foot include reddening of the skin, numbness, leg cramps, swelling, tingling pain, blisters or ulcers, bleeding under the skin, and gangrene (e.g., foot turns purple, blue, or gray).

Frostbite. Frostbite is an injury caused by freezing of the skin and deeper tissues, resulting in the loss of feeling and color in the affected areas. Frostbite can permanently damage body tissues, and severe cases can lead to amputation. Examples of risk factors for frostbite include contact with metal or water, dehydration, diabetes, smoking, alcohol abuse, sedating or judgment impairing medications, and prior history of frostbite. Symptoms of frostbite include numbness; tingling or stinging; aching; and bluish or pale, waxy skin. During treatment of frostbite and trench foot, avoid rubbing or putting pressure on affected areas, since that can damage tissue.

Hypothermia. When exposed to cold temperatures, the body loses heat faster than it can be produced. Prolonged exposure to cold causes internal body temperature to drop, resulting in a condition called hypothermia. Hypothermia affects brain function, making the victim unable to think clearly or move well (i.e., they may be unable to protect themselves from hazards, or experience slips, trips, and falls). This makes hypothermia particularly dangerous because a person may not recognize the symptoms and will be unable to make life-preserving decisions. Symptoms of hypothermia can depend on how long a person has been exposed to cold temperatures and individual variability.

Hypothermia Symptoms and First Aid

Early symptoms include shivering, fatigue, loss of coordination, confusion, and/or disorientation.

Late symptoms include no shivering, blue skin, dilated pupils, slowed pulse and breathing, and/or loss of consciousness.

If hypothermia is suspected, medical assistance should be requested immediately (e.g., call 911). Begin first aid by:

1. moving the worker to a warm room or vehicle,
2. removing wet clothing,
3. covering their body with loose, dry blankets, clothing, or towels (may use skin-to-skin contact or warm bottles or hot packs in armpits, sides of chest, and groin to increase body's temperature), and
4. providing warm, non-alcoholic beverages if the worker is conscious.

If the worker has no pulse, cardiopulmonary resuscitation (CPR) should be provided and continued during the warming attempts, until the person responds or medical aid becomes available. Chest compressions should not be performed for patients who manifest an organized rhythm on a cardiac monitor (e.g., automated external defibrillator [AED]), even if they have no palpable pulses and no other signs of life. The worker should be handled very gently and kept horizontal, because when cold, the heart is prone to ventricular fibrillation with any disturbance. Severely hypothermic patients have been known to survive neurologically intact after long periods (over an hour) in a state of "suspended animation" [State of Alaska DHSS 2014].

Photo by ilkercelik/Getty Images

Case Reports

Indoor Environment: Airline Catering Facility

In an airline catering facility cold room (approximately 40°F), meals were assembled at workstations in shifts lasting 3–8 hours [Ceballos et al. 2015; NIOSH 2014]. Because preparations sometimes required fine manual dexterity (e.g., thinly slicing fish, decorating with small garnishes), the workers preferred wearing thin gloves instead of thicker, better insulated gloves. The frozen food they handled caused their hands to become cold and numb. Drafts inside the cold room made some areas feel colder than others, and air velocities exceeded the recommended guidelines of 200 feet per minute (FPM) [ACGIH 2019]. In addition, the workers felt that their breaks were not long enough to warm up, or to change out of wet or sweat-dampened clothing. An evaluation of the cold room concluded that thermal comfort concerns perceived by workers might have resulted from workstation air drafts, insufficient use of personal protective equipment (e.g., better insulated gloves) due to dexterity concerns, work practices, and lack of knowledge about good health and safety practices. In an evaluation of a second airline catering facility where the temperature was approximately 40°F, workers reported that they

felt discomfort working in cold temperatures, particularly in the freezer or coolers [NIOSH 2015]. The reported findings suggest that language was a barrier to effective training and communication regarding workplace safety and health because employees came from 18 countries.

Outdoor Environment: Long Haul Driving Along Highway

In the winter of 2009, a 56-year-old male truck driver went to the emergency room seeking care [Alaska Trauma Registry]. He had come to Alaska after a long haul drive through Canada. Along his route, he had stopped to change a fuel filter. He accidentally splashed diesel fuel on his gloves, which froze to his hands as he worked outside along the highway. After arriving at his destination, he had to spend a night at the hospital receiving treatment for his frostbitten hands.

Outdoor Environment: Sheep Ranch

At 3:00 p.m., a 58-year-old woman (who was wearing tennis shoes, blue jeans, sweater, jacket, and gloves) and her husband left their sheep ranch headquarters to round up their animals and bring them in for protection from a major snow storm that was developing [NIOSH 1990]. The woman separated from her husband to chase down a second flock of sheep. Shortly afterward, a high wind arose and created whiteout conditions in the area. The husband was unable to locate the woman and returned to the ranch to obtain additional help. At 10:00 p.m., the sheriff's department, local volunteer fire department, emergency medical service, and search and rescue units became involved in the search. The search continued until 3:00 a.m., when it was decided to wait for daylight. At 7:45 a.m., the body of the woman was found. Autopsy results showed she had died from hypothermia.

Recommendations

Whether in an indoor or outdoor environment where cold stress conditions are possible, employers and workers should be aware of symptoms of cold-related illness and injury, not only in themselves but also in their coworkers, and be prepared to immediately notify their supervisor, provide first aid, and seek prompt medical assistance (e.g., call 911).

Prevention is the best way to avoid cold-related illness and injury. Employers and workers should follow the NIOSH recommendations below to reduce the risk of cold-related illness and injury.

All Cold Environments

Employers should:

- Train supervisors and workers to prevent, recognize, and treat cold-related illness and injury.
- Provide training in a language and vocabulary that the workers understand.
- Reduce workers' time spent in the cold environment.
- Reduce the physical demands of workers (e.g., use relief workers or rotate extra workers in and out of work for long, demanding jobs).
- Ensure access to warm areas and a place to change out of wet clothes.
- Encourage employees to take breaks to warm up when needed.
- Monitor workers in cold conditions and initiate a buddy system.
- Include a medical and environmental thermometer and chemical hot packs in first aid kits.
- Participate in joint management/employee safety committees.
- Provide appropriate cold weather gear such as hats, gloves, and boots for work in cold environments.
- Provide wind protective clothing based on air velocities.
- Provide prompt medical attention to workers who show signs of cold-related illness or injury.

Workers should:

- Take regular breaks to warm up.
- Monitor their physical condition and that of coworkers.
- Stay hydrated by drinking lots of water; warm beverages may help increase body temperature.
- Stay well nourished by snacking on high carbohydrate foods.
- Avoid touching cold metal or wet surfaces with bare skin.

Photo by sorn340/Getty Images

- Report signs and symptoms of cold-related illness and injury to supervisors and medical staff immediately.
- Participate in joint management/employee safety committees.
- Carry extra cold weather gear, such as a change of clothes, in case work clothing gets wet.
- Wear several layers of loose clothing for better insulation; take layers off if you begin to sweat and put them back on when you cool down. Inner layers should be wool or synthetic fabrics to wick away moisture; outer layers should be wind and water-resistant.
- Avoid wearing wet clothes.
- Protect the ears, face, hands, and feet by wearing hats, gloves, socks, and boots.

Indoor Environments

Employers should:

- Install equipment to reduce drafts and condensation.
- Provide warm water or dry air heaters outside cold rooms for workers to warm their hands.
- Minimize air velocity and not exceed 200 FPM.
- Perform preventative maintenance on a regular schedule and make repairs if heating systems are not working properly.
- Rotate employees to different tasks after every break.
- Minimize work requiring manual dexterity in cold rooms.
- Provide glove alternatives for workers inside cold rooms (e.g., glove liners or fingerless gloves to wear under plastic gloves).

Photo by wabeno/Getty Images

Outdoor Environments

Employers should:

- Create a plan for assessing and acting on workplace hazards posed by sudden weather changes, such as dropping temperatures or increasing wind speeds.
- Schedule normal maintenance and repairs in cold areas for warmer months when possible.
- Schedule cold jobs for the warmer part of the day.
- Ensure that workers traveling through or working in remote areas have appropriate cold-weather survival equipment (e.g., emergency communications equipment such as a personal locator beacon or satellite phone).

Acknowledgments

The principal contributors to this publication were Brenda Jacklitsch, PhD, MS, of the NIOSH Division of Science Integration (DSI) and Diana Ceballos, PhD, MS, CIH, of the Harvard T.H. Chan School of Public Health (formerly with NIOSH).

Suggested Citation

NIOSH [2019]. Preventing cold-related illness, injury, and death among workers. By Jacklitsch B, Ceballos D. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. DHHS (NIOSH) Publication No. 2019-113, DOI: https://doi.org/10.26616/NIOSHPUB2019113.

References

ACGIH [2019]. TLVs® and BEIs® based on documentation of the threshold limit values for chemical substances and physical agents & biological exposure indices. Cincinnati, OH: American Conference of Governmental Industrial Hygienists.

Alaska Trauma Registry, http://dhss.alaska.gov/dph Emergency/Pages/trauma/registry.aspx. Accessed November 2016.

Ceballos D, Mead K, Ramsey J [2015]. Recommendations to improve employee thermal comfort when working in 40°F refrigerated cold rooms. J Occup Environ Hyg *12*(9):D2216.

NIOSH [1990]. Wife of a sheep rancher was fatally injured while attempting to round up a flock of sheep. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. Fatality Assessment and Control Evaluation (FACE) Investigation Report No. 90CO024.

NIOSH [2008]. NIOSH safety and health topic: cold stress. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, www.cdc.gov/niosh/topics/coldstress.

NIOSH [2010]. NIOSH fast facts: protecting yourself from cold stress. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and

Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2010–115, www.cdc.gov/niosh/docs/2010-115/pdfs/2010-115.pdf.

NIOSH [2014]. Health hazard evaluation report: evaluation of ergonomic risk factors, thermal exposures, and job stress at an airline catering facility. By Ramsey JG, Musolin K, Ceballos D, Wiegand D, Mead K. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, NIOSH HHE Report No. 2011-0131-3221.

NIOSH [2015]. Health hazard evaluation report: evaluation of ergonomic risk factors, acute traumatic injuries, and occupational exposures at an airline catering facility. By Ramsey J, Kawamoto M, Ceballos D, Wiegand DM. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, NIOSH HHE Report No. 2011-0131-3222.

OSHA [2014]. Emergency preparedness and response safety and health guidelines — cold stress guide. Washington, DC: U.S Department of Labor, Occupational Safety and Health Administration, https://www.osha.gov/SLTC/emergencypreparedness/guides/cold.html.

State of Alaska DHSS [2014]. Cold injuries guidelines. Juneau, AK: Department of Health and Social Services, Division of Public Health, Section of Emergency Programs, Emergency Medical Services (EMS) Program, http://dhss.alaska.gov/dph/Emergency/Documents/ems/documents/Alaska%20DHSS%20EMS%20Cold%20Injuries%20Guidelines%20June%202014.pdf.

For More Information

Information about ***Cold Stress*** can be found on the following website:

https://www.cdc.gov/niosh/topics/coldstress/

1-800-CDC-INFO (1-800-232-4636)
TTY: 1-888-232-6348
CDC/NIOSH INFO: cdc.gov/info | cdc.gov/niosh
Monthly *NIOSH eNews*: https://www.cdc.gov/niosh/eNews.

Mention of any company or product does not constitute endorsement by NIOSH. In addition, citations to websites external to NIOSH do not constitute NIOSH endorsement of the sponsoring organizations or their programs or products. Furthermore, NIOSH is not responsible for the content of these websites.

As part of the Centers for Disease Control and Prevention, NIOSH is the federal agency responsible for conducting research and making recommendations to prevent work-related illness and injuries. All ***Workplace Solutions*** are based on research studies that show how worker exposures to hazardous agents or activities can be significantly reduced.

DOI: https://doi.org/10.26616/NIOSHPUB2019113
DHHS (NIOSH) Publication No. 2019-113

September 2019

OSHA® QUICK CARD™

How to Protect Yourself and Others

- Know the symptoms; monitor yourself and co-workers.
- Drink warm, sweetened fluids (no alcohol).
- Dress properly:
  - Layers of loose-fitting, insulating clothes
  - Insulated jacket, gloves, and a hat (waterproof, if necessary)
  - Insulated and waterproof boots

What to Do When a Worker Suffers from Cold Stress

For Hypothermia:

- Call 911 immediately in an emergency.
- To prevent further heat loss:
  - Move the worker to a warm place.
  - Change to dry clothes.
  - Cover the body (including the head and neck) with blankets, and with something to block the cold (e.g., tarp, garbage bag). Do **not** cover the face.
- If medical help is more than 30 minutes away:
  - Give warm, sweetened drinks if alert (no alcohol).
  - Apply heat packs to the armpits, sides of chest, neck, and groin. Call 911 for additional rewarming instructions.

For Frostbite:

- Follow the recommendations "**For Hypothermia**".
- Do not rub the frostbitten area.
- Avoid walking on frostbitten feet.
- Do not apply snow/water. Do not break blisters.
- Loosely cover and protect the area from contact.
- Do not try to rewarm the area unless directed by medical personnel.

For Trench (Immersion) Foot:

- Remove wet shoes/socks; air dry (in warm area); keep affected feet elevated and avoid walking. Get medical attention.

For more information:

OSHA® Occupational Safety and Health Administration

U.S. Department of Labor

www.osha.gov (800) 321-OSHA (6742)

ATTACHMENT 9

Safety Data Sheets

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

1 Identification of the substance/mixture and of the supplier

1.1 Product identifier

Trade Name: Alconox
Synonyms:
Product number: Alconox

1.2 Application of the substance / the mixture : Cleaning material/Detergent

1.3 Details of the supplier of the Safety Data Sheet

Manufacturer	**Supplier**
Alconox, Inc. 30 Glenn Street White Plains, NY 10603 1-914-948-4040	Not Applicable

Emergency telephone number:
ChemTel Inc
North America: 1-800-255-3924
International: 01-813-248-0585

2 Hazards identification

2.1 Classification of the substance or mixture:

In compliance with EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments.

Hazard-determining components of labeling:
Tetrasodium Pyrophosphate
Sodium tripolyphosphate
Sodium Alkylbenzene Sulfonate

2.2 Label elements:

Skin irritation, category 2.
Eye irritation, category 2A.

Hazard pictograms:

Signal word: Warning

Hazard statements:
H315 Causes skin irritation.
H319 Causes serious eye irritation.

Precautionary statements:
P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P321 Specific treatment (see supplemental first aid instructions on this label).
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P501 Dispose of contents and container as instructed in Section 13.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

Additional information: None.

Hazard description

Hazards Not Otherwise Classified (HNOC): None

Information concerning particular hazards for humans and environment:

The product has to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.

Classification system:

The classification is according to EC regulation No. 1272/2008, 29CFR1910/1200 and GHS Rev. 3 and amendments, and extended by company and literature data. The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

3 Composition/information on ingredients

3.1 Chemical characterization : None

3.2 Description : None

3.3 Hazardous components (percentages by weight)

Identification	Chemical Name	Classification	Wt. %
CAS number: 7758-29-4	Sodium tripolyphosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	12-28
CAS number: 68081-81-2	Sodium Alkylbenzene Sulfonate	Acute Tox. 4; H303 Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	8-22
CAS number: 7722-88-5	Tetrasodium Pyrophosphate	Skin Irrit. 2 ; H315 Eye Irrit. 2; H319	2-16

3.4 Additional Information : None.

4 First aid measures

4.1 Description of first aid measures

General information: None.

After inhalation:

Maintain an unobstructed airway.

Loosen clothing as necessary and position individual in a comfortable position.

After skin contact:

Wash affected area with soap and water.

Seek medical attention if symptoms develop or persist.

After eye contact:

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.

Remove contact lens(es) if able to do so during rinsing.

Seek medical attention if irritation persists or if concerned.

After swallowing:

Rinse mouth thoroughly.

Seek medical attention if irritation, discomfort, or vomiting persists.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

4.2 Most important symptoms and effects, both acute and delayed

None

4.3 Indication of any immediate medical attention and special treatment needed:

No additional information.

5 Firefighting measures

5.1 Extinguishing media

Suitable extinguishing agents:

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

For safety reasons unsuitable extinguishing agents : None

5.2 Special hazards arising from the substance or mixture :

Thermal decomposition can lead to release of irritating gases and vapors.

5.3 Advice for firefighters

Protective equipment:

Wear protective eye wear, gloves and clothing.
Refer to Section 8.

5.4 Additional information :

Avoid inhaling gases, fumes, dust, mist, vapor and aerosols.
Avoid contact with skin, eyes and clothing.

6 Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures :

Ensure adequate ventilation.
Ensure air handling systems are operational.

6.2 Environmental precautions :

Should not be released into the environment.
Prevent from reaching drains, sewer or waterway.

6.3 Methods and material for containment and cleaning up :

Wear protective eye wear, gloves and clothing.

6.4 Reference to other sections : None

7 Handling and storage

7.1 Precautions for safe handling :

Avoid breathing mist or vapor.
Do not eat, drink, smoke or use personal products when handling chemical substances.

7.2 Conditions for safe storage, including any incompatibilities :

Store in a cool, well-ventilated area.

7.3 Specific end use(s):

No additional information.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

8 Exposure controls/personal protection

8.1 Control parameters :

7722-88-5, Tetrasodium Pyrophosphate, OSHA TWA 5 mg/m3.

8.2 Exposure controls

Appropriate engineering controls:

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.

Respiratory protection:

Not needed under normal conditions.

Protection of skin:

Select glove material impermeable and resistant to the substance.

Eye protection:

Safety goggles or glasses, or appropriate eye protection.

General hygienic measures:

Wash hands before breaks and at the end of work.
Avoid contact with skin, eyes and clothing.

9 Physical and chemical properties

Appearance (physical state, color):	White and cream colored flakes - powder	**Explosion limit lower:** **Explosion limit upper:**	Not determined or not available. Not determined or not available.
Odor:	Not determined or not available.	**Vapor pressure at 20°C:**	Not determined or not available.
Odor threshold:	Not determined or not available.	**Vapor density:**	Not determined or not available.
pH-value:	9.5 (aqueous solution)	**Relative density:**	Not determined or not available.
Melting/Freezing point:	Not determined or not available.	**Solubilities:**	Not determined or not available.
Boiling point/Boiling range:	Not determined or not available.	**Partition coefficient (n-octanol/water):**	Not determined or not available.
Flash point (closed cup):	Not determined or not available.	**Auto/Self-ignition temperature:**	Not determined or not available.
Evaporation rate:	Not determined or not available.	**Decomposition temperature:**	Not determined or not available.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

Flammability (solid, gaseous):	Not determined or not available.	**Viscosity**:	a. Kinematic: Not determined or not available. b. Dynamic: Not determined or not available.
Density at 20°C:	Not determined or not available.		

10 Stability and reactivity

10.1 Reactivity : None

10.2 Chemical stability : None

10.3 Possibility hazardous reactions : None

10.4 Conditions to avoid : None

10.5 Incompatible materials : None

10.6 Hazardous decomposition products : None

11 Toxicological information

11.1 Information on toxicological effects :

Acute Toxicity:

Oral:

: LD50 > 5000 mg/kg oral rat - Product .

Chronic Toxicity: No additional information.

Skin corrosion/irritation:

Sodium Alkylbenzene Sulfonate: Causes skin irritation. .

Serious eye damage/irritation:

Sodium Alkylbenzene Sulfonate: Causes serious eye irritation .

Tetrasodium Pyrophosphate: Rabbit - Risk of serious damage to eyes .

Respiratory or skin sensitization: No additional information.

Carcinogenicity: No additional information.

IARC (International Agency for Research on Cancer): None of the ingredients are listed.

NTP (National Toxicology Program): None of the ingredients are listed.

Germ cell mutagenicity: No additional information.

Reproductive toxicity: No additional information.

STOT-single and repeated exposure: No additional information.

Additional toxicological information: No additional information.

12 Ecological information

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

12.1 Toxicity:

Sodium Alkylbenzene Sulfonate: Fish, LC50 1.67 mg/l, 96 hours.
Sodium Alkylbenzene Sulfonate: Aquatic invertebrates, EC50 Daphnia 2.4 mg/l, 48 hours.
Sodium Alkylbenzene Sulfonate: Aquatic Plants, EC50 Algae 29 mg/l, 96 hours.
Tetrasodium Pyrophosphate: Fish, LC50 - other fish - 1,380 mg/l - 96 h.
Tetrasodium Pyrophosphate: Aquatic invertebrates, EC50 - Daphnia magna (Water flea) - 391 mg/l - 48 h.

12.2 Persistence and degradability: No additional information.

12.3 Bioaccumulative potential: No additional information.

12.4 Mobility in soil: No additional information.

General notes: No additional information.

12.5 Results of PBT and vPvB assessment:

PBT: No additional information.

vPvB: No additional information.

12.6 Other adverse effects: No additional information.

13 Disposal considerations

13.1 Waste treatment methods (consult local, regional and national authorities for proper disposal)

Relevant Information:

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities. (US 40CFR262.11).

14 Transport information

14.1 UN Number: ADR, ADN, DOT, IMDG, IATA	None
14.2 UN Proper shipping name: ADR, ADN, DOT, IMDG, IATA	None
14.3 Transport hazard classes: ADR, ADN, DOT, IMDG, IATA	**Class:** None **Label:** None **LTD. QTY:** None

US DOT

Limited Quantity Exception: None

Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.

Non Bulk:
RQ (if applicable): None
Proper shipping Name: None
Hazard Class: None
Packing Group: None
Marine Pollutant (if applicable): No additional information.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

	Comments: None	**Comments:** None
14.4	**Packing group:** ADR, ADN, DOT, IMDG, IATA	None
14.5	**Environmental hazards** :	None
14.6	**Special precautions for user:**	None
	Danger code (Kemler):	None
	EMS number:	None
	Segregation groups:	None
14.7	**Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code:**	Not applicable.
14.8	**Transport/Additional information:**	
	Transport category:	None
	Tunnel restriction code:	None
	UN "Model Regulation":	None

15 Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture.

North American

SARA

Section 313 (specific toxic chemical listings): None of the ingredients are listed.
Section 302 (extremely hazardous substances): None of the ingredients are listed.

CERCLA (Comprehensive Environmental Response, Clean up and Liability Act) Reportable

Spill Quantity: None of the ingredients are listed.

TSCA (Toxic Substances Control Act):

Inventory: All ingredients are listed.
Rules and Orders: Not applicable.

Proposition 65 (California):

Chemicals known to cause cancer: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for females: None of the ingredients are listed.

Chemicals known to cause reproductive toxicity for males: None of the ingredients are listed.

Chemicals known to cause developmental toxicity: None of the ingredients are listed.

Canadian

Canadian Domestic Substances List (DSL):
All ingredients are listed.

EU

REACH Article 57 (SVHC): None of the ingredients are listed

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

Germany MAK: Not classified.

Asia Pacific

Australia

Australian Inventory of Chemical Substances (AICS): All ingredients are listed.

China

Inventory of Existing Chemical Substances in China (IECSC): All ingredients are listed.

Japan

Inventory of Existing and New Chemical Substances (ENCS): All ingredients are listed.

Korea

Existing Chemicals List (ECL): All ingredients are listed.

New Zealand

New Zealand Inventory of Chemicals (NZOIC): All ingredients are listed.

Philippines

Philippine Inventory of Chemicals and Chemical Substances (PICCS): All ingredients are listed.

Taiwan

Taiwan Chemical Substance Inventory (TSCI): All ingredients are listed.

16 Other information

Abbreviations and Acronyms: None

Summary of Phrases

Hazard statements:

H315 Causes skin irritation.
H319 Causes serious eye irritation.

Precautionary statements:

P264 Wash skin thoroughly after handling.
P280 Wear protective gloves/protective clothing/eye protection/face protection.
P302+P352 If on skin: Wash with soap and water.
P305+P351+P338 If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.
P321 Specific treatment (see supplemental first aid instructions on this label).
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362 Take off contaminated clothing and wash before reuse.
P501 Dispose of contents and container as instructed in Section 13.

Manufacturer Statement:

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), 29CFR1910/1200 and GHS Rev. 3

Effective date: 12.08.2015 **Revision** : 12.10.2015

Trade Name: Alconox

HMIS: 1-0-0

ATTACHMENT 10

Novel Coronavirus Guidelines

DRAFT

Addendum to GSI Site-Specific Health and Safety Plan

Novel Coronavirus Guidelines

April 2020

GSI Water Solutions, Inc.

Contents

SECTION 1: **Introduction**

1.1 Novel Coronavirus

The novel coronavirus is a new coronavirus that has not been previously identified. The virus causing coronavirus disease 2019 (COVID-19) is not the same as the coronaviruses that commonly circulate among humans and cause mild illness, like the common cold. Patients with COVID-19 will be evaluated and cared for differently than patients with a diagnosis caused by a common coronavirus.

On February 11, 2020, the World Health Organization announced an official name for the disease that is causing the 2019 novel coronavirus outbreak, first identified in Wuhan, China. The new name of this disease is coronavirus disease 2019, abbreviated as COVID-19. In COVID-19, 'CO' stands for 'corona,' 'VI' for 'virus,' and 'D' for disease. Formerly, this disease was referred to as "2019 novel coronavirus" or "2019-nCoV."

There are many types of human coronaviruses, including some that commonly cause mild upper-respiratory tract illnesses. COVID-19 is a new disease, caused be a novel (or new) coronavirus that has not previously been seen in humans.

1.2 Spreading COVID-19

The virus that causes COVID-19 seems to be spreading easily and sustainably in the community ("community spread") in some affected geographic areas. Community spread means people have been infected with the virus in an area, including some who are not sure how or where they became infected.

The virus that causes COVID-19 is spreading from person-to-person. Someone who is actively sick with COVID-19 can spread the illness to others. That is why CDC recommends that sick individuals be isolated either in the hospital or at home (depending on how sick they are) until they are better and no longer pose a risk of infecting others.

How long someone is actively sick can vary so the decision on when to release someone from isolation is made on a case-by-case basis in consultation with doctors, infection prevention and control experts, and public health officials, and involves considering specifics of each situation, including disease severity, illness signs and symptoms, and results of laboratory testing for that patient.

In addition, it is possible to contract the novel coronavirus and be asymptomatic, but potentially spread the virus. If you suspect or know you have had potential exposure to someone with COVID-19 symptoms or a positive result, you should self-isolate for 14 days.

1.3 Symptoms

According to the United States Center for Disease Control (CDC), reported illnesses have ranged from mild symptoms to severe illness and death for confirmed COVID-19 cases.

The below symptoms may appear 2–14 days after exposure (based on the incubation period of MERS-CoV viruses).

- Fever
- Cough
- Shortness of breath

If you develop emergency warning signs for COVID-19, get medical attention immediately. Emergency warning signs include*:

- Trouble breathing
- Persistent pain or pressure in the chest
- New confusion or inability to arouse
- Bluish lips or face

*This list is not inclusive. Please consult your medical provider for any other symptoms that are severe or concerning.

1.4 People at Higher Risk for COVID-19

COVID-19 is a new disease and there is limited information regarding risk factors for severe disease. Based on currently available information and clinical expertise, older adults and people of any age who have serious underlying medical conditions might be at higher risk for severe illness from COVID-19.

Based upon available information to date, those at high-risk for severe illness from COVID-19 include:

- People aged 65 years and older
- People who live in a nursing home or long-term care facility
- Other high-risk conditions could include:
    - People with chronic lung disease or moderate to severe asthma.
    - People who have serious heart conditions.
    - People who are immunocompromised. Many conditions can cause a person to be immunocompromised.
    - People of any age with severe obesity (body mass index [BMI] > 40) or certain underlying medical conditions, particularly if not well controlled, such as diabetes, renal failure, or liver disease.
    - People who are pregnant should be monitored since they are known to be at risk for severe viral illness, however, to date data on COVID-19 has not shown increased risk.

SECTION 2: **Safe Work Practices**

The novel coronavirus outbreak is an ongoing and continually changing health crisis response. Detailed recommendations and work restrictions should be reviewed on a daily basis during field activities to ensure no changes have occurred. The primary source of information should be based upon the locality where work is being performed:

- **Oregon:** Oregon Health Authority https://govstatus.egov.com/OR-OHA-COVID-19
- **California:** California Department of Public Health https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/Immunization/ncov2019.aspx
- **Washington:** Washington State Department of Health https://www.coronavirus.wa.gov/

Supplemental or additional facts and information can be obtained through the CDC. https://www.cdc.gov/coronavirus/2019-nCoV/index.html

2.1 Worker Training

According to the Occupational Safety and Health Administration (OSHA) COVID-19 resource page (https://www.osha.gov/SLTC/covid-19/controlprevention.html#health), OSHA recommends training all workers with reasonably anticipated occupational exposure to COVID-19 about the sources of exposure to the virus, the hazards associated with that exposure, and appropriate workplace protocols in place to prevent or reduce the likelihood of exposure. Training should include information about how to isolate individuals with suspected or confirmed COVID-19 or other infectious diseases, and how to report possible cases. Training must be offered during scheduled work times and at no cost to the employee.

Workers required to use personal protective equipment (PPE) must be trained. This training includes when to use PPE; what PPE is necessary; how to properly don (put on), use, and doff (take off) PPE; how to properly dispose of or disinfect, inspect for damage, and maintain PPE; and the limitations of PPE. Applicable standards include the PPE (29 CFR 1910.132), Eye and Face Protection (29 CFR 1910.133), Hand Protection (29 CFR 1910.138), and Respiratory Protection (29 CFR 1910.134) standards.

2.2 Personal Sanitation

The following considerations should be taken at all times, with particular focus on activities conducted outside the home:

- Wash your hands often with soap and water for at least 20 seconds, especially after you have been in a public place, or after blowing your nose, coughing, or sneezing. This will require our field teams to keep extra water and sufficient soap on hand at project sites for hand washing. Dry hands using disposable, single-use paper towels or equivalent and must be immediately thrown into trash cans.
- If soap and water are not readily available, use a hand sanitizer that contains at least 60 percent alcohol. Cover all surfaces of your hands and rub them together until they feel dry. Hand sanitizer should be used as a backup to wash water or where water is no longer remaining or not available. Ensure sufficient supplies of hand sanitizers are available.
- Avoid touching your eyes, nose, and mouth with unwashed hands.
- Cover your mouth and nose with a tissue when you cough or sneeze or use the inside of your elbow. Throw used tissues in the trash. Immediately wash your hands with soap and water for at least 20 seconds or use a hand sanitizer that contains at least 60 percent alcohol.

- Wipe all potential personal contact surfaces down at the start of each workday and every time shared equipment is transferred between personnel.
- When supplies are available, use gloved hands for work activities throughout the day where hands may come into contact with common surfaces or where transfer of shared equipment between personnel is required. Donning and doffing of gloves should follow best practices to avoid touching the gloves' outer surfaces (pinch and pull glove from the outside for removal on the first hand and slide ungloved fingers under inside of glove for removal on second hand).
- Do not share food or drinking glasses or bottles. Consider packing meals for work rather than picking up food while at the project site. Do not share coolers between workers.

2.3 Social Distancing During Field Efforts

The following considerations should be taken when working with other personnel on a project site or when traveling to/from a project site:

- Keep a minimum of 6 feet from other workers at all times. While this may require creative project planning or detailed communications protocols to support social distancing, this is the most effective method to minimize transmission of the novel coronavirus.
- If more than one employee must travel to the project site, take separate vehicles. Do not switch vehicles during the course of the workday or over the course of the field event without fully sanitizing the vehicle before handing the vehicle over.
- Use video, photographic, email, text messaging, or telephonic communication methods with other office personnel or field personnel working in different areas of the project site versus in person discussions when at all possible.
- Avoid overnight stays at lodging establishments to the extent practical. If overnight stays are required, discuss with workforce and project management prior to securing arrangement. Consider alternatives like local subcontractor arrangements for oversight or daily return to the home base point. Any extended day with travel must balance safety from COVID-19 exposure with fatigue and safe driving considerations.

Other considerations during planning for or work at a project site, include considering:

- Implementing flexible meeting and travel options (e.g., postpone non-essential meetings or events).
- Downsizing operations.
- Delivering products through curbside pick-up or delivery.

2.4 Social Distancing in the Office

Until further notice, all GSI employees must work from home if they are able to. Those with position duties requiring them to work from a GSI office are instructed to:

- Avoid in-person meetings. Use online conferencing, email, or phone when possible, even when personnel are in the same building.
- Unavoidable in-person meetings should be short and conducted in large meeting rooms where people can sit at least six feet from each other. Do not shake hands.
- Eliminate unnecessary travel and cancel or postpone nonessential meetings, gatherings, workshops, and training sessions.

- Do not congregate in kitchens, conference rooms, or other areas where people typically socialize. Keep six feet apart when possible.

These instructions satisfy the requirements of paragraphs 9 and 10 from Executive Order 20-12 issued by Oregon State Governor, Kate Brown.

2.5 Package and Supply Deliveries

When the office has business-critical deliveries, the person making the delivery will be asked to leave the package(s)/cooler(s) in an area where employees are not present. If a signature is required, the employee will ensure they remain at least six feet away from the delivery driver and immediately wash their hands after using a signing wand. The receiving employee must also sanitize any hard non-porous surfaces of the delivery where potential contact with the package will be made. If handling without sanitizing a surface, immediately wash hands for at least 20 seconds after movement of the package.

2.6 Cutting/Samples/Cooler/Field Equipment Disinfection

Employees should disinfect all non-disposable materials, equipment, supplies, samples, and coolers of the end of each workday at a minimum, and more often as practical and appropriate. Disinfecting refers to using chemicals to kill germs on surfaces. This process does not necessarily clean dirty surfaces or remove germs, but by killing germs on a surface after cleaning, it can further lower the risk of spreading infection. Disinfection agents include:

- Bleach solution of at least 1/3 cup bleach per gallon of water (4 teaspoons per quart).
- Alcohol solution of at least 70 percent.
- EPA-registered household disinfectants. Products with EPA-approved emerging viral pathogens claims are expected to be effective against COVID-19 based on data for harder-to-kill viruses. https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2

Wipe all surfaces or spray down with a spray bottle or pump-sprayer until sufficiently doused with the disinfection agent. Allow surfaces to dry and wearing gloved hands, stage materials for future access by others.

2.7 Vehicular Use

The following requirements shall be observed when operating the GSI vehicle, a rental car, or personal vehicle:

- DO NOT COME TO WORK, USE A SHARED VEHICLE, OR ANY OTHER SHARED RESOURCES IF FEELING SICK.
- Ensure sufficient supplies of EPA-registered household disinfectant wipes (or other disinfectants as identified in Section 2.4) and disposable gloves are maintained in the company vehicle.
- Follow the following steps during initial use of the company vehicle:
    - Don disposable gloves.
    - Take company vehicle keys from drawer or storage location and wipe with sanitizing wipes
    - Using the remote unlock the vehicle.
    - Wipe the door handles with sanitizing wipes prior to entering the vehicle.
    - Wipe all hard surfaces that the worker has a potential to come into contact with.
    - Remove and dispose of gloves.

- Follow the following steps at the completion of use of the company vehicle:
    - Don disposable gloves.
    - Clean the inside of the vehicle.
    - Wipe all hard surfaces within the vehicle.
    - Wipe the outside of any sanitizing supplies or glove boxes employees may have come into contact with.
    - Ensure sufficient glove and sanitizing supplies are still available within the vehicle. Restock as needed.
    - Close and lock the doors.
    - Wipe the door handles in contact with when closing the doors.
    - Wipe company vehicle keys with sanitizing wipes and return to drawer or storage location.
    - Remove and dispose of gloves.
- When on the project site, ensure no other workers use the vehicle for rest, meals, or staging of supplies, except in the event of a heat or cold illness-related emergency or emergency transport to medical facilities.

2.8 Sick Policy

DO NOT come to work if you are sick for any reason.

- Inform your project manager (PM) that you are feeling sick as soon as possible. The PM will make a decision if another worker can support the effort or if work can continue without oversight. Even if you do not have COVID-19 symptoms, getting others sick at the project site may compromise the ability to continue operations. It could also create a safety risk if you are trying to perform work in a reduced capacity.
- If you suspect possible COVID-19 symptoms, speak to your physician or medical provider to determine if you should be tested for the novel coronavirus.
- Self-quarantine from the project site, office, and outside the home if tested until you have a confirmed negative result.
- If you receive a positive result, inform GSI Human Resources of other workers that you have been in close contact with.
- Do not return to the project site until medical clearance has been provided by your physician or health care provider.

SECTION 3: **Signatures**

I have read, understood, and agree to abide by the requirements presented in this health and safety plan addendum. I understand that if I recognize an unsafe condition affecting my work, I have the absolute right to stop work until the condition is corrected.

Name Printed	Signature	Date