Americas

Sediment Trap Sampling Project-Specific HASP Addendum

Location:	Portland Harbor Sediment Traps Sampling Area	**Date:**	March 21, 2018
Prepared By:	Linda Howard, Glen Mejia, Anthony Palmieri, Nicky Moody	**Approved By:**	Jennifer Pretare (AECOM), Fred Merrill (AECOM)

Summary of Sediment Trap Sampling

Four sediment traps will be installed upriver of the Site, which requires the use of commercial divers over four (1 to 3 day) events in April, June, September, and December 2018. Gravity is subcontracting with Global Diving to provide commercial divers for the sediment trap activities. The dive operations and sediment trap sampling will be conducted from Gravity's RV *Tieton* [32-foot].

Installation: The Global dive team, with support from Gravity, will install the sediment trap in two steps: 1) installation of the helical anchor, and 2) installation of the trap assembly. The helical anchor measures 28 inches in length and is spun/augured into the seabed manually by the diver. The helical anchor has a custom top mount that connects directly to the sediment trap assembly. Once the anchor is installed, the sediment trap assembly is lowered by the diver to the seabed and connected with four bolts to the helical anchor. The sediment trap assembly comprises four glass cylinders that are 6 inches in length and 30 inches in height with a HDPE plastic adapter plate to safely hold the cylinders. Prior to deployment of the cylinders, sodium azide at a concentration of 0.05 micromole (µmol) will be added to each tube to prevent biofouling. Cylinders will be capped until they are settled on the bottom, after which point caps will be removed.

Sampling: The Global dive team, with support from Gravity, will collect the sediment traps in June, September, and December 2018. The diver will cap each tube and remove the trap assembly from the anchor, which will remain in place. The assembly will be brought to the surface where the field team will process the samples. Tubes will first be decanted of water using a siphon hose. Then 1 quart of laboratory grade deionized (DI) water will be added, and sediments mixed into the water column, at which point the tubes will be removed from the assembly and the sediment/water mix will be poured into a glass carboy. The glass carboy will be transported to the processing facility for sample processing. After sampling is complete, the tubes will be decontaminated, re-installed, sodium azide prepared, and re-deployed.

Retrieval: The sediment traps will be processed identical to the quarterly sampling, as described above. For the final retrieval in December 2018, the dive team will reverse auger the helical mooring out of the seabed by spinning counter clockwise. The full assembly, including anchor, will be rinsed and stored.

Task Leads and Supervisors

Organization	Job Title/Role	Name	Cell Phone
AECOM	Task Lead Site Safety Officer Project Field Coordinator	Nicky Moody	(b) (6)
AECOM	Site Safety Officer Project Field Coordinator	Dave Hose	
Geosyntec	Project Field Coordinator	Keith Kroeger	
Geosyntec	Project Chemist	Julia Klens-Caprio	
AECOM	Project Chemist	Amy Dahl	
AECOM	Commercial Diving Safety Officer	Paul Patterson	

Supplemental List of Personnel, Short-Service Employees, Subcontractors and their Safety Officers

(*from Programmatic HASP Summary: the Project-Specific HASPs will list all short-service employees, including subcontractors that are scheduled to participate in Project activities*)

Organization	Job Title/Role	Name	Cell Phone	SSEs and Safety Officers
Gravity	Gravity Project Manager	Shawn Hinz	(b) (6)	Safety Officer
Gravity	Captain	Mike Duffield		
Gravity	Captain	Rene Trudeau		
Gravity	Captain	Peter Jenkins		
Gravity	Captain	John Schaefer		
Gravity	Deckhands/Scientist	Jeff Wilson		
Gravity	Deckhands/Scientist	Jeff Schut		
Gravity	Deckhands/Scientist	Chad Furulie		
Global Diving	Dive Supervisor	Erik Woltjen		Safety Officer
Global Diving	Diver/Tender	Kyle Pellett		
Global Diving	Diver/Tender	Jon Potts		
AECOM	Scientist	Mark Tauscher		
AECOM	Scientist	Michaela McCoog		

Organization	Job Title/Role	Name	Cell Phone	SSEs and Safety Officers
AECOM	Scientist	Jeremy Haney	(b) (6)	SSE (Mentor: Nicky Moody)
AECOM	Scientist	Bruce Cassem		
Geosyntec	Scientist	Alison Clements		

Supplemental List of Hazard Materials

(*from Section 3.7 Hazard Communications: Hazardous materials that may be encountered as existing environmental or physical/health contaminants will be addressed in the Project-Specific HASPs that will be appended to this Programmatic HASP, The Supervisor or Safety Officer will maintain copies of all SDS on-site and in Project-Specific HASPs appended to this HASP. SDS may not be available for locally obtained products, in which case an alternate form of product hazard documentation will be acceptable*)

Hazardous Materials
Sodium azide
Nitric acid
Methanol
Alconox

Housekeeping and Personal Hygiene

(*from Section 3.9 Housekeeping and Personal Hygiene: Designated Safety Officer for individual study (to be designated in Project-Specific HASPs)*

Designated Safety Officer	Organization	ell Phone
Nicky Moody	AECOM	(b) (6)
Dave Hose	AECOM	

Supplemental List of Competent Persons

(*from Section 5.3.1 Competent Persons: To be identified in the Project-Specific HASP Addendum*)

Operations	Organization	Job Title/Role	Name	Cell Phone
Safe Vessel Operations	Gravity	Captain	Mike Duffield	(b) (6)
Safe Vessel Operations	Gravity	Captain	Rene Trudeau	
Safe Vessel Operations	Gravity	Captain	Peter Jenkins	
Safe Vessel Operations	Gravity	Captain	John Schaefer	
Safe Diving Operations	Global Diving	Dive Supervisor	Erik Woltjen	
Safe Diving Operations	Global Diving	Diver/Tender	Kyle Pellett	
Safe Diving Operations	Global Diving	Diver/Tender	Jon Potts	

Supplemental List of CPR/First Aid Trained Personnel

(*from Section 12.4 CPR/First Aid Trained Personnel: CPR/First Aid Trained Personnel that will be on-site will be identified in the Project-Specific HASPs for each study*)

Organization	Job Title/Role	Name	Cell Phone	Training
AECOM	Site Safety Officer Project Field Coordinator	Nicky Moody	(b) (6)	CPR, First Aid, and AED
AECOM	Site Safety Officer Project Field Coordinator	Dave Hose		CPR, First Aid, and AED
AECOM	Scientist	Mark Tauscher		CPR, First Aid, and AED
AECOM	Scientist	Michaela McCoog		CPR, First Aid, and AED
AECOM	Scientist	Bruce Cassem		CPR, First Aid, and AED
Geosyntec	Scientist	Alison Clements		CPR, First Aid, and AED

Organization	Job Title/Role	Name	Cell Phone	Training

HASP Addendum Attachments:

Attachment 1. AECOM Pre-Job Hazard Assessment
Attachment 2. Gravity Health and Safety and Environmental Plan
Attachment 3. Sodium Azide Hazard Assessment and Operating Procedure
Attachment 4. Global Diving Health and Safety Plan and Job Safety Analysis Form
Attachment 5. Vessel Diagrams
Attachment 6. Safety Data Sheets

Pre-Job Hazard Assessment

S3AM-209-FM4

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
List principal activities involved in the scope of work	Identify each safety or health hazard		Identify engineering and administrative controls and any specific Personal Protective Equipment (PPE) that is required	
ACTIVITY 1 – Mobilize personnel and equipment to study area.	Traffic/driving hazards	10	• All AECOM drivers must have current driver awareness training (available on AECOM University) • All drivers must have current, valid driver's license on their person. • Complete pre-use visual inspection. Wa k around the vehicle to inspect for potential hazards or mechanical issues before driving. • Practice defensive driving and drive in a courteous manner. • Seat belts must be worn by the driver and all passengers. • Obey all speed limits. • Drivers must not use cellular telephones or other communication devices such as two-way radios unless safely parked. • Window surfaces must be cleared of any materials such as ice, frost, mud, or water that can impair visibility. • Travel with headlights on at all times. • Travel during daylight hours when possible. • Equip vehicles with first aid kit, fire extinguisher, flares or triangle, spare tire and jack, cell phone. • The project goal is to limit activities to no more than 10 hours/day; contact project manager if work days extend beyond the 10 hours.	5
	Fatigue	15	• Extended workdays can be granted; however, workdays shall not exceed 14 hours and extended work weeks, 60 hours/week. • For emergency work, a single shift should be limited to 16 hours, and an employee should be off work for at	3

Attachment 1. AECOM Pre-Job Hazard Assessment

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
			least 12 hours before the next shift starts. If shift work is required, employees should be given sufficient time to get a continuous 7- to 8-hour period of sleep in each 24 hours, and at least 50 hours every 7 days. • Safety Officer and team members will watch and intervene when individuals appear to be fatigued; contact the project manager if a team member appears fatigued. • Night work will not occur on this project. • A journey management plan will be established for team members traveling >250 miles.	
	Parking hazards	10	Park in a clear location, and back in to parking location to avoid backing out upon departure.	3
	Lifting hazards/muscle strain	10	• Practice proper lifting and manual handing of materials and equipment, lift with the knees, avoid twisting, and seek assistance or employ additional handling equipment as needed. • Wear abrasion gloves when moving equipment. • No personnel should lift more than 40 pounds without assistance or mechanical aid. Know what items weigh before lifting or test them carefully.	3
ACTIVITY 2 – Load personnel and equipment onto vessel.	Lack of knowledge of tasks being performed	10	• Discuss tasks to be performed by personnel, potential hazards, and control measures.	1
	Water hazards	10	• Follow all appropriate water safety rules and regulations. • Wear Type III or V Personal Flotation Device (PFD) or life jacket.	4
	Severe weather	9	• Assess severe weather hazards using National Oceanic and Atmospheric Administration (NOAA) resources before on-water work: • Stop work if lightning is <6 miles away (<30 seconds between lightning flash and hearing thunder). If storm is approaching, do not wait for it to arrive before implementing stop work action. • Stop Work during wind gusts sustained at 25 mph, and at all times where debris is vis ble flying in air. • Stop work during hail storms; seek shelter inside building or wheelhouse/vessel cabin.	1

Attachment 1. AECOM Pre-Job Hazard Assessment

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
	Vessel boarding hazards	10	• Receive vessel operator's training prior to boarding vessel. • Follow vessel operator's instructions for boarding vessel. • Wear a Type III or V PFD or life jacket. Maintain three points of contact when boarding vessel. • Follow vessel operator's instructions for loading equipment onto vessel.	4
	Pinch points/hand injuries	8	Be aware of hands, feet, arms, and position of all personnel during tool use and equipment handling. Never position a hand where it can be pinched. Examples of pinch point hazards include: • Between lines under tension and hard surfaces • Between vessel and dock • Between equipment and hard surfaces on vessel	4
	Slips, trips, and falls	8	• Wear appropriate safety-toed boots with non-slip soles. • Ensure pathways are clear and free of obstruction prior to initiating work, ensure all lines are secure prior to initiating work, and adhere to proper housekeeping practices. • Maintain three points of contact when boarding vessel.	4
ACTIVITY 3 – Work aboard a research vessel on water.	Slips, trips, and falls	8	• Wear appropriate safety-toed boots with non-slip soles. • Ensure pathways are clear and free of obstruction prior to initiating work, ensure all lines are secure prior to initiating work, and adhere to proper housekeeping practices. • Maintain three points of contact at all times.	4
	Fatigue	12	• Extended workdays can be granted; however, workdays shall not exceed 14 hours and extended work weeks, 60 hours/week. • For emergency work, a single shift should be limited to 16 hours, and an employee should be off work for at least 12 hours before the next shift starts. If shift work is required, employees should be given sufficient time to get a continuous 7- to 8-hour period of sleep in each 24 hours, and at least 50 hours every 7 days. • Safety Officer and team members will watch and intervene when individuals appear to be fatigued; contact the project manager if a team member appears fatigued. • Night work will not occur on this project.	2

Attachment 1. AECOM Pre-Job Hazard Assessment

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
	Lines and equipment under tension creating line of fire or pinch point	9	• Keep body away from lines under tension. • Keep as much distance as possible between you and any source of potential energy release.	2
	Moving parts/pinch points/hand injuries	9	• Be aware of hands, feet, arms, and position of all personnel during tool use and equipment handling. • Never position a hand where it can be pinched if a hatch closes, a load releases, or a tool slips.	2
	Water hazards	10	• Vessel operator will provide a SH&E Orientation on boating operations prior to departing dock, which will cover the following: man overboard, power loss/disabled boat, fire onboard, medical emergency. • Vessel operator will perform a vessel inspection prior to departure. • Vessel operator will submit a float plan to the Project Manager (Jenny Pretare) and follow the float plan and communication plan identified in the float plan. • Passengers will obey Vessel Operator's orders at all times. • Adhere to all federal, state, and local boating and licensing laws. • Work must be performed in accordance with the "Buddy System." • PPE: US Coast Guard (USCG)-approved Type III or V PFD or life jacket, sized and adjusted to the wearer, shall be worn by all workers when aboard the research vessel. • Confirm vessel has secondary means of propulsion such as oars or paddles or backup motor. • Workers are to remain seated when vessel is in motion. Avoid standing in vessel whenever possible.	2
	Man overboard (MOB)/incapacitated person	10	Vessel operator will provide a SH&E Orientation on boating operations prior to departing dock, which will cover the following: man overboard, power loss/disabled boat, fire onboard, medical emergency. Vessel operator will review USCG MOB procedures: • No low visibility/night operations will occur. • When deploying equipment, do not lean over the boat. • When boat is underway, all people must remain in the cabin, seated or standing, while maintaining four points of contact; no work on deck may occur.	3

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
			• All staff aboard vessel will be trained in MOB recovery training. • Perform safety briefing prior to departure and discuss MOB recovery procedure. • Wear Type III or V PFD AT ALL TIMES on board a boat or on dock. • Person who observes person fall overboard must keep their eyes on him/her. • Immediately cease work operations and commence a rescue procedure. • Bring the vessel to the position of the person in the water (as opposed to having the person swim to the boat). • Immediately mark MOB location on GPS by "one-button *MOB* press." • Throw a MOB pole marker/raise a MOB flag into the water to denote the location of the person overboard and to alert other boat traffic. • Throw PFDs or other floatable items into the water to assist the person overboard. • Send a distress call on VHF Channel 16 if person is un-responsive or severely injured.	

	Vessel in danger of sinking	10	Vessel operator will be responsible for emergency actions and notifications; however, if the vessel crew is incapacitated, the following procedure shall be followed:
			• Send a distress call: PAN call over VHF Channel 16 if boat is not in imminent danger.
			• Send a Mayday distress call and repeat until message is received over VHF Channel 16 if boat is in imminent danger.
			  ○ Provide name of vessel
			  ○ Provide description of vessel
			  ○ Provide location of vessel (e.g., latitude/longitude, river mile, landmark, etc.
			  ○ Provide count of onboard passengers.
			  ○ Provide nature of distress.
			  ○ Descr be kind of assistance needed.
			• Turn on the bilge pump to begin pumping water to outside of boat.
			• Assemble the emergency pump and begin pumping water.
				4

	Vessel fire	10	• Remove all flammable material from ignition sources. • Communicate with Safety Officer and vessel operator if there will be any new flammable material brought	3

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
			onboard; store only in approved containers. Review SDS for firefighting procedures. • Review fire extinguisher location and quantity and confirm fire extinguishers are charged prior to leaving dock • Remember P.A.S.S: ○ Pull the Pin ○ Aim the fire extinguisher at the base of the fire ○ Squeeze the handle ○ Sweep the base of fire side to side • Send a Mayday distress call and repeat until message is received over VHF Channel 16 if boat is in imminent danger. ○ Provide name of vessel ○ Provide description of vessel ○ Provide location of vessel (e.g., latitude/longitude, river mile, landmark, etc. ○ Provide count of onboard passengers. ○ Provide nature of distress. ○ Descr be kind of assistance needed. • Inflate life raft/abandon vessel if necessary (e.g., risk of explosion).	
	Medical emergency	8	Vessel operator will review location of first aid kit and AED prior to departing the dock. The vessel operator or his/her designee will review how the AED operates with the crew prior to departing dock. • Review first aid kit location and contents prior to departure. • If a severe injury occurs, initiate a MAYDAY call. • Travel to Swan Island or location identified by responding EMS. • After emergency has been addressed, contact project manager and AECOM reporting line (1-800-348-5046).	2
	Heat stress/cold stress	9	• Begin heat stress/cold stress monitoring as applicable and continue throughout duration of task. • Implement heat stress/cold stress prevention procedures, as applicable. • Heat stress: Drink 8 oz water/hour and use appropriate work/rest schedule as specified in Heat Stress AECOM SH&E Procedure. • Cold Weather PPE (<50 degrees F): ○ Layers of non-cotton clothing; examples include down, wool, or other synthetic materials to provide insulation when wet	5

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
			○ Outer layer to break the wind ○ Hat or hardhat liner ○ Insulated footwear/extra socks if boots allow ○ Gloves that allow for insulation and dexterity ○ Hand warmers ○ Emergency set of dry clothing stored in waterproof bag	
	Severe weather hazards	9	Assess severe weather hazards using NOAA resources before on-water work: • Stop work if lightning is <6 miles away (<30 seconds between lightning flash and hearing thunder). If storm is approaching, do not wait for it to arrive before implementing stop work action. • Stop Work during wind gusts sustained at 25 mph, and at all times where debris is vis ble flying in air. • Stop work during hail storms; seek shelter inside building or wheelhouse/vessel cabin.	1
	Other commercial/recreational vessel traffic hazards	10	Adhere to all federal, state, and local boating and licensing laws.	3
ACTIVITY 4 – Deploy and retrieve sediment traps. Sediments traps consist of four glass cylinders placed in protective PVC sleeves, which commercial divers will mount vertically to rebar or pipe anchored to the river bottom. At retrieval, the divers will return to the traps, cap the glass cylinders, and transfer the cylinders to the vessel for processing. Once the processing is complete, the divers will return the glass cylinders to the PVC sleeves that remain fixed to the river bed. Sediment trap deployment and retrieval will be conducted from Gravity research vessels.	Scientific diving hazards (refer to Gravity and Global Diving Documentation for list of hazards)	10	Gravity and Global Diving will prepare the Dive Safety Plan. Global Diving will maintain a dive safety officer on-site. The dive plan will provide the following information: • List of Personnel • List of training, qualifications, certifications • ADCI certifications • Medical screening • First Aid/CPR+AED • Oxygen provider • First aid kit inventory • List of equipment to be used on job • Proof of annual maintenance • Maintenance records on all equipment • Hats – make/model • Umbilicals (pull test date) • Compressors (air certification) • Wet suits • Dry suits • Air samples (certification) • Job description: ○ Estimated depth	3

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
			○ Estimated currents ○ Estimate visibility ○ Estimated temperatures ○ Drawings, diagrams, photos of study area ○ Task Hazard Analysis/Job Hazard Analysis ○ Project-Specific Safe Work Plan/Dive Plan and Emergency Action Plan ○ Dive manual ○ Dive tables ○ Float plan ○ Acknowledgement of plans by personnel	
ACTIVITY 5 – Application of sodium azide to each glass cylinder on the vessel deck	WARNING: Chemical is highly toxic. Chemical hazards and potential for exposure (fatal if swallowed, may cause damage to organs through prolonged or repeated exposure) Inhalation exposure may occur when working with sodium azide. Survivors of serious sodium azide poisoning may have heart and brain damage.	10	• HAZCOM Training on sodium azide; Gravity Safety Officer and sodium azide competent person will review SDS with field crew. • Only those personnel involved in the task and that have been trained in HAZCOM usage/application of sodium azide will be in the exclusion zone when sodium azide is being applied. • Person applying sodium azide and bystanders shall always remain upwind of the application area; • Appropriate PPE includes: ○ Keep away from open flames, hot surfaces, and sources of ignition. ○ Do not get in eyes, on skin, or on clothing. ○ Wash face, hands and any exposed skin thoroughly after handling. ○ Keep in a dry, cool and well-ventilated place. ○ Keep container tightly closed. **IF EXPOSED** • According to the CDC and SDS, if you are sure someone incidentally ingested sodium azide, **do not attempt CPR using mouth to mouth. USE POCKET MASK WITH ONE-WAY VALVE.** Performing CPR on someone who has ingested sodium azide could expose you to the chemical. • Simultaneously call 911 and have team member contact Poison Control Number at (800) 222-1222. • Mobilize immediately to dock.	3
ACTIVITY 6 – Decontaminate equipment.	Lifting hazards/muscle strain	10	• Practice proper lifting and manual handing of materials and equipment, lift with the knees, avoid twisting, and seek assistance or employ additional handling equipment as needed. • Wear abrasion gloves when moving equipment.	3

Attachment 1. AECOM Pre-Job Hazard Assessment

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
			• No personnel should lift more than 40 pounds without assistance or mechanical aid. Know what items weigh before lifting or test them carefully.	
	Potential contaminant exposure	9	• The decontamination procedure described in the field sampling plan and summarized below will be followed: o Rinse equipment with river water. o Any water or sediment will be washed into the surface waters near the vicinity of the collection site before proceeding to the next station. o Liquinox (or alternate phosphate-free detergent-bearing liquid wastes from decontamination) will be used to decontaminate equipment that contacts sediment and will be washed overboard. o Rinse with distilled water. o Remove and dispose of nitrile gloves following decontamination procedure. • PPE: Nitrile gloves and chemical goggles. If splash hazard exists, disposable Tyvek or other impermeable clothing (e.g., rubber raingear) can be used, washed, and rinsed during the decontamination process. • Additional information is found in the Task-Specific Field Sampling Plan.	3
	Safety and spill equipment	9	• A spill response kit, to include an appropriate empty container, materials to allow for booming or diking the area to minimize the size of the spill, and appropriate clean-up material (i.e., speedy dri, absorbent pads, etc.), will be available on the project study area and positioned for quick and easy access.	2
ACTIVITY 7 – Load/transport samples to on-shore facility for processing and shipping to lab.	Lifting hazards/muscle strain	9	• Practice proper lifting and manual handing of materials and equipment, lift with the knees, avoid twisting, and seek assistance or employ additional handling equipment as needed. • Wear abrasion gloves when moving equipment. • No personnel should lift more than 40 pounds without assistance or mechanical aid. Know what items weigh before lifting or test them carefully.	3
	Driving hazards	10	• All drivers must have current, valid driver's license on their person. • Complete pre-use visual inspection. Walk around the vehicle to inspect for potential hazards or mechanical issues before driving. • Practice defensive driving and drive in a courteous manner.	5

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
			• Seat belts must be worn by the driver and all passengers. • Drivers must not use cellular telephones or other communication devices such as two-way radios unless safely parked. • Window surfaces must be cleared of any materials such as ice, frost, mud, or water that can impair visibility. • Equip vehicles with first aid kit, fire extinguisher, flares or triangle, spare tire and jack, and cell phone. • Ensure all loads are properly secured.	
ACTIVITY 8 – Sample processing at warehouse	Lifting hazards/muscle strain	6	• Practice proper lifting and manual handing of materials and equipment, lift with the knees, avoid twisting, and seek assistance or employ additional handling equipment as needed. • Wear abrasion gloves when moving equipment. • No personnel should lift more than 40 pounds without assistance or mechanical aid. Know what items weigh before lifting or test them carefully.	3
	Potential contaminant exposure	9	• Maintain awareness of potential contaminant exposure and implement avoidance procedures. • Use appropriate PPE, including nitrile gloves and safety glasses with side shields. Use proper tools for decontamination. • Wear appropriate PPE, including nitrile gloves and safety glasses and/or chemical goggles. • Use proper tools for decontamination. • Follow other Standard Operating Procedures (SOPs) for decontamination as specified in the Task-Specific Field Sampling Plan.	3
	Risk of inhalation when handling acid and solvents used for cleaning high volume sampling supplies	9	• Project-specific SOPs for high-volume sampling are provided in Appendix B of the Field Sampling Plan. • **Do not allow solvents and acids to sit in ambient air longer than needed for decontamination** • Perform decontamination in area with high ventilation away from ignition sources. • Wear appropriate PPE, including nitrile gloves and safety glasses and/or chemical goggles. • Monitor breathing space using PID. See Programmatic HASP for VOC action levels. • Refer to chemical SDS for chemical specific PPE. • Ensure adequate ventilation:	2

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
			○ **Acetone PEL:** 1000 ppm, **ACGIH TWA:** 250 ppm ○ **Methanol PEL:** 200 ppm **ACGIH:** 200 ppm ○ **Hexane PEL:** 500 ppm **ACGIH:** 50 ppm • Confirm emergency eyewash locations are located in proximity to solvent handling area. • Per SDSs, confirm safety shower is present and located near acid and solvent area.	
ACTIVITY 9 – Demobilize at end of work shift.	Traffic/driving hazards	10	• All AECOM drivers must have current driver awareness training (available on AECOM university) • All drivers must have current, valid driver's license on their person. • Complete pre-use visual inspection. Walk around the vehicle to inspect for potential hazards or mechanical issues before driving. • Practice defensive driving and drive in a courteous manner. • Seat belts must be worn by the driver and all passengers. • Obey all speed limits. • Drivers must not use cellular telephones or other communication devices such as two-way radios unless safely parked. • Window surfaces must be cleared of any materials such as ice, frost, mud, or water that can impair visibility. • Travel with headlights on at all times. • Travel during daylight hours when possible. • Equip vehicles with: first aid kit, fire extinguisher, flares or triangle, spare tire and jack, cell phone. • The project goal is to limit activities to no more than 10 hours/day; contact project manager if work days extend beyond the 10 hours.	5
	Fatigue	15	• Extended workdays can be granted; however, workdays shall not exceed 14 hours and extended work weeks, 60 hours/week. • For emergency work, a single shift should be limited to 16 hours, and an employee should be off work for at least 12 hours before the next shift starts. If shift work is required, employees should be given sufficient time to get a continuous 7- to 8-hour period of sleep in each 24 hours, and at least 50 hours every 7 days. • Safety Officer and team members will watch and	3

Attachment 1. AECOM Pre-Job Hazard Assessment

Principal Activities	Potential Safety/Health Hazards	Initial Risk Rating	Control Measures	Final Risk Rating
			intervene when individuals appear to be fatigued; contact the project manager if a team member appears fatigued. • Night work will not occur on this project. • A journey management plan will be established for team members traveling >250 miles.	

SPECIAL REQUIREMENTS

Step #	Equipment to be Used	Inspection Requirements	Training Requirements
	List equipment to be used in work activity	List inspection/permit requirements for work activity	List training requirements including hazard communication
1.	Research vessel	Perform boat inspection prior to use. Complete and submit float plan prior to use.	USCG-licensed vessel operator or equivalent. MOB recovery with limited assistance. First Aid/CPR Training. Approved boating safety course.
2.	Sediment traps	Daily inspection before use.	Employees operating equipment shall be experienced or trained in the specific use of the equipment for the purpose of the sampling effort.
3.	Diving equipment	Proof of annual maintenance and maintenance records on all equipment Umbilicals (pull test date) Compressors (air certification) Air samples (certification)	ADCI Certification Medical Screening
4.	Emergency equipment provided by vessel operator (Gravity): • First aid kit/AED • GPS • Satellite phone (if cell phone service does not cover entire survey area) • VHF radios will remain on Channel 16 (for hailing/distress calls) at all times to listen for boat traffic, alerts, etc. unless actively keying/ communicating on another channel with another party • Rescue rope in throw bag (commercially available) • Air horns and/or whistles • Waterproof flashlight • *Secondary "kicker" motor and *alternate means of propulsion (oars or paddles) • *Bailer (if bilge pump is not provided, bucket, or similar device should be on board) • *Duct tape • *Length of rope for securing boat on shore or alongside larger vessel • *Functional bilge pump/emergency pump • *Anchor with five to seven times as much line as the depth of water plus the distance from the surface of the water to where the anchor will attach to the bow • *Type 4 throwable ring or cushion • *Type BC fire extinguisher (10 pound) if extra fuel is carried in portable containers. * Required minimum equipment to be provided by vessel	Inspect all equipment for battery life and integrity during the pre-trip boat inspection.	Personnel should be familiar with all emergency equipment.

	provider (chartered boat); project Field Coordinator to ensure remaining equipment is carried on board.		
5.	Emergency eyewash and shower station	Check at beginning of field event that it is present and has not been used.	SH&E Orientation of how to use equipment
6.	Sodium azide	Sodium azide is contained appropriately.	HAZCOM Training on sodium azide

INSTRUCTIONS AND RISK MATRIX

Hazard Evaluation – Identify principal steps of the task. Identify potential safety/health hazards for each step and determine initial risk rating using the matrix provided below. Identify control measures including PPE for each hazard. Re-evaluate hazard potential and assign a final risk rating. If the final risk rating is a 5-9 (medium risk) or 10-25 (high risk), additional hazard controls shall be identified and applied until the final risk rating is reduced to 4 or below. The final risk rating cannot be reduced to 4 or lower, additional approvals are needed before the activity can begin. Add additional rows as required to cover all major steps/aspects of the activity.

Special Requirements – Identify equipment to be used including specific PPE required. Identify inspection requirements such as competent person, permit issue, documented task hazard analysis, etc. Identify training requirements such as hazard communication, scaffold user, fall protection, etc.

High ← → Low

Probability (High ↑ ↓ Low)	Severity: 5 - Catastrophic	4 - Critical	3 - Major	2 - Moderate	1 - Minor
5 - Frequent	25	20	15	10	5
4 - Probable	20	16	12	8	4
3 - Occasional	15	12	9	6	3
2 - Remote	10	8	6	4	2
1 - Improbable	5	4	3	2	1

10-25 (red) are high risk, 5-9 (yellow) are medium risk, and 1-4 (green) are low risk

Severity – Potential Consequences				
	People	Property Damage	Environmental Impact	Public Image/Reputation
Catastrophic	Fatality, Multiple Major Incidents	>$1M USD, Structural collapse	Offsite impact requiring remediation	Government intervention
Critical	Permanent impairment, Long term injury/illness	>$250K to $1M USD	Onsite impact requiring remediation	Media intervention
Major	Lost/Restricted Work	> $10K to $250K USD	Release at/above reportable limit	Owner intervention
Moderate	Medical Treatment	> $1K to $10K USD	Release below reportable limit	Community or local attention
Minor	First Aid	</=$1K USD	Small chemical release contained onsite	Individual complaint

Probability		
Frequent	Expected to occur during task/activity	9/10
Probable	Likely to occur during task/activity	1/10
Occasional	May occur during the task/activity	1/100
Remote	Unl kely to occur during task/activity	1/1,000
Improbable	Highly unlikely to occur, but possible during task/activity	1/10,000

Risk Rating (Probability x Severity)	Risk Acceptance Authority
1 to 4 (Low)	Risk is tolerable, manage at local level
5 to 9 (Medium)	Risk requires approval by Operations Lead/Supervisor & SH&E Manager
10 to 25 (High)	Risk requires the approval of the Operations Manager & SH&E Director

HEALTH AND SAFETY AND ENVIRONMENTAL PLAN
Portland Harbor RI/FS 2018 studies

Gravity Consulting LLC

Updated February 2018

Prepared for:

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The information in this Health and Safety Plan has been designed for the methods presently contemplated by Gravity Consulting L.L.C. (Gravity) for execution of the proposed work. Therefore, this document may not be appropriate if the work is not performed by or using the methods presently contemplated by Gravity. In addition, as the work is performed, conditions different from those anticipated may be encountered and this document may have to be modified. Therefore, Gravity only makes representations or warranties as to the adequacy of the Health and Safety Plan for currently anticipated activities and conditions.

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Acronyms and Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
COC	Contaminants of Concern
CRZ	Contamination Reduction Zone
DOT	Department of Transportation
ERCP	Emergency Response and Contingency Plan
EZ	Exclusion Zone
GFCI	Ground Fault Circuit Interrupter
HASP	Health and Safety Plan
HSR	Health and Safety Representative
IDLH	Immediately Dangerous to Life or Health
JSA	Job Safety Analysis
LO/TO	Lockout/Tagout
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
PHSM	Project Health and Safety Manager
PM	Project Manager
PPE	Personal Protective Equipment
REL	Recommended Exposure Limits
SHSO	Site Health and Safety Officer
SM	Site Manager
SS	Site Supervisor
SSO	Site Safety Officer
SZ	Support Zone
TLV	Threshold Limit Values

1.0 Introduction

This Health and Safety Plan's (HASP) objective is to help establish safe working conditions at the site Portland Harbor Study Site. Safety procedures and protective equipment are chosen according to potential hazards. Specific hazard control methods have been evaluated and selected to minimize the potential of accident or injury.

This HASP prescribes the procedures that must be followed during specific site activities. Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval of the Project Manager (PM) and the Project Health and Safety Manager (PHSM).

The provisions of this plan are mandatory for all personnel and subcontractors assigned to the project. All visitors to the work site must abide by the requirements of this plan. All project participants will attend a pre-job briefing where the contents of this HASP will be discussed. Project staff assigned to this project must sign the Agreement and Acknowledgement Sheet (see Appendix A) to confirm that they understand and agree to abide by the provisions of this plan.

All work will comply with the Occupational Safety and Health Act (OSHA) standard, "Hazardous Waste Operations and Emergency Response" (29 CFR 1910.120) and other federal, state, and local procedures that require the development and implementation of a HASP. Generation of this document certifies that the workplace has been evaluated for hazards. A hazard assessment has been performed and the adequacy of the personal protective equipment (PPE) selected was evaluated as required by 29 CFR 1910.132(d), 1910.134, 1926.25, and 1926.55, and is duly noted by the signature(s) and date appearing on the cover page of this document.

1.1 Site Description/Background Information

The PDI study area encompasses the in-river portion of an approximately 27-mile stretch of the Willamette River within Portland Harbor, from approximately RM 1.9 to RM28.4. Project specific information is included in the AECOM Sampling and Analysis plan and HASP.

1.2 Scope of Work

This plan addresses health and safety issues involved with environmental monitoring, sediment, and water characterization.

1.3 Key Safety Personnel

The following people share responsibility for health and safety at the site. See Section 1.3.1 for a description of the role and responsibility of each.

Gravity Project Manager: *Shawn Hinz.*	Office: 425-888-8256 Cellular: 425-281-1471
Gravity Site Supervisor: *Chad Furulie*	Office: 206-905-9617 Cellular: 206-649-6033
Gravity Site Health and Safety Officer: *Jeff Wilson*	Office: 206-905-9617 Cellular: 206-905-9617

1.3.1 Responsibilities of Key Personnel

1.3.1.1 Project Manager

The PM has authority to direct response operations; the PM assumes total control over site activities. In addition, the PM:

- Prepares and organizes background review of the project, the work plan, and the field team.
- Obtains permission for site access and coordinates activities with appropriate officials.
- Briefs the Site Supervisor (SS), Site Health and Safety Officer (SHSO), and field personnel on specific assignments.
- Together with the SS and SHSO, sees that health and safety requirements are met.
- Consults with the PHSM regarding unsafe conditions, incidents, or changes in site conditions or the scope of work.

1.3.1.2 Site Supervisor

The SS Reports to the PM, has authority to direct response operations, and assumes control over on-site activities. In addition the SS:

- Conducts daily safety meetings.
- Executes the work plan and schedule.
- Manages the construction operations.
- In conjunction with the SHSO, conducts periodic field health and safety inspections to ensure compliance with this HASP.
- Enforces safety procedures.
- Coordinates with the SHSO in enforcing worker protection levels.
- Enforces site control.
- Notifies, when necessary, local public emergency officials.
- In conjunction with the SHSO, responsible for following-up on incident reports to the PM.

1.3.1.3 Site Health and Safety Officer

The SHSO advises the PM and SS on all aspects of health and safety on site. The SHSO stops work if site operations threaten worker or public health and safety and informs the PHSM of any changes in site conditions or project status. In addition, the SHSO:

- Conducts periodic inspections to assess whether the HASP is being followed.
- Periodically inspects protective clothing and equipment.
- Sees that protective clothing and equipment are properly stored and maintained.
- Controls entry and exit at the access control points.
- Performs air monitoring in accordance with this HASP. Maintains and oversees operation of monitoring equipment and interpretation of data from the monitoring equipment.

- Monitors workers for signs of stress, including heat stress, cold exposure, and fatigue.
- Enforces the “buddy” system.
- Is informed of emergency procedures, evacuation routes, and telephone numbers of the local hospital, poison control center, fire department, and police department.
- Notifies, when necessary, local public emergency officials.
- Communicates incidents promptly to SS and PM.
- Maintains communication with PHSM on site activities.
- If applicable, ensures decontamination and disposal procedures are followed.
- Maintains the availability of required equipment.
- Advises appropriate health services and medical personnel of potential exposures.
- Notifies emergency response personnel in the event of an emergency. Coordinates emergency medical care.

1.3.1.4 Project Health and Safety Manager

The specific duties of the HSM include:

- Providing technical input into the design and implementation of the site HASP
- Advising on potential for worker exposure to project hazards along with appropriate methods and/or controls to eliminate site hazards.
- Ensures that a hazard assessment has been performed and the adequacy of the personal protective equipment (PPE) selected was evaluated as required by 29 CFR 1910.132(d), 1910.134, 1926.25, and 1926.55, and is duly noted by the signature(s) and date appearing on the cover page of this document

1.3.1.5 Work Team

The Work Team reports to the SS for on-site activities and is responsible for:

- Safely completes on-site tasks required to fulfill the work plan.
- Complies with the HASP.
- Attends and participates in daily safety meetings.
- Notifies the SS and SHSO of suspected unsafe conditions.
- Reports all incidents to the SS and SHSO.

1.4 Health and Safety Training Programs

This Section describes the health and safety training programs that site personnel must comply with.

1.4.1 Medical Surveillance and Respirator Fit Testing

This program tracks the physical condition of the company's employees in compliance with Occupational Safety and Health Administration (OSHA) standards (29 CFR 1910.120(e)), and the International Marine Contractors Association (IMCA) requirements for non-marine crew working in the offshore zone . Medical surveillance and Physicals will consist of the following:

- Current medical clearance to conduct hazardous waste field work and to wear a respirator.
- Yearly physicals by offshore trained physician – see Appendix B for medical certifications

1.4.2 Training

Training requirements and programs will comply with the OSHA Hazardous Waste Operations and Emergency Response regulation, 29 CFR 1910.120. Training requirements will consist of the following:

- Field personnel must complete a minimum of 40 hours of hazardous waste activity instruction.
- Field personnel must complete a minimum of three days of supervised field instruction.
- Field personnel assigned to the site will also receive 8 hours of refresher training each year.
- On-site managers and supervisors directly responsible for employees engaged in hazardous waste operations will receive an additional 8 hours of supervisory training.
- Field personnel assigned to site will also receive first aid/CPR and blood borne pathogen training.
- Other training may be required depending on the task to be performed (e.g., confined space, excavation/trenching, underground storage tank removal, fall protection, respiratory protection, and hazard communication).

1.4.3 Initial Orientation

Hazardous Waste Operations Initial Health and Safety Orientation will consist of the following:

- All project participants engaged in site operations will attend an initial site orientation where this HASP will be discussed and followed. Personnel will acknowledge having been given the orientation by signing the agreement and acknowledgement form in Appendix A.

2.0 Hazard Analysis

Any change in the scope of work will require an amendment to this HASP. Any task conducted beyond the scope of work identified in this HASP must be evaluated using the Job Safety Analysis (JSA) process prior to conducting the work.

2.1 Job Safety Analysis

Common Gravity work tasks have been evaluated for their hazards and JSA documents developed which detail the chemical, physical and biological hazards associated with these tasks along with the control measures (engineering, administrative and/or personal protective equipment) that will be used to ensure that these tasks are conducted in a safe manner.

The PM and SS will be responsible for identifying work tasks and project site conditions that are beyond the previously developed JSA documents, and for communicating such information to the PHSM. The PHSM will work with the PM and SS to develop project specific JSAs or provide guidance in the development of JSAs to meet the identified project hazards.

If work tasks are identified during the course of the project which were not previously addressed in the JSA documentation supplied in Appendix C of this HASP then a task-specific JSA document shall be developed at the project site prior to conducting the work. The SS and SHSO shall develop this document(s) with input from the PM and PHSM as needed. Project personnel shall be trained on the contents of the developed task-specific JSA prior to its implementation. A copy of the task-specific JSA form used in this process is supplied in Appendix B of this HASP.

2.2 Hazard Communication Procedures

The purpose of hazard communication (Employee Right-to-Know) is to ensure that the hazards of all chemicals located at this field project site are communicated according to 29 CFR 1926.59 to all Gravity personnel and Gravity subcontractors. Personnel must follow the hazard communication procedures listed in Sections 2.3.1 and 2.3.2 when handling corrosive materials.

2.2.1 Corrosive Material Handling Procedures

Corrosive materials include acids and bases. They are extremely corrosive materials with a variety of uses. Acids include hydrochloric, nitric, and sulfuric acids. Bases include sodium hydroxide. Observe the following procedures when working with corrosive materials:

- Wear gloves and eye-splash protection while using acid dispensed from a small dropper bottle during water sampling.
- Wear a full-face, air-purifying respirator equipped with combination cartridges (organic vapor/acid gas) as well as Tyvek coveralls and nitrile gloves for large volume applications.
- Have an eyewash bottle and/or portable eyewash station on site.
- Do not add anything into a virgin chemical drum, including unused product.
- Avoid mixing strong acids and bases. Consult the PHSM for task-specific evaluation. If mixing is absolutely necessary, do it slowly. Avoid vapors or fumes that are generated.
- When diluting acids, add the acid to water in small quantities and mix cautiously.
- When diluting bases, add water to the base in small quantities and mix cautiously.

2.2.2 Hazard Communication Program

2.2.2.1 Container Labeling

Gravity personnel will ensure that all drums and containers are labeled according to contents. These drums and containers will include those from manufacturers and those produced on site by operations. All incoming and outgoing labels shall be checked for identity, hazard warning, and name and address of responsible party.

2.2.2.2 Employee Information and Training

An ongoing corporate training program will train employees on chemical hazards. In addition, chemical hazards will be communicated to employees through daily safety meetings and by an initial site orientation program. At a minimum, Gravity and related subcontractor employees will be instructed on the following:

- Chemicals and their hazards in the work area.
- How to prevent exposure to these hazardous chemicals.
- What the company has done to prevent workers' exposure to these chemicals.
- Procedures to follow if they are exposed to these chemicals.
- How to read and interpret labels and MSDS for hazardous substances found on Gravity sites.
- Emergency spill procedures.
- Proper storage and labeling.

3.0 Project Hazards and Controls

In addition to the Task-Specific JSAs described in the previous section, Section 3 of this HASP lists the health and safety procedures and practices applicable to this project. For additional information, consult with your health and safety professional.

3.1 Daily Safety Meetings

Daily safety meetings make accident prevention a top priority for everyone and makes them aware of important accident prevention techniques. Observe the following daily safety meetings procedures and practices:

- Daily safety meetings will be held each morning prior to site activities
- The tailgate meeting form in Appendix B will be used to document the meeting.

3.2 Physical Hazards and Controls

3.2.1 General Site Activities

- Observe the following general procedures and practices:
- Legible and understandable precautionary labels shall be affixed prominently to containers of potentially contaminated soil, water, and clothing.
- No food or beverages shall be present or consumed in a Contamination Reduction Zone (CRZ) or Exclusion Zone (EZ). These are only allowed in designated areas of the support zone.
- No tobacco products shall be present or used, and cosmetics shall not be applied in a CRZ or EZ. These are only allowed in designated areas of the support zone, if areas have been designated.
- Beards, facial hair, or other facial obstructions that interfere with respirator fit will preclude admission to the EZ when respirators are required.
- An emergency eyewash unit shall be located immediately adjacent to employees who handle hazardous or corrosive materials, including decontamination fluids. All operations involving the potential for eye injury, splash, etc., must have approved eyewash units locally available capable of delivering at least 0.4 gallons per minute for at least 15 minutes.
- All on-site activities will be conducted during daylight hours. If work after dusk becomes necessary due to an emergency, adequate lighting must be provided and notification of such activity made to the location contact.
- Hazardous work, such as handling hazardous materials and heavy loads, and equipment operation, etc., should not be conducted during severe storms.
- All temporary electrical power must have a ground fault circuit interrupter (GFCI) as part of its circuit if the circuit is not part of permanent wiring. All equipment must be suitable and approved for the class of hazard present.

3.2.2 Slip/Trip/Fall

Observe the following procedures and practices to prevent slips/trips/fall:

- Inspect each work area for slip/trip/fall potential prior to each work task.

- Slip/trip/fall hazards identified must be communicated to all personnel. Hazards identified shall be corrected or labeled with warning signs to be avoided.
- All personnel must be aware of their surroundings and maintain constant communication with each other at all times.

3.2.3 General Falls/Ladders

Observe the following general falls/ladders procedures and practices:

- Assess work areas for fall hazards. A fall protection system is required if work is conducted six feet or over.
- Use Type 1A rated ladders.
- Make sure ladder rungs are sturdy and free of cracks.
- Use ladders with secure safety feet.
- Pitch ladders at a 4:1 ratio.
- Secure ladders at the top or have another person at the bottom to help stabilize it.
- Ladders used to access an upper landing surface shall extend at least three feet above the upper landing surface.
- Do not use ladders for access to air stripper towers above six feet. Instead, use aerial lift.
- Use non-conductive ladders near electrical wires.
- The top step of a stepladder should not be used as a step.
- Do not carry any object or load that could cause a loss of balance or a fall.

3.2.4 Boating Operations

The following precautions shall be followed when conducting boating trailer and launch activities:

- Follow trailer/boat manufacturer's instructions for securing boat to trailer
- Follow trailer/boat manufacturer's instructions for securing boat trailer to towing vehicle
- Prohibit workers from moving into trailer/vehicle pinch points without advising vehicle operator
- Use experienced operators when backing trailers on boat ramps
- Wear proper work gloves when the possibility of pinching, or other injury may be caused by moving/ handling large or heavy objects
- Maintain all equipment in a safe condition
- Wear reflective warning vests when exposed to vehicular traffic
- Launch boats one at a time to avoid collisions
- Use a spotter for vehicles backing boats to launch area
- Understand and review hand signals
- Wear boots with non-slip soles when launching boats
- Wear USCG approved flotation devices when working on/near water
- Keep ropes and lines coiled and stowed to eliminate trip hazards

- Maintain 3 point contact on dock/pier ladders

The following precautions shall be followed when conducting boating operations:

- Wear USCG Approved personal flotation devices for work activities on or near water
- Provide a floating ring buoy with at least 90 feet of line in the immediate boat launch/land areas
- Step into the center of the boat
- Keep your weight low when moving in the boat
- Move slowly and deliberately
- Steer directly across other boat wakes at 90 degree angle to avoid capsizing
- Steer boat facing forward
- Watch for floating objects in the water
- Right-of-way is yielded to vessels on your boat's right (and vessels with limited ability to maneuver)

The following precautions shall be followed when working on a boat:

- Observe proper lifting techniques
- Obey sensible lifting limits (60 lb. maximum per person manual lifting)
- Use mechanical lifting equipment (pulleys, winches) to move large, awkward loads
- Wear USCG Approved personal flotation devices for work activities on or near water

The following safety related items shall be available when conducting boating operations:

Table 3-2
Safety Equipment Specific to In-Water Work

Additional Safety Equipment for Sampling Vessel per US Coast Guard Requirements:	
• Proper vessel registration, numbering, and documentation (registered with state, certificate of vessel registration number displayed, and carry valid certificate of number • USCG approved Personal Flotation Devices (PFDs/life jackets) for every person on sampling vessel (Type II PFD required, Type 1 PFD preferred as it will turn most unconscious wearers face up in water) • Appropriate, non-expired, visual distress devices for day and night use from the following: – Three hand-held red flares (day and night) or: – One hand-held red flare and two parachute flares (day and night) or; – One hand-held orange smoke signal, two floating orange smoke signals (day) and one electric distress light (night only) • Properly maintained and inspected USCG approved fire extinguishers (no fixed system = (2) B-1 or (1) B-2 type extinguishers, fixed system = (1) B-1 type extinguisher) • Proper ventilation of gasoline powered vessels • Sound producing device (whistle, bell, or horn) • VHF 2-way radio • Not exceed vessel safe loading capacity • Proper navigational light display • Throwable life ring with attached line (any vessel larger than 16 ft is required to carry one Type IV (throwable) PFD	
Additional USCG Recommended Equipment Includes:	
• Extra visual distress signals • Spare Gravity • Heaving line • Fenders • First aid kit • Flashlight • Mirror • Searchlight • Sunburn lotion • Tool kit • Spare fuel • Chart and compass	• Boat hook • Spare propeller • Mooring line • Food and water • Binoculars • Spare batteries • Sunglasses • Marine hardware • Extra clothing • Spare parts • Alternate propulsion (oars/paddles) • Dewatering device (pump or bailer)

3.2.5 Working Over or Near Water

Personal Flotation Devices:

Personal flotation devices are not required where employees are continuously protected from the hazard of drowning by railings, nets, safety belts or other applicable provisions.

Type III, Type V, or better U.S. Coast Guard approved International Orange personal floatation device (PFD) shall be provided and properly worn by all personnel in the following circumstances:

1. On floating pipelines, pontoons, rafts, or stages;
2. On structures extending over or next to water except where guardrails or safety nets are provided for employees;
3. Working alone at night where there are drowning hazards, regardless of other safeguards provided;
4. In skiffs, small boats, or launches, unless in an enclosed cabin or cockpit; or
5. Whenever there is a drowning hazard.

The following precautions shall be followed when using personal floatation devices:

- Prior to and after each use, the buoyant work vests or life preservers shall be inspected for defects which would alter their strength or buoyancy. Defective devices or devices with less than 13 lbs. Buoyancy shall be removed from service.
- All PFDs shall be equipped with reflective tape as specified in 46 CFR 25.25-15.
- 30-inch U.S. Coast Guard approved ring buoys with at least 150 feet of 600 pound capacity line shall be provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed 200 feet.
- PFD lights conforming to 46 CFR 161.012 shall be required whenever there is potential need for life rings to be used after dark. On shore installations, at least one life ring, and every third one thereafter, shall have a PFD light attached. PFD lights on life rings are required only in locations where adequate general lighting (e.g., floodlights, light stanchions) is not provided.

Lifesaving and Safety Boats:

Regulations require that a lifesaving boat is available and ready for use under working conditions where there is a potential for employees to fall into swift running water, such as a river or a strait with strong currents. The following precautions shall be followed concerning the use of lifesaving powerboats:

- At least one lifesaving powerboat shall be immediately available at locations where employees work over or immediately next to water.
- Personnel trained in launching and operating the powerboat shall be readily available during working hours. Lifesaving personnel shall perform a lifesaving drill before the initiation of work at the project site and periodically thereafter (at least monthly or whenever new personnel are involved).
- Powerboats shall be kept afloat or ready for instant launching.
- Lifesaving powerboats shall be equipped, at a minimum, as follows:
  - Two oars (oars not required on boats powered by an inboard motor);
  - Oarlocks attached to the gunwales or the oars;
  - One ball-pointed boat hook;
  - One ring buoy with 50 feet of 600 pound capacity line attached; and
  - PFD's in number equaling the powerboat rating for the maximum number of personnel allowed on board.

- Powerboats shall have flotation tanks or buoyant material capable of floating the boat and its equipment and the crew.
- On vessels without permanently mounted navigational lights, portable battery-operated navigation lights will be available and used for night operations.

3.2.6 Hand and Power Tools

Observe the following procedures and practices when working with hand and power tools:

- Keep hand tools sharp, clean, oiled, dressed, and not abused.
- Worn tools are dangerous: e.g., the “teeth” in a pipe wrench can slip if worn smooth; an adjustable wrench will slip if the jaws are sprung; hammerheads can fly off loose handles.
- Tools subject to impact (chisels, star drills, and caulking irons) tend to “mush-room.” Keep them dressed to avoid flying spalls. Use tool holders.
- Don't force tools beyond their capacity. No “homemade” handles or extensions (cheaters) are permitted! Don't use tools for pry bars.
- Flying objects can result from operating almost any power tool, so always warn people in the vicinity and use proper eye protection.
- Each power tool should be examined before use for damaged parts, loose fittings, and frayed or cut electric cords. Tag and return defective tools for repairs. Inspect also for adequate lighting, proper lubrication, and abandoned tools or material that could “vibrate into trouble.”
- Air must be shut off or the electric cord unplugged before making tool adjustments. Air must be “bled down” before replacement or disconnection.
- Proper guards or shields must be installed on all power tools before issue. Do not use improper tools or tools without guards in place.
- Replace all guards before start-up. Remove cranks, key, or wrenches used in ser-vice work.

3.2.7 Vehicular Traffic

Observe the following procedures and practices regarding vehicular traffic:

- Wear traffic safety vest when vehicle hazard exists.
- Use cones, flags, barricades, and caution tape to define work area.
- Use vehicle to block work area.
- Engage police detail for high-traffic situations.
- Always use a spotter in tight or congested areas for material deliveries.

3.2.8 Noise

Observe the following procedures and practices regarding noise:

- Wear hearing protection when equipment such as a drill rig, jackhammer, cut saw, air compressor, blower or other heavy equipment is operating on the site.
- Wear hearing protection whenever it is necessary to speak above normal conversational speech due to loud noise—this much noise indicates the need for protection.

- Conduct noise monitoring of suspected high noise operations at the beginning of the workday or start up of new operations to verify noise control/hearing protection requirements.

3.2.9 Lifting and Material Handling

Observe the lifting and material handling procedures and practices:

- Use leather gloves when handling metal, wire rope, sharp debris, or transporting materials (wood, piping, drums, etc.).
- The size, shape, and weight of the object to be lifted must first be considered. No individual employee is permitted to lift any object that weights over 60 pounds. Multiple employees or mechanical lifting devices are required for objects over the 60-pound limit.
- Plan a lift before doing it. Bend at the knees and lift with the legs; keep the natural curves of the back; do not use back muscles.
- Check route for clearance.
- Use the buddy system when lifting heavy or awkward objects.
- Do not twist body while lifting.
- Know the capacity of any handling device (crane, forklift, chain fall, come-along) that you intend to use.
- Use tag lines to control loads.
- Ensure that your body, material, tools, and equipment are safe from such unexpected movement as falling, slipping, rolling, tripping, bowing, or any other un-controlled motion.
- Trucks (i.e., flat beds) hauling equipment or materials must not be moved once rigging has been released.
- Chock all material and equipment (such as pipe, drums, tanks, reels, trailers, and wagons) as necessary to prevent rolling.
- Tie down all light, large-surface-area material that might be moved by the wind.
- When working at heights, secure tools, equipment, and wrenches against falling.
- Do not store materials or tools on ducts, lighting fixtures, beam flanges, hung ceilings, or similar elevated locations.
- Fuel-powered tools used inside buildings or enclosures shall be vented and checked for excessive noise

3.2.10 Fire Control

Observe the following fire control procedures and practices:

- Smoke only in designated areas.
- Keep flammable liquids in closed containers.
- Keep site clean; avoid accumulating combustible debris such as paper.
- Follow Hot Work Safety Procedures when welding or performing other activities requiring an open flame.
- Isolate flammable and combustible materials from ignition sources.

- Ensure fire safety integrity of equipment installations according to NEC specifications.

3.2.11 Static Electricity/Transfer of Flammable Liquids

Observe the following procedures and practices regarding static electricity when transferring flammable liquids:

- Do not create static discharge in flammable atmosphere.
- Electrically bond and ground pumps, transfer vessels, tanks, drums, bailers, and probes when moving flammable liquids.
- Electrically bond and ground vacuum trucks and the tanks they are emptying.
- Do not splash fill containers with flammable liquids.
- Pour flammable liquids slowly and carefully.
- Two Fire extinguishers (2A20: BC) must be available, charged, inspected, and readily accessible.

3.2.12 Cleaning Equipment

Observe the following procedures and practices when cleaning equipment:

- Wear appropriate PPE to avoid skin and eye contact with isopropyl alcohol, Alconox, or other cleaning materials.
- Stand upwind to minimize any potential inhalation exposure.
- Dispose of spent cleaning solutions and rinses accordingly.

3.3 Environmental Hazards and Controls

3.3.1 Mosquitoes

Mosquitoes in the New Caledonia have been known to carry West Nile Virus, St. Louis encephalitis, and Dengue Fever. To avoid mosquito bites:

- Apply insect repellent containing DEET (N,N-diethyl-meta-toluamide) when you're outdoors.
- Read and follow the product directions whenever you use insect repellent.
- Wearing long-sleeved clothes and long pants treated with repellent to further reduce your risk, as will staying indoors during peak mosquito feeding hours (dusk until dawn).
- Limit the number of places available for mosquitoes to lay their eggs by eliminating standing water sources from around the work area.
- Check to see if there is an organized mosquito control program near the project site. If no program exists, work with your local government officials to establish a program.

3.3.2 Poisonous Snakes

Observe the following procedures and practices regarding poisonous snakes:

- Avoid walking in areas where snakes may nest or hide. When walking, always look ahead for signs of snakes.

- Use extreme caution when moving or lifting objects that could be used by snakes as cover.
- Never reach under or behind objects or into other areas where snakes may hide.
- Poisonous snakebites are medical emergencies—seek immediate medical treatment.
- Wear sturdy leather boots.

3.3.3 Bird Droppings

Large populations of roosting birds may present a disease risk. The most serious health risks arise from disease organisms that grow in the accumulations of bird droppings, feathers, and debris under a roost – especially if roosts have been active for years. Among the fungal diseases associated with bird droppings, the two most common are Histoplasmosis and Cryptococcosis.

If you are working in an area where large quantities of droppings are present, follow certain precautions to minimize the risk from disease organisms in the droppings:

- Wear a respirator that can filter particles as small as 0.3 microns, such as a HEPA filter.
- Wear disposable protective gloves, hat, coveralls, and boots if you will be in close contact.
- Wash or shower at the work site after cleanup, if possible.
- Modify the structure or use methods to prevent birds from reestablishing the roost.

3.3.4 Feral Dogs

Feral dogs have shown up on several Gravity jobsites. Packs of feral dogs can be dangerous, so if you observe them on the site, call animal control immediately. If a dog approaches you, take the following steps to reduce your chances of being attacked:

- Don’t run away or run past the dog.
- Remain calm. Don’t scream. If you say anything, speak calmly and firmly. Avoid eye contact. Try to stay still until the dog leaves, or back away slowly until the dog is out of sight. Don’t turn and run.
- If you fall to the ground or are knocked down, curl into a ball, placing your hands over your head and neck. Protect your face.

If a dog bites someone, take the following steps:

- Restrain the dog immediately, if it is safe to do so. The dog will have to be quarantined or tested for rabies.
- Check on the victim’s condition. Call 911 if paramedic response is required.
- Call the EHS Department to arrange for medical treatment.

3.3.5 Rodent-Borne Diseases

Rodent infestation in the workplace has the potential to cause serious communicable diseases including hantavirus pulmonary syndrome and bubonic plague. The most common rodent-borne disease is hantavirus, which may infect workers who inhale tiny droplets containing the virus when fresh rodent urine, droppings or nesting materials are stirred up.

Working conditions that my put workers at risk of hantavirus include:

- Contact with rodent feces or dried urine which may mobilize particles of these wastes into the air where they may be inhaled
- Entry into rooms or warehouses that have been closed up and infested for extended periods
- Activities that stir up dust which may mobilize hantavirus

If working in areas of obvious rodent infestation, take the following precautions:

- Do not enter rooms or warehouses that have been closed up unless absolutely necessary.
- If work in closed up areas or areas with rodent infestation is necessary, contact professional exterminators to eliminate the infestation and clean up the location
- If an exterminator is not available/possible, employees should clean up the infested area using the following steps
  - When going into outbuildings or rooms that have been closed for an extended period, open them up and air out before cleaning
  - Don an air purifying respirator equipped with HEPA P-100 cartridges and nitrile gloves before cleaning
  - Don't stir up dust by sweeping up or vacuuming up droppings, urine or nesting materials
  - Thoroughly wet contaminated areas with detergent or liquid to deactivate the virus. Most general-purpose disinfectants and household detergents are effective. However, a hypochlorite solution prepared by mixing 1 and 1/2 cups of household bleach in 1 gallon of water may be used in place of commercial disinfectant.
  - Once everything is wet, take up contaminated materials with a damp towel, then mop or sponge the area with disinfectant.
  - Spray dead rodents with disinfectant and flea repellent (to avoid bubonic plague), then double-bag and dispose in appropriate waste disposal system. Contact the local or state health department for other disposal methods.
  - Finally, remove respirator and disinfect gloves before taking them off with disinfectant or soap and water. After taking off the clean gloves, thoroughly wash hands with soap and warm water.

If you experience hantavirus symptoms (fatigue, fever, and muscle aches) within 1 to 5 weeks of exposure to potentially affected rodents and their droppings, contact your supervisor immediately.

3.3.6 Heat Stress

Observe the following general procedures and practices regarding heat stress:

- Increase number of rest breaks and/or rotate workers in shorter work shifts.
- Watch for signs and symptoms of heat exhaustion and fatigue.
- During hot months, plan work for early morning or evening.
- Use ice vests when necessary.
- Rest in cool, dry areas.

3.3.6.1 Signs, Symptoms, and Treatment

Adverse climatic conditions are important considerations in planning and conducting site operations. High ambient temperature can result in health effects ranging from transient heat fatigue, physical discomfort, reduced efficiency, personal illness, increased accident probability, etc., to serious illness or death. Heat stress is of particular concern when chemical protective garments are worn since they prevent evaporative body cooling. Wearing personal protective equipment places employees at considerable risk of developing heat stress.

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses, regular monitoring and other preventive precautions are vital.

Heat Rash. Heat rash can be caused by continuous exposure to hot and humid air and skin abrasion from sweat soaked clothing. The condition is characterized by a localized red skin rash and reduced sweating. Aside from being a nuisance, the ability to tolerate heat is reduced. To treat, Keep skin hygienically clean and allow it to dry thoroughly after using chemical protective clothing.

Heat Cramps. Heat cramps are caused by profuse perspiration with inadequate electrolytic fluid replacement. This often robs the larger muscle groups (stomach and quadriceps) of blood which can cause painful muscle spasms and pain in the extremities and abdomen. To treat, remove employee to a cool place and give sips of water or an electrolytic drink. Watch for signs of heat exhaustion or stroke.

Heat Exhaustion. Heat exhaustion is a mild form of shock caused by increased stress on various organs to meet increased demand to cool the body. Onset is gradual and symptoms should subside within one hour. It symptoms include weak pulse; shallow breathing; pale, cool, moist skin; profuse sweating; dizziness; fatigue. To treat, remove employee to a cool place and remove as much clothing as possible. Give sips of water or electrolytic solution and fan the person continuously to remove heat by convection. Do not allow the affected per-son to become chilled—treat for shock if necessary.

Heat Stroke. Heat stroke is the most severe form of heat stress; the body must be cooled immediately to prevent severe injury and/or death. *This is a medical emergency!* Symptoms include red, hot, dry skin; body temperature of 105◦ Fahrenheit or higher; no perspiration; nausea; dizziness and confusion; strong, rapid pulse. Since heat stroke is a true medical emergency, transport the victim to a medical facility immediately. Prior to transport, remove as much clothing as possible and wrap the victim in a sheet soaked with water. Fan vigorously while transporting to help reduce body temperature. Apply cold packs, if available; place under the arms, around the neck, or any other place where they can cool large surface blood vessels. If transportation to a medical facility is delayed, reduce body temperature by immersing victim in a cool water bath (however, be careful not to over-chill the victim once body temperature is reduced below 102o F). If this is not possible, keep victim wrapped in a sheet and continuously douse with water and fan.

3.3.6.2 Prevention

The implementation of preventative measures is the most effective way to limit the effects of heat-related illnesses. During periods of high heat, adequate liquids must be provided to re-place lost body fluids. Replacement fluids can be a 0.1 percent salt-water solution, a commercial mix such as Gatorade, or a combination of these with fresh water. The replacement fluid temperature should be kept cool, 50o F to 60o F, and should be placed close to the work area. Employees must be encouraged to drink more than the amount required to satisfy thirst. Employees should also be encouraged to salt their foods more heavily during hot times of the year.

Cooling devices such as vortex tubes or cooling vests can be worn beneath impermeable clothing. If cooling devices are worn, only physiological monitoring will be used to deter-mine work activity.

All workers are to rest when any symptoms of heat stress are noticed. Rest breaks are to be taken in a cool, shaded rest area. Employees shall remove chemical protective garments during rest periods and will not be assigned other tasks.

All employees shall be informed of the importance of adequate rest and proper diet including the harmful effects of excessive alcohol and caffeine consumption.

3.3.6.3 Monitoring

Heat stress monitoring will be required when employees are working in environments exceeding 90ºF ambient air temperature. If employees are wearing impermeable clothing, this monitoring will begin at 78ºF. There are two general types of monitoring that the health and safety representative can designate to be used: wet bulb globe temperature (WBGT) and physiological. The Heat Stress Monitoring Record form (see Appendix B) will be used to record the results of heat stress monitoring.

Wet Bulb Globe Temperature (WBGT). The WBGT index is the simplest and most suitable technique to measure the environmental factors which most nearly correlate with core body temperature and other physiological responses to heat. When WBGT exceeds 25.9oC (78oF), the work regiment in Table 1 and Figure 1 of the section Heat Stress in the latest edition of the "American Conference of Governmental Industrial Hygiene (ACGIH) Threshold Limit Value (TLV) Booklet" should be followed.

Physiological. Physiological monitoring can be used in lieu of, or in addition to, WBGT. This monitoring can be self-performed once the health and safety representative demonstrates appropriate techniques to affected employees. Since individuals vary in their susceptibility to heat, this type of monitoring has its advantages. The two parameters that are to be monitored at the beginning of each rest period are:

- **Heart Rate** – The maximum heart rate (MHR) is the amount of work (beats) per minute a healthy person's heart can be expected to safely deliver. Each individual will count his/her radial (wrist) pulse as early as possible during each rest period. If the heart rate of any individual exceeds 75 percent of their calculated maximum heart rate (MHR = 200 - age) at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same. An individual is not permitted to return to work until his/her sustained heart rate is be-low 75 percent of their calculated maximum heart rate.
- **Temperature** – Each individual will measure his/her temperature with a thermometer for one minute as early as possible in the first rest period. If the temperature exceeds 99.6^{o}F at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same. An individual is not permitted to return to work if his/her temperature exceeds 100.4^{o}F

3.3.6.4 Training

Employees potentially exposed to heat stress conditions will be instructed on the contents of this procedure. This training can be conducted during daily tailgate safety meetings.

3.3.7 Cold Stress

Observe the following procedures and practices regarding cold stress:

- Take breaks in heated shelters when working in extremely cold temperatures.
- Upon entering the shelter, remove the outer layer of clothing and loosen other layers to promote evaporation of perspiration.

- Drink warm liquids to reduce the susceptibility to cold stress.
- Be aware of cold stress symptoms, including shivering, numbness in the extremities, and sluggishness.
- Provide adequate insulating dry clothing to maintain warmth if work is performed in air temperature below 40° F. Wind chill cooling rates and the cooling power of air are critical factors. The higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required.
- If the air temperature is of 32° F or less, hands should be protected.
- If only light work is involved and if the clothing on the worker may become wet on the job site, the outer layer of the clothing in use should be impermeable to water. With more severe work under such conditions, the outer layer should be water repellent, and the outer wear should be changed as it becomes wetted. The outer garments should include provisions for easy ventilation in order to prevent wetting of inner layer by sweat.
- If available clothing does not give adequate protection to prevent cold injury, work should be modified or suspended until adequate clothing is made available, or until weather conditions improve.
- Implementing a buddy system in which workers are responsible for observing fellow workers for early signs and symptoms of cold stress.

3.3.7.1 Signs, Symptoms, and Treatment

Cold stress can range from frostbite to hypothermia. Below are listed the signs and symptoms of cold stress. Personnel should follow the appropriate guidelines if any personnel exhibit these symptoms:

Frostbite - Pain in the extremities and loss of manual dexterity. "Frostnip" or reddening of the tissue, accompanied by a tingling or loss of sensation in the extremities. Continuous shivering.

Hypothermia -Pain in the extremities and loss of manual dexterity. Severe, uncontrollable shivering. Inability to maintain level of activity. Excessive fatigue, drowsiness, irritability, or euphoria. Severe hypothermia: clouded consciousness, low blood pressure, pupil dilation, cease of shivering, unconsciousness, and possible death.

Remove the patient to a warm, dry place. If clothing is wet, remove and replace with dry clothing. Keep patient warm. Re-warming of patient should be gradual to avoid stroke symptoms. Dehydration of the loss of body fluids may result in cold injury due to a significant change in blood flow to the extremities. If patient is conscious and alert, warm sweet liquids should be provided. Coffee and other caffeinated liquids should be avoided because of diuretic and circulatory effects. Extremities affected by frostbite should be gradually warmed up and returned to normal temperature. Moist compresses should be applied; begin with lukewarm compresses and slowly increase the temperature as changes in skin temperature are detected. Keep patient warm and calm, remove to a medical facility as soon as possible.

3.3.8 Inclement Weather

Observe the following procedures and practices regarding inclement weather:

- Stop outdoor work during electrical storms, hailstorms, and other extreme weather conditions such as extreme heat or cold.
- Take cover indoors or in vehicle.

- Listen to local forecasts for warning about specific weather hazards such as tornadoes, hurricanes, and flash floods.

4.0 Personal Protective Equipment

The minimum level of PPE should be selected according to the hazards that may be encountered during site activities in accordance with established U.S. EPA levels of protection (D and C). Only PPE that meets the following American National Standards Institute (ANSI) standards are to be worn:

- Eye protection - ANSI Z87.1-1989.
- Head protection - ANSI Z89.1-1986.
- Foot protection - ANSI Z41-1991.
- Traffic vest in high traffic areas and around heavy equipment.

4.1.1 Level D

Level D protection will be used when:

- The atmosphere contains no known hazard
- Work functions preclude splashes, immersions, or the potential for unexpected inhalation of, or contact with, hazardous concentrations of chemicals
- Atmospheric concentrations of contaminants are less than the Threshold Limit Value (TLV)

4.2 Activity Specific Levels of Protection

See Tables 4-2 and 4-3 for general PPE requirements for Levels D and C protection for project work sites.

Level D is the minimum acceptable level for sites where petroleum hydrocarbons are the COC. Upgrade to Modified Level D occurs when there is a possibility that contaminated media can contact the skin or work uniform. Upgrade to Level C occurs when the results of air monitoring reveals that action levels have been exceeded. Wear hearing protection when there are high noise levels. Workers must maintain proficiency in the use and care of PPE that is to be worn.

Table 4-4
Activity Specific PPE/Air Monitoring Summary

Job Task	PPE Level	Instrument	Monitoring Frequency / Special Requirements
Loading and unloading sample coolers, boat equipment, general non-sampling activities on boat	Level D	N/A	Hard hat for overhead hazards. PFD when working on or near water.
Operation of sampling vessel and equipment from inside boat house (MSS operator)	Modified Level D	N/A	Should not leave pilot house if overhead hazards, decontamination chemicals, or sediment exposure is possible. PFD when working on or near water.
Decontamination of sampling equipment	Level D with potential upgrade to Level C	PID	Potential upgrade to Level C when handling samples – presence of product odors. Air monitoring at start up of work at each

			task location, then every 30 – 60 minutes based upon air monitoring results. Monitor 15 minutes to continuously if action levels have been reached. Face shield with hard hat for splash hazard and overhead hazard. PFD when working on or near water.
General site duties, system O&M, operation of equipment, etc.	Level D	N/A	Hard hat for overhead hazards. PFD when working on or near water.

Note 1: "Start up of work at each new task location" means to monitor the air quality at each new operation on the site. The breathing zone is the area inside a 1-foot radius around the head.

Note 2: A downgrade in the air monitoring program must be approved by the SHSO and HSM.

5.0 Decontamination

5.1 Decontamination Procedures

Operations conducted at this site have the potential to contaminate field equipment and PPE. See the following sections for the decontamination procedures that must be followed to prevent the transfer of contamination to vehicles, administrative offices, and personnel.

5.1.1 Field Equipment

Field equipment can include bailers, interface probes, hand tools, drill augers, and miscellaneous sampling equipment. Observe the following practices and procedures when decontaminating field equipment:

- Decontaminate with a solution of detergent and water; rinse with water prior to leaving the site.
- Protect from exposure by covering with disposable covers such as plastic to minimize required decontamination activities.

5.1.2 Disposable PPE

Disposable PPE can include Tyvek suits, inner latex gloves, respirator cartridges. Observe the following practices and procedures when decontaminating disposable PPE:

- Dispose of according to the requirements of the client and state and federal agencies.
- Change out respirator cartridges daily and dispose accordingly.

5.1.3 Non-disposable PPE

Non-disposable PPE can include respirators and boots and gloves. When decontaminating respirators, observe the following practices and procedures:

- Wipe out respirator with disinfecting pad prior to donning.
- Decontaminate on site at the close of each day with a solution of an approved sanitizing solution.

When decontaminating boots and gloves, observe the following practices and procedures:

- Decontaminate outside with a solution of detergent and water; rinse with water prior to leaving the site.
- Protect from exposure by covering with disposable covers such as plastic to minimize required decontamination activities.

5.1.4 Emergency Decontamination

Personnel with medical problems or injuries may also require decontamination. There is the possibility that the decontamination may aggravate or cause more serious health effects. If prompt lifesaving, first aid, and medical treatment are required, decontamination procedures will be omitted. In either case, a member of the site management team will accompany contaminated personnel to the medical facility to advise on matters involving decontamination.

5.1.5 Sanitizing of Personal Protective Equipment

Respirators, reusable protective clothing, and other personal articles not only must be decontaminated before being reused, but also sanitized. The insides of masks and clothing become soiled due to

exhalation, body oils, and perspiration. Manufacturer's instructions should be used to sanitize the respirator masks. If practical, reusable protective clothing should be machine-washed after a thorough decontamination; otherwise, it must be cleaned by hand.

6.0 Site Control/Communications

6.1 Site Control

To prevent contamination from migrating from personnel and equipment, work areas will be clearly specified as an Exclusion Zone (EZ), Contaminant Reduction Zone (CRZ), or Support Zone (SZ) prior to beginning operations. Each work area will be clearly identified using signs or physical barriers.

The primary purpose for site controls is to establish the hazardous area perimeter, to reduce migration of contaminants into clean areas, and to prevent access or exposure to hazardous materials by personnel. At the end of each workday, the site should be secured and/or guarded to prevent unauthorized entry. Site work zones will include:

- **Clean Zone/Support Zone (SZ)**. This uncontaminated zone will be the area outside the exclusion and decontamination (decon) zone and within the geographic perimeters of the site (boat and processing area). This area is used for staging of materials, parking of vehicles, office and laboratory facilities, sanitation facilities, and receipt of deliveries. Personnel entering this zone may include delivery personnel, visitors, security guards, etc., who will not necessarily be permitted in the exclusion zone.
- **Contaminant Reduction Zone (CRZ).** The contaminant reduction zone will provide a location for removal of contaminated PPE and final decontamination of PPE. A separate decontamination area will be established for heavy equipment. All personnel and equipment must exit via the decon area.
- **Exclusion Zone/Hot Zone (EZ)**. The exclusion zone will be the “hot zone” or contaminated area inside the site perimeter (sample collection area of boat). Entry to and exit from this zone will be made through a designated point. Appropriate warning signs to identify the exclusion zone should be posted (i.e., DANGER, AUTHORIZED PERSONNEL ONLY, PROTECTIVE EQUIPMENT BEYOND THIS POINT, etc.). Personnel and equipment decontamination must accompany exit from the exclusion zone.

For sediment investigations, the exclusion zone is defined as the area where individuals may come in direct contact with potentially contaminated sediment (i.e. sampling equipment, decontamination area and chemicals, bow of sampling vessel). For core extrusion activities, the exclusion zone will be defined as the area where extrusion activities occur.

A log of all personnel visiting, entering, or working on the site shall be maintained by the SS or SHSO. No visitor will be allowed in the EZ without showing proof of training and medical certification, per 29 CFR 1910.120(e), (f). Visitors will attend a site orientation given by the SS/SHSO and sign the HASP.

6.1.1 General Site Control Safety Procedures

The following are standard safe work practices that apply to all site personnel; they will be discussed in the safety briefing prior to initiating work on the site:

- Eating, drinking, chewing gum or tobacco, and smoking is prohibited in the EZ/CRZs.
- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco, and smoking.
- A buddy system will be used. Hand signals will be established to maintain communication.

- During site operations, each worker will consider himself as a safety backup to his partner. Off-site personnel will provide emergency assistance.
- Visual contact will be maintained between buddies on-site when performing hazardous duties.
- No personnel will be admitted to the site without the proper safety equipment, training, and medical surveillance certification.
- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the SS/SSO, will be immediately dismissed from the site.
- Proper decontamination procedures must be followed before leaving the EZ.

6.1.2 Site Security and Work Zone Definition

This Section contains general guidelines for developing site security measures for working in a street or roadway and excavations.

6.1.2.1 Working In Street or Roadway

Observe the following site control practices and procedures when working in streets or road-ways:

- Wear traffic vest and hardhat when vehicle hazard exists.
- Use cones, flag-mounted cones, caution tape, and/or barricades.
- Use vehicle strobe light and block area with truck.
- Develop traffic flow plan for high traffic situations (as appropriate):
  - use flag person
  - use flashing arrow sign
  - use “MEN WORKING” signs liberally
  - obtain lane closing permits
  - engage police details

6.2 Field Communications

Communications between all Shaw employees and subcontractors at the work site can be verbal and/or non-verbal. Verbal communication can be affected by the on-site background noise and various PPE. See Table 6-1 for a list of the type of communication methods and equipment to use, depending on site conditions. Communication equipment must be checked daily to ensure proper operation. All project personnel must be initially briefed on the communication methods prior to starting work; communication methods should be reviewed in Daily Tailgate Safety Meetings.

Table 6-1
Field Communication Methods

Communication Device	Type of Communications	Signal
Telephone On-Site Or Cellular Telephone	Emergency notification	Initiate phone call using applicable emergency numbers
Two-way Radio	Emergency notification among site personnel	Initiate radio communication with Code Red message
Compressed Air Horn	Hailing site personnel for non-emergency	One long blast, one short blast
Compressed Air Horn	Hailing site personnel for emergency evacuation	Three long continuous blasts
Visual	Hailing site personnel for distress, need help	Arms waved in circle overhead
Visual	Hailing site personnel for emergency evacuation	Arms waved in criss-cross over head
Visual	Contaminated air/strong odor	Hands clutching throat
Visual	Break, lunch, end of day	Two hands together, break apart

7.0 Emergency Response and Contingency Plan

In the event of an emergency, immediate action must be taken by the first person to recognize the event.

7.1 Spills and Releases of Hazardous Materials

When required, notify the National Response Center. The following information should be provided to the National Response Center:

- Name and telephone number.
- Name and address of facility.
- Time and type of incident.
- Name and quantity of materials involved, if known.
- Extent of injuries.
- Possible hazards to human health or the environment outside of the facility.

The emergency telephone number for the National Response Center is 800-424-8802. If hazardous waste has been released or produced through control of the incident, ensure that:

- Waste is collected and contained.
- Containers of waste are removed or isolated from the immediate site of the emergency.
- Treatment or storage of the recovered waste, contaminated soil or surface water, or any other material that results from the incident or its control is provided.
- Ensure that no waste that is incompatible with released material is treated or stored in the facility until cleanup procedures are completed.
- Ensure that all emergency equipment used is decontaminated, recharged, and fit for its intended use before operations are resumed.

7.2 Emergency First Aid Procedures

- Maintain a first aid kit and eye wash station on site.
- Survey the situation. Do not endanger your own life. Do not enter a confined space to rescue someone who has been overcome unless properly equipped and trained. Ensure all protocols are followed including that a standby person is pre-sent. If applicable, review MSDS to evaluate response actions for chemical exposures.
- Call 911 (if available) or the fire department immediately. Explain the physical injury, chemical exposure, fire, or release.
- Decontaminate the victim without delaying life-saving procedures.
- If the victim's condition appears to be non-critical, but seems to be more severe than minor cuts, he/she should be transported to the nearest hospital by trained Emergency Medical Services (EMS) personnel: let the doctor assume the responsibility for determining the severity of the injury. If the condition is obviously serious, EMS must transport the victim.
- Notify the PM, SS and the SHSO. Complete the appropriate incident investigation reports.

7.2.1 Stop Bleeding and CPR Guidelines

To Stop Bleeding

Perform the following steps to stop bleeding. Responder must have a current certificate to administer first aid.

1. Give medical statement.
2. Assure airway, breathing, and circulation.
3. Use direct pressure over the wound with clean dressing or your hand (use non-permeable gloves). Direct pressure will control most bleeding.
4. Bleeding from an artery or several injury sites may require direct pressure on a pressure point. Use pressure points for 30 to 60 seconds to help control severe bleeding.
5. Continue primary care and seek medical aid as needed.

CPR

Perform the following steps to administer CPR. Responder must have a current certificate to administer CPR.

1. Make sure the scene is safe before administering aid to the victim.
2. Arousal: Check for consciousness. If not conscious continue with these CPR instructions.
3. Open airway with chin-lift.
4. Look, listen, and feel for breathing.
5. If breathing is absent, give 2 breaths (1 second each) with visible chest rise. NOTE: Use a CPR mask or other approved barrier device if possible.
6. Bare victim's chest and locate CPR finger position.
7. Deliver first cycle of 30 chest compressions at a rate of not less than one per second.
8. Repeat Steps 5, 6 and 7 until an AED has arrived and is ready to deliver a shock, or you have been relieved by another CPR-trained person or professional emergency response personnel.

7.2.2 Injury Management/Incident Notification

Observe the following injury management/incident notification procedures and practices:

Injury Management

Observe the following injury management procedures and practices:

- Once a personal injury incident is discovered the first action will be to ensure the injured party received appropriate medical attention.
- If it is safe to do so, the nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident.
- The work crew supervisor will be summoned. The work crew supervisor will immediately make contact with the PM or other designated individual to alert them of the medical emergency. The work crew supervisor will advise and perform the following "Care of the Employee":
  - Location of the victim at the work site.

- Nature of the emergency.
- Whether the victim is conscious.
- Specific conditions contributing to the injury, if known.
- Escort the injured person to the occupational clinic or hospital or arrange for ambulance.

Notification Requirements

Directly After "Care of the Employee," make the following notifications, in order:

- Contact the PM and H&S Manager immediately
- PM will contact upper line management
- The H&S Manager will facilitate the incident investigation

All client requirements will also be adhered to pertinent to personal injury incident reporting.

Incident Other Than Personal Injury

All incidents including fire, explosion, property damage, environmental release etc. will be responded in accordance with the AECOM site specific Health and Safety Plan. In general, this includes securing the site appropriate to the incident, turning control over the emergency responders, or securing the site and summoning appropriate remedial personnel or equipment. Gravity will immediately notify the client of any major incident, fire, equipment/ property damage, and environmental incident with a preliminary report. A full report will be provided within 72 hours.

7.3 Site Emergency Information

Table 7-1
Site Emergency Form / Emergency Phone Numbers*

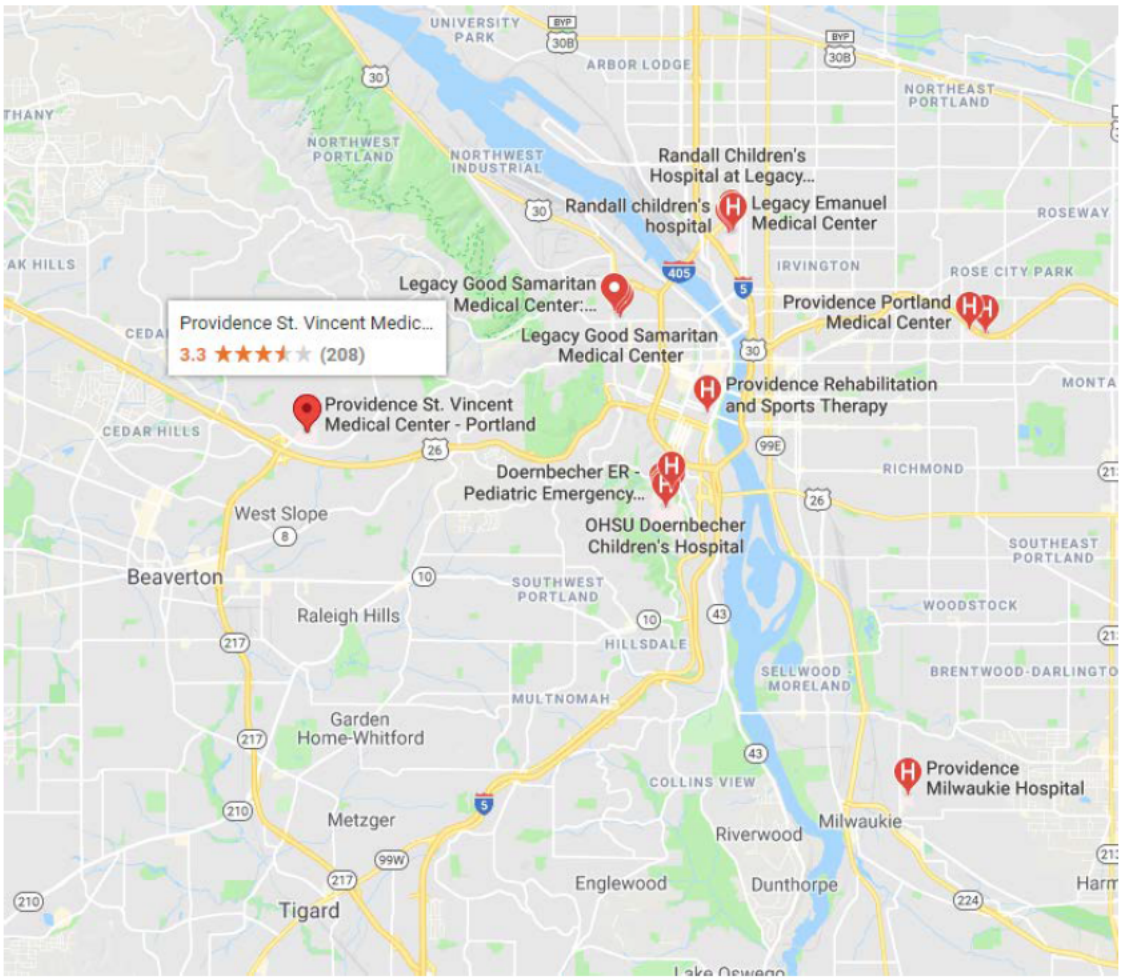
Category	Information
Possible Contaminants of Concern	Heavy Metals, organics
Minimum Level of Protection	Level D
Site(s) Location Address	Fred Devine and Salvage
Emergency Phone Numbers	
Contact	Project Manager 425-281-1471
Ambulance	15
Fire	15
Police	16
Poison Control	1-800-222-1212
Project Manager (PM)	Shawn Hinz
Site Supervisor (SS)	Chad Furulie
Site Health and Safety Officer (SHSO)	Jeff Wilson
Project Health and Safety Manager (PHSM)	Jeff Wilson

National Response Center	1-800-424-8802

**In the event of any emergency contact the Project Manager (PM) or the Health and Safety Representatives (SHSO or Project CIH)*

Table 7-2
Hospital Information: TBD

Category	Information
Name:	Providence St. Vincent Medical Center
Address:	9205 SW Barnes Rd,
City, State:	Portland, OR 97225
Phone:	(503) 216-1234
Emergency Phone:	



APPENDICES

GRAVITY Consulting LLC

Appendix A
Safety Plan Acknowledgement Form

Safety Plan Acknowledgement Form

Project #: 081236 **Project Name:**

I have read the site-safety plan for this site and fully understand its contents.

Date	Name	Company

Appendix
B
Offshore Medical Certifications

Chemical Name: sodium azide ***C.A.S. No.:*** 26628-22-8

Synonyms: azide, azium, Hydrazoic acid sodium salt, U-3886, kazoe, NSC 3072, smite, azoture de sodium (FRENCH), natriumazid (GERMAN), natriummajide (DUTCH), azoturo di sodium (ITALIAN)

Formula: NaN3 ***Structure:*** $Na^{+}\ ^{-}N = N^{+} = N^{-}$ (two crystalline forms are known: rhombohedral and hexagonal)

Description: Colorless to white solid, it is highly toxic to humans and presents a severe explosion risk when shocked or heated. Used as a probe, mutagen, and a preservative in lab sample preps to prevent microbiological growth in laboratory preparations by inhibiting cytochrome oxidase in gram negative bacteria (gram positive bacteria are resistant). It is also used in the preparation of other azides, some energetically favorable (Cu, Pb, Ag).

Hazards: Sodium azide is on the Special Health Hazard Substance List because it is a mutagen. Mutagens may have a cancer risk - sodium azides current status is A4; Not classifiable as a human carcinogen, as sodium azide or as hydrazoic acid vapor. All contact with this substance should be reduced to the lowest possible level. This substance is also on the EPA Hazardous Substance List (P105) and is considered an acutely hazardous waste when discarded as an unused, off specification commercial chemical product, or spill residue. Note that metal shelves and other metal items used to handle sodium azide (i.e., spatulas, plumbing) can also result in the formation of shock sensitive heavy metal azides and thus should be avoided. It is for this reason no azide compounds should be released into plumbing drains. Solid sodium azide can explode from heating or shock. Solutions of sodium azide do not pose the same danger of shock-sensitivity or explosion associated with the solid form, however, the toxic hydrazoic acid is generated and volatizes at room temperature when the sodium azide is dissolved in water.

Emergency Exposure Procedures:

Ingestion

Sodium azide poisoning by ingestion is treated with supportive medical care in a hospital setting. No specific antidote exists for sodium azide poisoning. The most important thing is for victims to seek medical treatment as soon as possible. Call Public Safety at x2111 immediately and request assistance.

Eye/Skin

If your eye or skin is exposed to NaN3 or HN3, use the emergency eye wash to immediately flush with large amounts of water for 15 minutes and then seek medical attention. If you swallow or inhale NaN3, seek medical attention immediately.

.

Exposure Limits:

OSHA: Vacated 1989 OSHA PEL Ceiling limit 0.1 ppm (as HN3) with skin designation*. A ceiling limit of 0.3 mg/cu m (as NaN3) with skin designation* is still enforced in some U.S. states.
Non-Regulatory:
NIOSH: The recommended airborne exposure limit is 0.11 ppm as hydrazoic acid or 0.3 mg/m3 as sodium azide, which should not be exceeded at any time.
ACGIH: The recommended airborne exposure limit is 0.11 ppm as hydrazoic acid or 0.29 mg/m3 as sodium azide (0.1 ppm Ceiling with skin designation*), which should not be exceeded at any time.

* The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.

Storage:

If not dissolved, solid sodium azide should be stored in a secured cabinet because of the extremely low toxicity and shock hazard. Solutions of sodium azide do not pose the danger of shock-sensitivity associated with the solid form. Incompatibles: acid chlorides and halogenated solvents
CONDITIONS TO AVOID: AVOID CONTACT WITH METALS, AVOID CONTACT WITH ACID. HEAT-SENSITIVE.

***Spill Procedures*:** Solid form: Reclaim any material that can be reused and place in a labeled container. Place all unwanted material into an appropriately sized container not larger than 1kg labeled *"Hazardous Waste – sodium azide crystal* (approx mass)*, spill debris"* including any material used to decontaminate surfaces. Use as many 1Kg containers as needed. Cap securely and store in satellite accumulation area. *Liquid Form*: Use spill kit, or other absorbent material and place absorbent material into an appropriately sized container not larger than 1Kg in size labeled *"Hazardous Waste – sodium azide (concentration and volume), spill debris"* including any material used to decontaminate surfaces. Use as many 1Kg containers as needed Cap securely and store in satellite accumulation area.

General Precautions:

Take precautions to avoid contact with metals. Take precautions to avoid shock in the solid form. The solution is should be prepared inside a laboratory chemical hood to avoid exposure to hydrazoic acid. Hydrazoic acid has similar toxicity as solid sodium azide. Sink disposal of solutions of azide compounds that have not been deactivated must be avoided.

Work Description / Procedures:

Sodium azide is used primarily as a preservative to prevent microbiological growth. For Sediment Traps the Sodium Azide is diluted to .05 umol to prevent biofouling.

Detailed Procedures for Sediment Traps:

Sodium Azide will be used in each 5 liter glass sediment trap to minimize biofouling. Sodium Azide will be diluted in the laboratory to a solution of .05 umol and distributed to vessel. Dilutions will always be conducted under a hood with proper PPE. On Vessel 2 liters of Sodium Azide solution will be poured in each trap followed by 3 liters of river water. Traps will be capped and deployed to the river bottom by diver where the caps will be removed and the traps set for 3 months. After 3 months the traps will be capped by diver, brought to the surface and processed. Water from the traps will be decanted by siphon into a disposal bucket (see below).

Experimental Safety Precautions:

Ensure the following precautions are taken:

1. Always wear eye protection
2. Always wear gloves
3. Ensure only diluted Sodium Azide is used on vessel and that all dilutions are conducted at the laboratory
4. Ensure waste is properly disposed of (see below)
5. Conduct specific tool boxes regarding the hazards

Disposal: Sodium azide is among the P-listed hazardous wastes regulated by the US Environmental Protection Agency. As a discarded commercial chemical product, off specification species, container residues or spill clean up material, it must be managed as a P-coded hazardous waste. After Samples are collected by the sediment traps all liquid in each trap will be disposed of in a 5 gallon waste bucket and disposed of at a Hazardous Waste Facility.

REFERENCES

Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH), Pocket Guide to Chemical Hazards.

Generic NaN3 MSDS:
http://aben.cals.cornell.edu/bmb lab/msds/naazide.html

Northeastern University Fact sheet:
http://www.ehs.neu.edu/hazardous waste/fact sheets/sodium azide/

SITE SAFETY HEALTH AND DIVING OPERATIONS PLAN

PROJECT: Portland Harbor Superfund Pre-Remedial Investigation

LOCATION: WILLAMETTE RIVER, PORTLAND, OREGON

Submitted To:
Gravity Marine Services

Submitted By:
Global Diving & Salvage Inc
3840 W Marginal Way SW
Seattle, WA 98106
206-623-0621

The following personnel have reviewed and prepared this Site Safety Health and Diving Operations Plan:

TBD
Diving Supervisor - Global Diving & Salvage, Inc

Tracy Krawiec
Dive Safety Specialist- Global Diving & Salvage, Inc

Jeff Birchfield
HSE Program Manager - Global Diving & Salvage, Inc

In order to provide information in a clear and concise manner, the Site Safety Health and Diving Operations Plan has been divided into sections identified by the following headings:

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1. GENERAL PROVISIONS

The following document concerns the sampling work to be performed in the Willamette River in Portland Oregon, and, addresses the associated site specific health, safety, and diving operational requirements. Global Diving & Salvage ("Global") and its subcontractors will follow Global's Injury and Illness Prevention Plan, Manual of Safe Diving Practices, Site Specific Health and Safety Plan, and all applicable state, federal, and industry health and safety guidelines. Global's safety manuals are available at any time upon request.

1.1 *Regulatory Compliance*

As a rule, Global performs all diving related work to the standards set forth by the governing body of the ADCI. If there is any conflict between operational standards set forth by the ADCI or any other governing organization such as OSHA, Global will follow whichever rule is the most strict when applied to the safety of any person working at the site.

All site activities will also comply with the following regulations and industry guidance publications. Global personnel and their subcontractors will follow the strictest requirement on the work site:

- Occupational Safety and Health Administration (OSHA) Construction Industry Standards, 29 CFR 1926
- Occupational Safety and Health Administration (OSHA) General Industry Standards, 29 CFR 1910
- Occupational Safety and Health Administration (OSHA) Commercial Diving Standards 29 CFR Part 1910, and Subpart T
- Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response, 29 CFR 1926.65 or 29 CFR 1910.120
- United States Coast Guard (USCG), 46 CFR 197, Subpart B
- ADCI (Association of Diving Contractors International), Industry Standards, 6th Edition

1.2 *Personnel Requirements*

Manning requirements will meet industry best practices and clients' requirements to ensure the project is completed in a safe manner, whichever is the strictest. All crew will have the specific certifications and training required for the project. All Global personnel receive new hire orientations, annual training, and specific training to their position. All certifications or proof of training are kept electronically and are available upon request.

1.2.1 Job Specific Personnel Requirements

- Crew will receive an overview of Site Specific Health and Safety Plan
- Daily safety topics and JSA's reviewed at Tailgate Meetings

1.2.2 Personnel Certification Requirements

- First Aid, CPR, AED, BLS, O2 Provider
- 24hr Initial HAZWOPER with current 8hr HAZWOPER refresher
- Current Fit to Work *(Diving personnel must have ADCI and Global compliant physical)*
- TWIC
- All diving personnel shall have ADCI Certification(s) for the position in which they are filling.
- Personally-owned diving equipment shall have (but not limited to) the following:
  - Current helmet certification
  - Bailout - must have gauge, current visual, current hydro (5 years)
  - ADCI approved diving harness

1.2.3 Personnel Training Requirements

- Employee Training (required annually, meets Global programs and regulatory requirements)
- 8hr HAZWOPER Refresher
- Incident Reporting
- Lock Out Tag Out
- Hazard Communication
- Personal Protective Equipment
- Marine Debris Training (Offshore)
- Emergency Action Plan & Procedures
- Hearing Loss Prevention
- O2 Provider
- CPR and First Aid
- Blood Borne Pathogens
- Behavior Based Safety Program (BBS)
- Rigging & Signal Person Training (as applicable)
- Supervisors must have ADCI Supervisor Card, Global's Supervisors Training, and Letter of Appointment on file.
- Personnel new to the project site, they shall complete a vessel orientation.
- Diving Medical Technician's (DMT) are required to maintain current refreshers and a National Board of Hyperbaric Medical Technology certification.

1.2.4 PPE (Personal Protective Equipment)

PPE should be used as a last line of defense to mitigate safety concerns after all engineering controls have been exhausted. PPE requirements vary project to project, however these are the requirements for this project in particular:

- Hard hat
- Proper clothing to protect against the elements
- Steel toed boots
- Safety glasses
- Reflective high visibility vest, or garment
- Gloves to be carried at all times and used during tending, rigging, mooring and as appropriate
- Hearing protection, fall-arrest or fall-protection and respirators will be worn as required by state and federal regulations.
- High visibility life jackets shall be worn when working over or near the water

1.2.5 Visitors

Visitor access to the regulated project area (the dive station and area above or around where the diver will be working) will be restricted. The following criteria must be met for visitors to gain access to this area:

- Visitors will be employees and/or representatives of designated contractors. All visitors must wear PPE, including approved life jacket or high visibility vest if necessary, hardhat if necessary, safety glasses, and safety toed shoes.
- Visitors must read and sign the Safety Plan Acknowledgement Sheet. By signing the form, visitors agree to comply with all specifications contained in the Site Specific Health and Safety Plan and with all applicable requirements.
- Visitors who do not adhere to these requirements will not be allowed access and/or will be requested to leave the regulated work area.

2. DIVING OPERATIONS

All Diving Operations fall under Global's Manual of Safe Diving Practices (MSDP). For this project, the following considerations and site specific information shall be reviewed, and additional hazards are to be identified and addressed prior to diving operations.

2.1 *Scope of Work*

Title: RM11E SEDIMENT SAMPLING

Location: WILLAMETE RIVER, PORTLAND OREGON

Date: TBD

Client: GRAVITY MARINE

The scope of work is to assist with the setting and recovery of 4 sediment traps, and installation of Porewater samplers into surface sediments, with a (3) man commercial diving team

2.2 *Diving Station*

Diving will occur off a Global diving support vessel (DSV). The Diving Supervisor directs the diving operations from the diving control station onboard the DSV, maintaining full visibility of diving operations: tending operations, diver entry and exit, and other concurrent operations. Communication is maintained by the Diving Supervisor with deck crew via a two way communication system as well as a separate two way communication system with the diver. In addition, the Diving Supervisor monitors the diver's work and movements via a diver helmet mounted video camera system.

2.3 *Surface Supplied Diving Equipment*

The following equipment below (but not limited to) will support diving operations throughout the project and are considered life support systems.

- Surface Control Station
- Diesel driven Model 325 air compressor (primary air supply)
- Air supply manifold with low pressure alarm and pneumo depth gauges
- Diving umbilicals plus standby umbilicals capable of reaching the farthest points of any diver location
- Surface supplied diving helmets with U/W camera and light
- Closed circuit television (CCTV) video system with recording capabilities
- ADCI approved first aid kit
- Automated external defibrillator (AED)
- Divers Alert Network (DAN) Emergency Oxygen kit
- Stokes litter
- Certified commercial diving helmets

2.3.1 Critical Surface Supplied Redundant Diving Equipment

- Air bank rack (2) 220cf air cylinders
- Deck whips (low and high pressure)
- Diving umbilicals

- Dive radio
- Diving helmets

2.3.2 Project Specific Tools and Equipment

Sampling and collection items

2.3.3 Equipment Certifications

Air certification for breathing air compressors, annual hose certifications, chamber hydro certifications, and bi-annual pneumofathometer certifications used on this project are available upon request.

2.4 *Diver Ingress and Egress*

A ladder will be the primary means of diver ingress and egress to and from the water. In the event of a LARS failure, a backup LARS will be utilized or a ladder for egress procedures.

- The Diver shall be tended from the deck of the DSV and the dive control conducted from the diving control station onboard the DSV to allow the Diving Supervisor to be in continuous communication during the dive.

2.5 *Ambient Conditions*

The Diving Supervisor on site will determine safe working conditions, taking into account the following.

- Divers may encounter limited visibility and strong currents
- Water temperatures are expected to be between47-49 degrees fareheit. (Divers will wear dry suits as their primary thermal requirements)
- Water velocity is expected to range from 0 – 1.5 knots during operations

2.5.1 Maximum Anticipated Depth and Bottom Times

Anticipated depth is < 30 ffw

2.6 *Diving Mode*

Surface supplied diving

2.7 *Decompression Mode*

No decompression diving schedules shall be followed as per Global (US Navy Rev 6) Surface Supplied Air diving Tables

3. DIVING OPERATIONAL ROLES AND ASSIGNMENTS

A (3) man commercial diving team shall be assigned the following assignments throughout the project. The Diving Supervisor is ultimately responsible for the safety of all personnel and equipment working on the project. He is responsible for working with the Global Regional Manager, Regional Dive Operations Manager and the HSE Group on all matters concerning the safety of the operation.

3.1 *Dive Team Members Project Assignments*

Diving personnel shall be assigned their duties prior to the start of any dive. These duties are to be assigned by the Diving Supervisor and may be changed from time to time as required.

3.2 *Diving Supervisor*

The Diving Supervisor is responsible for safe and efficient conduct of the entire job and is ultimately responsible for all diving operations. Duties include (but are not limited to) the following:

- Monitors gas supplies to divers
- Has the ultimate responsibility and stop work authority in commercial diving operations
- Monitors diver radio communications to constantly remain abreast of events of the dive
- Remains at the dive station throughout the entire dive, including any in-water decompression that may be required
- Monitors real-time video feed via a helmet-mounted camera
- Involved in all topside communications (especially crane operations)

3.2.1 Log book

For each dive, a dive log will be filled out completely. In addition, the Diving Supervisor shall keep a running log of the day's events both on deck and in the water.

3.2.2 Pre-Dive

The Diving Supervisor will conduct a pre-dive conference with all members of the dive team and on site customer personnel prior to commencement of diving operations. Items of discussion will include the day's activities, safety awareness items, and development and discussion of JSA's that may be pertinent to the activities.

3.2.3 Safety Inspections

The Diving Supervisor will conduct a safety inspection of the worksite, equipment, and materials prior to commencing diving. Any identified safety items or procedures brought up by the crew or contractor will be mitigated prior to work.

3.2.4 Post Dive

After the completion of each dive, the Diving Supervisor shall:

- Question each Diver as to his physical condition
- Instruct Divers to report any physical problems or adverse physiological effects, including symptoms of decompression sickness or gas embolism
- Advise the Diver of the nearest location of an operational decompression chamber
- Alert each Diver to the potential hazards of flying after diving or undergoing a change in elevation

3.3 *Divers*

The Diver's duty is to perform tasks as required and directed by the Diving Supervisor, including the following specific tasks:

1. Provide clear, concise, and constant communications to topside
2. Be aware of surrounding underwater hazards at all times
3. Maintain proper ascend /descend rates as per US NAVY DIVING TABLES REV. 6
4. Maintain umbilical management practices throughout the dive

3.4 *Diver Medic Technician (DMT)*

DMT's are members of the dive team and provide first response in assisting an injured or unwell diver. They may remotely communicate with diving physicians to provide the necessary treatment until arrival on scene. The DMT also supports the hyperbaric chamber personnel with providing continued treatment under the care of a hyperbaric physician. Roles of the DMT include, but are not limited to the following:

- Administer first aid and emergency treatment.
- Carry out the directions of a doctor pending the arrival of a more skilled medical aid
- Communicate understandably by telephone or radio with a doctor as necessary
- Be familiar with diving procedures and compression chamber operation
- Assist the diving supervisor with decompression procedures and advise when medical help should be sought

Note: Not all projects will have a DMT onsite

3.5 *Standby Diver*

The duty of the standby diver is to provide assistance to the diver(s) in an emergency. The standby diver should have all required equipment readily available and be ready to provide emergency assistance when called upon by the supervisor. The standby diver should be versed in the scope of work the diver is performing in order to render assistance immediately if required.

A qualified surface standby diver shall be readily available. Duties include, *(but are not limited to)* the following:

- Ensure the surface diving equipment is maintained and ready for intervention within the surface diving range
- The surface standby diver shall be dressed for diving with equipment readily available
- Be ready to make an emergency surface dive for an emergency situation

The standby diver will be versed in the scope of work the diver is performing so as to be ready to render assistance at a moment's notice if required. The standby diver's gas supply shall be segregated from the main supply in case of gas contamination. The standby diver will not occupy any other position or perform other duties while performing standby diver duties. The standby diver shall remain near the dive radio to stay abreast of all underwater activities.

3.6 *Tenders*

Tenders are qualified to tend divers and assist in operating surface support equipment under the direct supervision of fully-qualified diving and/or professional tending personnel. Tender duties include (but not limited to) the following tasks:

- Assist in dressing and undressing the diver's equipment

- Continuously tend the diver while the diver is entering, working in and exiting the water and to be aware of the diver's location and depth throughout the dive
- Be aware of the scope of work the diver is performing so tooling can be readied

3.7 *Time Keeper*

The diving supervisor or DPIC, as designated by the diving supervisor shall conduct time keeping procedures for diving operations.

4. SITE SPECIFIC SAFETY

This section addresses the site specific safety considerations for the project. Additional hazards identified are to be mitigated utilizing a Job Safety Analysis (JSA) and at tailgate meetings. All Global safety policies are to be followed in addition to the site specific safety concerns.

4.1 *Site Background*

4.2 *Job Safety Analysis (JSA's)*

The Job Safety Analysis is an important tool used to identify and analyze all of the hazards associated with each task on a given project to then formulate a safe working procedure to eliminate or minimize exposure to the potential hazards.

4.2.1 Specific JSA's for this project (but not limited too) the following

- Diver Recovery
- Communications
- Slips-Trips- Falls
- Vessel Traffic

JSA's shall be performed for all heavy lift operations; work tasks with a history of injury/near miss incidents; operations with catastrophic potential such as fire, explosion, toxic atmosphere, or oxygen deficient atmosphere; new personnel performing the task; or work rarely performed.

A JSA may be developed and completed at the client request or when directed by the Diving Supervisor or Project Manager.

4.3 *Stop Work Authority*

Anyone can stop work, make a hazard observation, or fix an unsafe condition. Global authorizes anyone on the job site to exercise "Stop Work Authority" immediately if there is a safety concern on any portion of the operation or if they believe there is an immediate threat to life, health, or the environment so it can be addressed immediately.

Employees may stop work with fellow co-workers and/or go to their Supervisor, Superintendent, Regional Manager, Regional Dive Operations/Enviro Operations Manager or the Health, Safety, Environmental (HSE) Group for additional support. Before continuing an operation, the designated person in charge, supervisor, or superintendent on site has the authority to evaluate the stop work and ensure the appropriate mitigations are put into place prior to resuming work.

A "time out for safety" may be exercised in the event that an employee feels a risk needs to be addressed prior to it becoming a threat to life, health, or environment. For "time out for safety," the team, including the direct supervisor, will address the situation before continuing operations.

4.4 *Management of Change (MOC)*

Management of Change is utilized when a deviation occurs from established processes and procedures. The purpose of the MOC is to maintain an acceptable level of safety and quality to Global's standards while satisfying operational needs. In addition, a MOC is utilized for safety policies, procedures, and regulations as well as internal personnel and process changes. The MOC is initiated onsite by the Designated Person in Charge or the Diving Supervisor/Superintendent and routed to shore side management for final approval prior to implementation.

4.5 *Lock Out / Tag Out Procedures*

Lock Out/Tag Out procedures are not anticipated at this time beyond standard operational practices onboard the DSV. Any work performed which requires taking project operating equipment out of service shall be done only after proper notification and formal approval is obtained through the Diving Supervisor.

All Global employees are required to comply with the restrictions and limitations imposed upon them during the use of Lock Out/Tag Out; however, it is management's/supervisor's responsibility to enforce the standard to make sure that all employees perform the Lock Out/Tag Out in accordance with this procedure. All employees, upon observing a machine or piece of equipment which is locked out or tagged out, shall not attempt to start, energize, or use that machine or equipment. Employees shall not attempt to use a piece of equipment with a red tag on it.

4.6 *Welding, Burning, & Cutting*

Topside or underwater hot work is not **anticipated** in the current scope of work.

The following criteria will apply:

- Prepare area for hot work – please refer to client specific requirements.
- Inspect welding/burning gear prior to each use.
- Ensure oxygen cylinders are free from oil or grease, kept away from flammable substances, and stored separately from acetylene, etc.
- During weld operations:
    - Utilize a standing welding shield
    - Wear a welding shield
    - Ensure ventilation and fresh air
    - Ensure fire extinguisher is available
    - Assign fire watch during operations and up to 30 minutes after operations
    - Remove flammable materials
    - If a Hot Work Permit is required, use the template included in the attachments

During dive operations:

- No underwater burning or cutting of any type will be conducted until the area behind or above has been vented and inspected to be gas free of unburned or hydrogen gases.
- Diver must maintain communications with the Diving Supervisor.
- There shall be a pre-determined cut plan. Plan all cuts prior to beginning cutting.
- Anticipate and plan for possible trapped gas or stored energy in the area of the planned cut. Diving Supervisor works with Diver to agree on cuts and cut plan.
- Inspect cutting torch prior to sending to Diver.
- Diver is to use insulating gloves.
- A knife switch will be used to apply or remove current to the cutting torch.

4.7 *Environmental Controls Management*

Global ensures that environmental hazards are addressed to protect site personnel and the environment. In the event of an environmental spill, spill kits with PPE and recovery materials will be onboard the vessel and available for immediate deployment. All onsite crew members shall participate in an emergency spill orientation. During the orientation, crew members will be informed of the potentially hazardous exposures and the client's contingency and emergency plans.

4.7.1 Exposure Management

In the event that hazardous materials are identified the following PPE would be advised, in addition to development of a HAZMAT plan.
Minimum exposure gear levels:

- DuPont Tychem SL exposure suits (to be worn over the diver's diving suit)
- Oil and chemical resistant gloves *(i.e.: Atlas 660 gloves)*
- Chemical resistant boots
- Boots and gloves sealed with tape

Maximum exposure gear levels:

- HAZMAT environmentally sealed diving dress
    - Desco air hat or Kirby Morgan Superlight with double exhaust system
    - Viking heavy-duty dry suit with helmet yoke
    - Sealed cuff rings mated to chemical resistant gloves
    - Suit-attached chemical resistant boots

4.7.2 Pollution Control Management

In the day-to-day operations at the job site, personnel will routinely handle chemicals and other materials that may degrade the environment. Global will take proactive measures (such as routine inspections) to mitigate any potential damage that could occur from products released from our inventory or equipment.

4.7.3 Pollution Control Prevention

Only chemicals used for routine maintenance of equipment are expected on this project. All equipment will be maintained through preventative maintenance and routine visual inspections. During inspections, personnel will clean up free-floating oils and products from equipment or the work area. During preventative maintenance, hoses and fittings will be inspected and repaired as necessary to prevent an unplanned release. Preventative booming and absorbent materials/equipment will be available for emergency deployments.

4.7.4 Control Procedures

Work in well-ventilated areas when working with hazardous chemicals or where ventilation can be portably installed.

4.7.5 Work Practices

- Handle all hazardous material containers with care.
- Isolate hazardous materials from other materials so that no combining can occur.
- Do not leave hazardous materials unattended for any amount of time.
- Clean up spills promptly.
- Wash hands and face after working with hazardous materials.
- No smoking is allowed around any hazardous chemicals.
- Avoid heat and sparks when working with hazardous materials.
- Store all flammable materials in tightly closed approved containers and in a single location.
- Know where fire extinguishers are when you are working with hazardous materials; make certain you have the correct type of extinguisher for the material you are working with.

4.7.6 Prevention of Exposure

To prevent employee exposure to hazardous chemicals, ensure control procedures, work practices, and proper personal protective equipment are to be available to trained employees.

4.7.7 Symptoms of Over-Exposure

The symptoms of exposure are classified in two groups:

- Acute: symptoms generally occur during or shortly after exposure to sufficiently-high concentrations of contaminants
- Chronic: symptoms generally occur after exposure to lower concentrations of contaminants over longer periods of time.

After appropriate emergency and first aid procedures are taken, the incident should be immediately reported to the Diving Supervisor.

4.8 *Protocols for Night Operations*

Night operations are not anticipated throughout the project. If the project parameters change and exceed into night conditions, the following will apply:

- Diving surface control vans (SCV), support vessels, and portable lights are used to provide adequate lighting for work to be performed.
- Dive Tender location
- Tool vans
- Critical diving support equipment
- Fuel station
- Ingress/egress points
- Flashlights and headlamps are available for crew to transit in low-light walkways
- Other miscellaneous areas as required

4.9 *Severe Weather*

Severe changes in the weather will be taken into consideration on a daily basis throughout the duration of the project. Site specific weather information will be monitored for the following:

- High wind events
- High precipitation and severe storms
- Electrical storms

4.10 *Vessel Traffic*

Vessel traffic, rough waters, and wakes are to be expected. Visual awareness and precautions will include the following:

- Monitoring of vessel traffic on the appropriate VHF channels
- Monitor marine radios for all traffic
- Set boundary marker buoys
- Display international dive flag
- Notify Coast Guard of ongoing diving activities (if applicable)

5. EMERGENCY MANAGEMENT PLAN

5.1 *Site Specific Emergency Procedures*

Recommended procedures have been developed to deal with accidents and/or emergency situations should they occur as detailed in the following sections. Additionally the Diving Emergency Protocols section provides a list of potential diving emergency situations that may arise and suggested actions to be taken in the event of an emergency occurrence. The person in charge (PIC) of maintaining communications and for making or assigning the responsibility to make all emergency calls will be designated before the start of the project.

5.1.1 Incident Investigation, Reporting and Recordkeeping

Global strives to promote and enforce both a safe working environment and safe working habits; however at times incidents may occur. All incidents are reported to the Incidents Team and to the Supervisor. Refer to **Table (B) - Emergency (GDS) Phone Numbers**. Global records and may investigate team observations, near misses, or incidents. An incident may be an Injury, Illness, Equipment damage or failure, spill, theft, etc). All recordable injuries and significant losses are investigated. If the incident is a recordable injury or illness pursuant to OSHA recordkeeping requirements, it will be indicated on the OSHA 300 and 300a Log. Near Misses and Team observations are reported to our Safety Group via email and further investigation may occur. Notification will be completed by our Compliance and Claims Manager.

5.1.2 Activating Emergency Services

The primary means of activating emergency services shall be via marine radio communications on board the DSV, or utilizing cellular phones if reception is available and or satellite phones for backup. Emergency contact numbers will be available and posted at the work site. A list of the contact numbers is provided in **Table (B) - Emergency (GDS) Phone Numbers**. In the event of an emergency, the action taken will be followed on this SSHP plan based on section *(Injury Awareness and Treatment Contingency)*.

5.2 *Emergency Victim Transport Plan*

5.2.1 Diver Hyperbaric Injury

In the event of a diving incident with DCS symptoms the diver will be recompressed in the onsite chamber. Diving related injuries or illness consultation will be sought from Global's designated hyperbaric physician per the Emergency Contact numbers in **Table (B) - Emergency (GDS) Phone Number.** The onsite Diving Supervisor will perform neurological assessments, and will maintain clear communications with the hyperbaric physician and the Diving Supervisor.

Should a decompression sickness (DCS) or arterial gas embolism (AGE) symptom arise, all other Divers will be removed from the water immediately to minimize, if any decompression commitments. Treatment will be in accordance with advisement from the Hyperbaric Physician and U.S. Navy Recompression Treatment Tables. Should transport to shore be necessary, a low elevation flight will need to be considered, and availability to a recompression chamber either at Global's Seattle Office or Hospital as per the hyperbaric physician's request.

5.2.2 Topside or Other Injury

In the event of a topside injury, personnel will provide the initial first aid response. The Diving Supervisor will seek medical direction from the topside medical consult line if applicable. If transport is necessary the Diving Supervisor will initiate emergency transport. The injured worker will be transported to the nearest dock facility via vessel where they will be transferred by stretcher, stokes litter to shoreline for transport to the nearest medical facility as listed in **Table B - Emergency (GDS) Phone Numbers.** The Incidents team may request the DMT to accompany the injured worker to shore, or a field adjuster may be arranged by the incidents team to meet the employee to the medical facility.

5.3 *Injury Awareness and Treatment Contingency*

5.3.1 Non-Life Threatening Injury

Non life threatening injury that the vessel can offer (Cuts, Type 1 decompression sickness, etc) Initial response is to utilize first aid trained on site. Notify the dive supervisor immediately to evaluate and treat.

5.3.2 Non-Life threatening illnesses (Needing Medical Assistance)

Non life threatening illness needing medical assistance more than the vessel can offer (Illnesses, Action after Type 2 decompression sickness treatments, and or need for hospitalization). Notify the diver medical technician (Diving Supervisor) upon the initial response utilizing emergency personnel to administer first aid. The Dive Supervisor will contact the medical consult line for medical direction and care. If transporting to nearest medical facility is required, contact the incidents team, and refer to **Table (B) - Emergency (GDS) Phone Numbers.**

5.3.3 Life Threatening Injury (Needing Immediate Medical Attention)

A life threatening injury needing immediate medical attention
Initial response is to utilize first aid personnel to administer first aid. The Dive Supervisor may determine transport via Medi-vac or other immediate transport to the nearest medical facilty on shore for further treatment. If transporting to nearest medical facility is required, contact the incidents team, refer to **Table (B) - Emergency (GDS) Phone Numbers** to forward coordinates, symptoms, and dive profile to the hyperbaric physician.

5.3.4 Life Threatening Injury (Concurrent with Hyperbaric Treatment)

This will most likely be a situation of a diver getting seriously injured while diving and needing to be decompressed. Initial response is utilizing the DMT to administer first aid. The Diving Supervisor will call the hyperbaric physician. The diver will be treated in the nearest recompression chamber as soon as possible. Refer to **Table (B) - Emergency (GDS) Phone Numbers** to forward coordinates, symptoms and dive profile. The Diving Supervisor or Hyperbaric Physician may determine transport to hyperbaric facility is necessary. A low elevation flight and planning for hyperbaric facility may be necessary.

5.3.5 Other Emergency

If the dive station is notified that a natural or manmade emergency is imminent or exists, every effort will be made to recover the Diver and evacuate personnel, vessel, etc. If a Diver is in the water, he will be instructed to surface or come up to his decompression stop (if applicable) and complete his decompression obligation. The Diving Supervisor will keep the Project Owner and Global Diving and Salvage appraised of the situation concerning the Diver and dive crew.

5.4 *Fuel Spill Emergency Response*

The PRIMARY concern during a spill event will always be the safe recovery and decontamination of the diver. See **Table B. Emergency Phone Numbers.** If a fuel spill occurs, all resources will be devoted to containment and cleanup of the fuel. If a diver is in the water, he will be instructed to surface or come up to his decompression stop (if applicable) and complete his decompression obligation. After the diver and tenders have undergone decontamination procedures, all hands will assist in the containment and cleanup.

Global will stage all equipment in containment or be able to contain leakage. Furthermore Global will provide absorbent boom and absorbent pads capable of encompassing and securing any leakage.

Should Global have a release from equipment or products on the job site, personnel will follow the Spill Response Action Steps:

1. STOP PRODUCT FLOW

2. WARN PERSONNEL
3. SHUT OFF IGNITION SOURCES
4. DON PERSONAL PROTECTIVE EQUIPMENT
5. CONTAIN/CONTROL SPILL
6. CLEAN SPILL UP

5.4.1 Fire

In the event of a fire, notify other surface support personnel for assistance by voice and/or radio communication. If a Diver is in the water, the Diving Supervisor will return the diver to the surface.

1. Locate fire extinguisher, water source, etc. and attempt to extinguish the fire
2. Use the proper extinguisher for the type of fire
3. Use the PASS (Pull Aim Squeeze & Sweep) method when attempting to use a fire extinguisher on a small fire. If you are not familiar with how to use an extinguisher allow trained personnel to fight the fire.
4. If the fire goes out: Stand back, it can flare up!

6. DIVING EMERGENCY PROCEDURES

6.1 *Protocols & Procedures for Surface-Diving Emergencies & Unplanned Events*

The following emergency procedures and protocols are to address events or emergencies that may arise during the course of surface diving. Any emergency or unusual situation that arises on a project may require internal reporting.

Note: Not all emergency procedures will apply to all projects (i.e.: Required decompression) Refer to emergency contacts for each project or report internally following Global's standard incident reporting protocol at your earliest opportunity.

Emergency Diving Protocols:

1. LOSS OF COMMUNICATION
2. LIGHT HEADED OR DIZZY DIVER ON THE BOTTOM
3. MISSED WATER STOP
4. LOSS OF 50/50 IN THE WATER
5. VARIATIONS IN ASCENT RATE
6. ENTRAPPED OR FOULED DIVER
7. LOST OR DISORIENTED DIVER
8. INJURED DIVER
9. EXCEEDED MAXIMUM DECOMPRESSION TABLE
10. DECOMPRESSION SICKNESS IN THE WATER
11. LOSS OF BREATHING MEDIUM
12. ASYMPTOMMATIC OMITTED DECOMPRESSION (AIR)
13. ASYMPTOMMATIC OMITTED DECOMPRESSION (GAS)
14. SYPTOMATIC OMITTED DECOMPRESSION
15. UNRESPONSIVE DIVER (INCLUDING LOSS OF CONSCIOUSNESS)
16. OXYGEN TOXICITY IN WATER
17. DECOMPRESSION INCIDENT
18. EXCEEDED SURFACE INTERVAL (ASYMPTOMATIC)
19. LOSS OF OXYGEN IN CHAMBER DURING SURFACE DECOMPRESSION
20. OXYGEN TOXICITY DURING CHAMBER DECOMPRESSION
21. SAFE WAY OUT (DIVER UNABLE TO CLEAR DURING DESCENT IN CHAMBER)
22. SURFACE CREW MEMBER INJURY/ILLNESS WITH DIVER IN THE WATER
23. ADVERSE ENVIRONMENTAL CONDITIONS
24. CRITICAL EQUIPMENT FAILURE WITH DIVER IN THE WATER

25. FIRE IN EQUIPMENT OR ABOARD A DIVE PLATFORM
26. SEVERED DIVE UMBILICAL

1. LOSS OF COMMUNICATIONS	
Diving Supervisor	1. Dive supervisor attempts to re-establish electronic communications. (Record audio and video if available)
Diving Supervisor Topside Crew	2. If communications cannot be re-established, dive supervisor directs topside crew to attempt communications through USN Rev 6 line pull signals.
Diving Supervisor Diver	3. Dive supervisor attempts communications with video light (if using); diver reports back into camera with hand-signals video and hand response based on line pull signals.
Diving Supervisor	4. If applicable, dive supervisor puts breathing media to diver's pneumo.
Diving Supervisor Standby Diver Topside Crew	5. If communications are not established, dive supervisor directs standby diver and crew to stand ready to assist primary diver if required.
Diver	6. If line pull signals are recognized, primary diver proceeds to down line/stage/surface as applicable and commences ascent.
Diving Supervisor	7. Dive supervisor recovers primary diver to first stop once communications through line pull signals are established.
Diving Supervisor Standby Diver	8. If no form of communication with primary diver is established, the dive will be terminated. The dive supervisor will send the standby diver to diver's assistance prior to bringing primary diver to his first stop or the surface.
Diving Supervisor	9. Loss of communication will be assessed and repaired if necessary prior to commencing diving operations.
2. LIGHT HEADED OR DIZZY DIVER ON THE BOTTOM	
Diver	1. Diver reports vertigo, light headedness or is dizzy.
Diving Supervisor	2. Have the diver stop work and ventilate.
Diving Supervisor	3. If the diver reports symptoms are relieved work may resume.
Diving Supervisor	4. If symptoms are not relieved switch the diver to an alternate gas supply and continue ventilation.
Diving Supervisor	5. If symptoms are relieved, isolate the suspect bank of gas for analysis. If necessary flush the system.
Diving Supervisor	6. If at least 2 safe gas supplies remain work may resume.
Diving Supervisor	7. If symptoms are not relived or at least 2 banks of safe are not available terminate the dive.

3. MISSED WATER STOP	
Diving Supervisor	1. The supervisor must determine if there are any remaining stops in the schedule.
Diving Supervisor	2. If no stops remain, surface the diver at the required ascent rate and follow the omitted decompression procedures, listed in section 12.
Diving Supervisor	3. If stops remain on the schedule and the diver is asymptomatic, resume decompression at the next possible stop and complete in water decompression. Then surface and follow omitted decompression procedures.
Diving Supervisor	4. If the diver is symptomatic in the water, follow the Decompression sickness in the water procedures.
Note: If the diver is symptomatic in the water the supervisor must weigh the risks of directly surfacing the diver for treatment or using the decompression sickness in the water procedures.	
4. LOSS OF 50/50 IN THE WATER	
These procedures apply when 50/50 is lost or unable to be supplied to the diver.	
Diving Supervisor	1. Shift the diver to air and continue the decompression while trying to correct the problem.
Diving Supervisor	2. If 50/50 is restored, continue the decompression as planned count time on air toward decompression.
Diving Supervisor	3. If 50/50 is not restored, continue planned decompression on air.
Diving Supervisor	4. When in water decompression is completed, surface decompress as planned.
5. VARIATIONS IN ASCENT RATE	
Diving Supervisor Diver	The following rules for correcting due to variations in rate of ascent apply to all tables. The normal rate of ascent to the first stop and between subsequent stops is 30 fsw/min. Minor variations in the rate of travel between 20 and 40 fsw/min are acceptable and do not require correction. 1. **Travel Rate Exceeded.** If the rate of ascent is greater than 40 fsw/min, stop the ascent, allow watches to catch up and then continue ascent. 2. **Early Arrival at the First Decompression Stop.** If a diver arrives early at the first decompression stop, begin timing the first stop when the required travel time has been completed.
Diving Supervisor	3. **Delays in Arriving at the First Decompression Stop.** • **Delay up to 1 minute.** A delay of up to one minute in reaching the first decompression stop can be ignored. • **Delay greater than 1 minute, deeper than 50 fsw.** Round up the delay time to the next whole minute and add it to the bottom time; re-compute the decompression schedule. If no change in schedule is required, continue on the planned decompression. If a change in schedule is required and the new schedule calls for a decompression stop deeper than the diver's current depth, perform any missed deeper stops at the diver's current

	depth. Do not go deeper. • **Delay greater than 1 minute, shallower than 50 fsw.** If a delay in ascent greater than 1 minute occurs shallower than 50 fsw, round the delay time up to the next whole minute and add the delay time to the diver's first decompression stop.
Diving Supervisor	4. **Delays in Leaving a Stop or Between Decompression Stops.** • **Delay less than 1 minute leaving an air stop**. When the delay in leaving an air stop is less than 1 minute, disregard the delay. Resume the normal decompression when the delay is over. • **Delay less than 1 minute between air stops.** If the delay between stops is less than 1 minute, disregard the delay.
Diving Supervisor	5. Dive supervisor seeks medical advice and assistance from designated hyperbaric consultation if required.
Diving Supervisor	6. Dive supervisor completes internal reporting.
6. ENTRAPPED OR FOULED DIVER	
Diver	1. Primary diver informs topside he is trapped or fouled.
Diving Supervisor	2. Dive supervisor works to keep the primary diver calm and ensures the primary diver does not ditch equipment.
Diving Supervisor Standby Diver	3. Dive supervisor directs standby diver and crew to stand ready to assist primary diver as required.
Diver	4. Primary diver determines the extent of entrapment or fouling and communicates status to dive supervisor.
Diver Diving Supervisor	5. Primary diver attempts to free himself. Dive supervisor provides primary diver a reasonable amount of time to clear himself from entrapment or entanglement in umbilical or debris.
Diving Supervisor	6. If the primary diver frees himself, it will be the decision of the dive supervisor whether or not to continue the dive.
Diving Supervisor Standby Diver Tender	7. In the event the primary diver is unable to free himself, the dive supervisor will deploy the standby diver to assist. A separate tender should be utilized (if available) to tend the standby diver.
Standby Diver	8. The standby diver assesses the situation and reports to the dive supervisor.
Diving Supervisor	9. The dive supervisor determines the best way to proceed and communicates plan to both primary diver and standby diver.
Standby Diver Diving Supervisor	10. Standby diver works at the direction of the dive supervisor to free and/or recover primary diver.
Diving Supervisor	11. Once primary diver has been freed by standby diver, the dive will be terminated and the conditions will be reassessed by the entire dive crew, utilizing a Stop Work or safety tailgate.

Diving Supervisor	12. If planned decompression table was exceeded, dive supervisor should refer to Procedure #9 – Exceeded Maximum Decompression Table. If omitted decompression occurred, the dive supervisor should refer to Procedure #12 – Asymptomatic Omitted Decompression.
Diving Supervisor	13. If standby diver deployed and/or decompression table or omitted decompression occurred, dive supervisor to complete internal reporting at his earliest opportunity.
7. LOST OR DISORIENTED DIVER	
Diving Supervisor Diver	1. Dive supervisor works to keep the primary diver calm and has diver review recent movements to ascertain general vicinity of primary diver. **Dive supervisor records (if not already) all activities from this point on with video/audio if possible.*
Diving Supervisor Diver	2. Dive supervisor has primary diver turn on mask free flow and looks for bubbles to verify position. If position cannot be verified, dive supervisor has diver follow his hose back until he recognizes where he is.
Diving Supervisor Standby Diver	3. Dive supervisor directs standby diver and crew to stand ready and assist primary diver as required.
Diving Supervisor Standby Diver	4. Dive supervisor launches standby diver to recover primary diver and/or assist as applicable.
Diving Supervisor	5. If planned decompression table was exceeded, dive supervisor should refer to Procedure #9 – Exceeded Maximum Decompression Table. For omitted decompression, diving supervisor should refer to Procedure # 12 – Asymptomatic Omitted Decompression.
Diving Supervisor	6. If standby diver deployed or omitted decompression occurred, the dive supervisor is to complete internal reporting.
8. INJURED DIVER	
Diver Diving Supervisor	1. Primary diver immediately informs topside of the nature and extent of injury. **If possible, dive supervisor records all activities from this point on with audio/video if not already doing so.*
Diving Supervisor	2. If handheld radios are being utilized on deck, dive supervisor directs radio channels to be kept clear of chatter and deck personnel to remain ready for further directions.
Diving Supervisor Standby Diver	3. Dive supervisor directs standby diver and crew to stand ready to assist diver as required.
Diving Supervisor Standby Diver Diver	4. Dive supervisor aborts dive and primary diver is surfaced either by himself, or (if necessary) the dive supervisor launches standby diver to assist.
Standby Diver	5. If standby diver is deployed, he/she should remain with primary diver, administering first aid and evaluating injury. Standby diver recovers primary diver to surface, monitoring primary diver's breathing during ascent. If primary diver stops breathing, standby diver over pressurizes primary diver's regulator if possible.
Diving Supervisor	6. Dive supervisor follows decompression procedures, except when severity of injury indicates a greater risk than omitting decompression.
Diving	7. Dive supervisor implements planned primary diver recovery procedure. If surface decompression

Supervisor Topside Crew	is required, the DMT or dive supervisor will designate a topside crew member to lock into chamber with the injured primary diver.
Diving Supervisor	8. If planned decompression table was exceeded, dive supervisor should refer to Procedure #9 – Exceeded Maximum Decompression Table. If omitted decompression, dive supervisor refers to Procedure # 12 – Asymptomatic Omitted Decompression.
Diving Supervisor	9. Dive supervisor proceeds with requesting required medical assistance and emergency evacuation if required.
Diving Supervisor	10. Dive supervisor completes internal reporting.
9. EXCEEDED MAXIMUM DECOMPRESSION TABLE	
Diving Supervisor	1. Dive supervisor refers to U.S. Navy standard air decompression table to find appropriate schedule. May have to select the next greater depth. The US Navy air decompression table contains longer schedules at various depths for this purpose.
Diving Supervisor	2. Dive supervisor seeks hyperbaric consultation if required and completes internal reporting.
10. DECOMPRESSION SICKNESS IN THE WATER	
Diving Supervisor	1. Direct the diver to descend 10' and report if obtaining significant relief.
Diving Supervisor	2. If significant relief is noted, spend 30 min. at that depth. (Treatment Depth). If no relief, descend 10' deeper but no more.
Diving Supervisor	3. After spending 30 min at treatment depth, multiply the remaining scheduled stops by 1.5 times and resume schedule.
Diving Supervisor	4. After reaching surface after completion of water stops, treat the diver on a table 6
Diving Supervisor	5. Supervisor may elect to surface the diver and treat via surface treatment. *See note below.*

The Supervisor has (3) options when a chamber is available.

1. Surface the diver immediately and treat in the chamber as a type 2 bend.
2. Treat the diver for 30 minutes at the depth of relief then surface and treat as a type 2 bend.
3. Treat at the depth of relief for 30 min. Then complete the remaining water stops modified as to the procedure and then surface and treat as a type 2 bend.

Note: These options are contingent on the perceived risks of staying in the water or surfacing.
50/50 Nitrox should be used in the water at 90 fsw and shallower. If recompression goes deeper than the table use 1.5 times the time called for at the first stop. Contact a Hyperbaric Doctor and make internal notifications as soon as possible.

11. LOSS OF BREATHING MEDIUM	
Diver	1. Primary diver informs topside of loss of primary breathing medium and activates primary diver-worn or carried EGS (bailout).
Diving Supervisor	2. Dive supervisor works to keep the primary diver calm and ensures the primary diver has closed his free flow. Dive supervisor directs standby diver and topside crew of situation and advises to stand ready.

Diving Supervisor Diver	3. Dive supervisor opens up primary diver's pneumo on manifold and requests that primary diver check pneumo for air supply. Primary diver is instructed to insert pneumo under neck dam if air is observed. 4. If possible, dive supervisor records all activities from this point on with audio/video.
Diving Supervisor	5. Dive supervisor determines if the loss of breathing medium is due to topside supply issues or a compromised umbilical. Dive supervisor works to re-establish breathing media supply by activating topside secondary breathing medium supply.
Diving Supervisor	6. If breathing medium is re-established through secondary supply, the dive is terminated. The primary diver is returned to the surface following any decompression commitments.
Diving Supervisor Topside Crew	7. After the primary diver is safely returned to the surface, conditions will be reassessed by entire crew before any further diving commences. Prior to resuming dive operations, a JSA will be performed to address relevant mitigations.
Diving Supervisor Standby Diver	8. If breathing medium is not re-established to the primary diver, the dive supervisor deploys the standby diver into the water to assist primary diver.
Diving Supervisor Diver Standby Diver	9. Dive supervisor determines the best way to proceed and communicates plan to both primary diver and standby diver. If handheld radios are being utilized on deck, dive supervisor directs radio channels to be kept clear of traffic and directs deck personnel to remain ready for further directions. The standby diver proceeds at the direction of the dive supervisor to provide recovery assistance of the primary diver to the stage/surface.
Diving Supervisor	10. Dive supervisor returns divers to the surface and determines options if decompression commitments are required.
Diving Supervisor Topside Crew	11. Following the safe return of the primary diver to the surface, conditions will be reassessed by entire dive crew before any further diving commences. Prior to resuming dive operations, a Job Safety Analysis will be performed to address relevant mitigations.
Diving Supervisor	12. If planned decompression table was exceeded, dive supervisor should refer to Procedure #9 – Exceeded Maximum Decompression Table. If omitted decompression, dive supervisor shall refer to Procedure #12 – Asymptomatic Omitted Decompression.
Diving Supervisor	13. Dive supervisor completes internal reporting.
12. ASYMPTOMATIC OMITTED DECOMPRESSION (AIR)	
Diving Supervisor	Certain emergencies (such as uncontrolled accent, an exhausted air supply, or bodily injury) may interrupt or prevent required decompression. The resulting actions will be determined by which category this incident falls into: asymptomatic "without DCS type symptoms" or symptomatic "with DCS type symptoms." • If an uncontrolled ascent to the surface occurs at a rate greater than 30fsw/min - but the dive itself is within no-decompression limits - the primary diver should be observed on the surface for one hour to ensure that symptoms of decompression sickness or arterial gas embolism do not develop. • If any decompression was omitted, it must be addressed in some manner to avert latter difficulty even if the diver shows no symptoms. The following table shows initial

	management steps to be taken for Asymptomatic Omitted Decompression.		
Decompression Stop Omitted	Surface Interval *(Note 1)*	**Action**	
		Chamber Available *(Note 2)*	**No Chamber Available**
None	**Any**	**Observe on Surface for 1 Hour**	
20 or 30 fsw	Less than 1 min	Return to depth of stop. Increase stop time by 1 min. Resume decompression according to original schedule.	
	1 to 7 min	Use Surface Decompression Procedure *(Note 3)* **Treatment Table 6**	Return to depth of stop. Multiply 30 and/or 20 fsw air or O2 stop times by 1.5
	Greater than 7 Min	**Treatment Table 5** if 2 or fewer $SurDO_2$ periods **Treatment Table 6** if more than 2 $SurDO_2$ periods	
Deeper than 30 fsw	Any	**Treatment Table 6** *(Note 4)*	Descend to depth of first stop. Follow the schedule to 30 fsw. Switch to O2 or 50/50 at 30 fsw if available. Multiply 30 and 20 fsw air or O2 stops by 1.5

Notes:

- *For surface decompression, surface interval is the time from leaving the last stop or passing 30 fsw stop to arriving at depth in the chamber.*
- *Using a recompression chamber is strongly preferred over in-water recompression for returning a diver to pressure. Compress to depth as fast as possible, not to exceed 100 fsw/min.*
- *For surface intervals greater than 5 minutes but less than or equal to 7 minutes, follow and refer to Procedure #18 – Exceeded Surface Interval (Asymptomatic)*
- *If a diver missed a stop deeper than 50 fsw, compress to 165 fsw and start Treatment Table 6A.*

13. ASYMPTOMATIC OMITTED DECOMPRESSION (GAS)

Decompression Stop Omitted	Surface Interval *(Note 1)*	**Action**	
		Chamber Available	**No Chamber Available**
None but uncontrolled assent greater than 30'/min	Any	Observe on Surface for 1 Hour	

20 or 30 fsw	Less than 1 min	Return to depth of stop. Increase stop time by 1 min. Resume decompression according to schedule.	
	1 to 7 min	Use Surface Decompression Procedure (See note 3)	Return to depth of stop. Multiply 30 and/or 20fsw stop times by 1.5
	Greater than 7 Min	**Treatment Table 5** if 2 or fewer $SurDO_2$ periods **Treatment Table 6** if more than 2 $SurDO_2$ periods	
40 or 50 fsw	Any	**Table 6**	
Deeper than 50 fsw	Any	Less than 60 minutes missed	**Table 6A**
		More than 60 minutes missed	**Table 8**

Notes:

- *For surface decompression, surface interval is the time from leaving the last stop to arriving at depth in the chamber.*
- *Compress the diver in the chamber as fast as possible not to exceed 100'/min.*
- *For surface intervals greater than 5 but less than 7 min.*
  a. *Increase 50' chamber stop to 30 min.*
  b. *Add an additional 15 min. to the 40' chamber time.*

14. SYMPTOMATIC OMITTED DECOMPRESSION

Diving Supervisor	Seek hyperbaric consultation; meanwhile the following treatment actions should occur: • If a diver has had an uncontrolled ascent and has any symptoms, he should be compressed immediately in a recompression chamber to 60 fsw. • Conduct a rapid neurological assessment and treat accordingly. c. If a diver surfaced from 50 fsw or shallower, compress to 60 fsw and begin Treatment **Table 6**. d. If a diver surfaced from a greater depth, compress to 60 fsw or the depth where the symptoms are significantly improved (not to exceed 165 fsw) and begin Treatment **Table 6A**. e. For uncontrolled ascent deeper than 165 fsw, the diving supervisor may elect to use **Treatment Table 8** at the depth of relief, not to exceed 225 fsw.

Diving Supervisor	1. Treatment of symptomatic divers who have surfaced unexpectedly is difficult when no recompression chamber is onsite. Immediate transportation to a recompression facility is indicated.
Diving Supervisor	2. Dive supervisor seeks medical advice and assistance from designated hyperbaric consultation (if available) at any point during the process. Dive supervisor completes internal reporting.
15. UNRESPONSIVE DIVER (INCLUDING LOSS OF CONSCIOUSNESS)	
Diving Supervisor Standby Diver	1. Dive supervisor directs standby diver and crew as well as deploys standby diver on a separate breathing supply mix if possible.
Diving Supervisor	2. If handheld radios are being utilized on deck, dive supervisor directs radio channels to be kept clear of chatter and deck personnel to remain ready for further directions. Maintain audio/video recording.
Diving Supervisor	3. If air supply issue is suspected, primary diver should be switched to secondary supply or standby alternate supply. Diver's pneumo should also be activated.
Diving Supervisor Standby Diver	4. At dive supervisor's direction, the standby diver will enter the water and swiftly advance, following the primary diver's hose to aid the primary diver in his ascent to the surface. Primary diver shall not be recovered to surface if convulsing or seizing. The standby diver will restrain the primary diver at current depth. Once convulsions have subsided, allow a short period for stabilization; then the standby diver may recover primary diver to surface/stage.
Standby Diver	5. Standby diver monitors diver's breathing during ascent. If breathing stops with primary diver, the standby diver is to free flow hat periodically during ascent if possible. Care should be taken not to create a forceful and continuous free-flow that could cause pulmonary over inflation. If the primary diver appears not to be breathing, the standby diver should attempt to reposition the primary diver's head to open the airway. Airway obstruction will be the most common reason why an unconscious diver fails to breathe.
Diving Supervisor Standby Diver	6. If the primary diver appears to be breathing (whether conscious or unconscious), decompress primary diver on standard decompression schedule using surface decompression.
Diving Supervisor Standby Diver	7. If the primary diver remains unconscious and breathing cannot be detected in spite of repeated attempts to position the head and open the airway, an extreme emergency exists. The dive supervisor must weigh the risk of catastrophic, even fatal decompression sickness if the primary diver is brought to the surface, versus the risk of asphyxiation if the primary diver remains in the water. As a general rule, if the dive supervisor has any doubt about the primary diver's breathing status, the dive supervisor may assume he is breathing and continue normal decompression in the water. If the dive supervisor is certain that the primary diver is not breathing, the primary diver will be surfaced at 30 fsw/minute, deploying the standby diver as required. Recompress the diver immediately and treat for omitted decompression. Dive supervisor refers to Procedure # 12 – Asymptomatic Omitted Decompression.
Diving Supervisor	8. Dive supervisor follows decompression procedures except when severity of injury indicates a greater risk than omitting decompression.
Diving Supervisor	9. Dive supervisor (if required) will request medical assistance and emergency evacuation. Dive supervisor seeks hyperbaric consultation if applicable. Upon reaching surface, deck crew will administer first aid until consciousness is regained or emergency response personnel arrive. Dive supervisor completes internal reporting.

	Note: Consideration should also be taken to treat any possibility of pulmonary over inflation injury by chamber recompression to 60 fsw, if chamber is available and with continued assessment.
16. OXYGEN TOXICITY IN WATER	
Diving Supervisor	1. If dive supervisor notes signs or primary diver reports symptoms of O_2 toxicity, dive supervisor immediately switches to air or a lower PPO_2 (Partial Pressure Oxygen) mix and has primary diver free flow.
Diving Supervisor	2. Dive supervisor recovers primary diver to shallower depth if possible. *Note: Care must be taken when reducing depth if diver is convulsing.*
Diving Supervisor Standby Diver	3. Dive supervisor directs crew and deploys standby diver. Standby diver assists primary diver as required.
Diving Supervisor	4. Dive supervisor decompresses primary diver on applicable air table.
17. DECOMPRESSION INCIDENT	
Diving Supervisor Topside Crew	1. If DCS is suspected, a quick neurological exam should be performed to determine if Type I or II symptoms are present. The dive supervisor will direct a topside crew member to perform neuro. *Note: It is important to not delay treatment when performing the initial neurological exam. If conditions are obviously serious compress as soon as possible and then perform the neurological examination.*
Diving Supervisor Topside Crew	2. Dive supervisor compresses a topside crew member in with primary diver to treat as below: **Type I** – Compress diver to 60 fsw on oxygen on a Table 6. Crew member that is pressed in with primary diver performs full neurological exam upon reaching 60 fsw. Follow U.S. Navy Dive Manual and seek hyperbaric consultation for additional treatment procedures. **Type II** – Compress diver to a depth of significant improvement and treat accordingly on a Table 6a. Crew member that is pressed in with primary diver performs full neurological exam upon reaching 165 fsw and arrival at 60 fsw. Follow U.S. Navy Dive Manual and consult hyperbaric consult for additional treatment procedures.
Diving Supervisor	3. Dive supervisor completes internal reporting.
18. EXCEEDED SURFACE INTERVAL (ASYMPTOMATIC)	
Diving Supervisor	1. Asymptomatic exceeded surface interval (greater than 5 minutes, less than 7 minutes) Increase 50ft stop from a half period to a full period. Add an additional half period to the time required at the 40-foot stop.
Diving Supervisor	2. Asymptomatic surface interval exceeding 7 minutes or any symptoms that manifest between departing last water stop and reaching 50 foot in the chamber. 3. Treat on **Table 5** if 2 or **less** $SURDO_2$ periods called for in table. Treat on **Table 6** if 2 or **more** $SURDO_2$ periods are called for in the table.
Diving Supervisor	4. Dive supervisor seeks medical advice and assistance from designated hyperbaric consult if indicated. Dive supervisor completes internal reporting.
Notes: • *The supervisor may elect to ignore the use of Table 5 in the above procedure and use a Table 6 at his discretion.*	

• *If any symptoms develop during surface interval treat accordingly.*	
19. LOSS OF OXYGEN IN CHAMBER DURING SURFACE DECOMPRESSION	
Diving Supervisor	1. If there is a temporary loss of oxygen, disregard time as dead time. If there is a permanent loss of oxygen, the diving supervisor follows below procedures for completing decompression time on 50/50 Nitrox or air. • If the diver is at 50 fsw when the loss occurs, ascend to 40 feet. f. If 50% nitrogen 50% oxygen is available, multiply the remaining oxygen time by two to obtain the "equivalent chamber decompression time on 50/50." Air breaks are not required when breathing 50/50. g. If chamber air is the only gas available, multiply the remaining chamber time on oxygen by the ratio of the water stop times on air at 30 and 20 fsw to the oxygen time at those depths to obtain the "equivalent chamber decompression time on air." h. Allocate 10% of the equivalent air or 50/50 nitrogen-oxygen time to the 40-fsw stop, 20% to the 30-fsw stop and 70% to the 20-fsw stop. • If the loss occurred at 30 fsw, allocate 30% of the equivalent air or nitrogen-oxygen time to the 30-fsw stop and 70% to the 20-fsw stop. *Note: Air breaks are not required when breathing 50/50.*
20. OXYGEN TOXICITY DURING CHAMBER DECONMPRESSION	
Diver	1. Primary diver reports or chamber operator notes symptoms of O_2 toxicity.
Diving Supervisor	2. If possible, dive supervisor records all activates from this point on with audio/video if not already doing so.
Chamber Operator	3. Chamber operator directs primary diver to remove oxygen mask. If primary diver is unresponsive or convulsing, switch chamber mask to air, lock in tender immediately and have chamber operator report to the dive supervisor.
Diver Chamber Operator	4. Fifteen minutes after all symptoms have subsided, chamber operator directs the primary diver to resume oxygen breathing at the point of interruption.
Chamber Operator Diver Tender	5. If symptoms develop again or if the first symptom is a convulsion, the following actions shall be taken: a. Lock tender into chamber to assist diver in removing BIB. b. After all symptoms have completely subsided, decompress the chamber 10 feet at a rate of 1 fsw/min. For a convulsion, begin travel when the patient is fully relaxed and breathing normally. c. Resume oxygen breathing at the shallower depth at the point of schedule interruption.
Diving Supervisor	6. If another oxygen toxicity symptom occurs, decompression time is completed on air. Dive supervisor refers to procedure #19 - Loss of Oxygen in Chamber during Surface Decompression.
Diving Supervisor	7. At any point during the process, the dive supervisor seeks medical advice and assistance from designated hyperbaric consultation if available. Dive supervisor completes internal reporting.
21. SAFE WAY OUT (DIVER UNABLE TO CLEAR DURING DESCENT IN CHAMBER)	
Chamber Operator	1. On rare occasions, a diver may not be able to reach 50 fsw in the chamber because of difficulty equalizing middle ear pressure. In this situation, an alternative procedure for surface

Diver	decompression on oxygen may be used. 2. Compress the diver to the deepest depth he can attain initially. 3. Begin oxygen breathing at that depth. Continue attempts to gradually compress the diver deeper. 4. If the in-water decompression schedule required only a 20-fsw water stop, attempt to compress the diver to 20 fsw. If the in-water decompression schedule required a 30-fsw water stop, attempt to compress the diver to 30 fsw. 5. Double the number of chamber oxygen periods indicated in the table, and have the diver take these periods at whatever depth he is able to attain. 6. Oxygen time starts when the diver initially goes on oxygen. Interrupt oxygen breathing every 60 minutes with a 15-min air break. 7. Upon completion of the oxygen breathing periods, surface the diver at 30 fsw/min. Any unusual symptoms would require recompression. *Note: **"safe way out"** procedure is not intended to be used in place of normal SURDO$_2$ procedures.*
22. SURFACE CREW MEMBER INJURY/ILLNESS WITH DIVER IN THE WATER	
Diving Supervisor	1. Dive supervisor evaluates the effect of loss of personnel on the current operations.
Diving Supervisor	2. Dive supervisor informs the primary diver of the situation. Dive supervisor determines whether to continue or abort dive.
Diving Supervisor	3. Dive supervisor completes internal reporting.
23. ADVERSE ENVIRONMENTAL CONDITONS	
Diving Supervisor	1. Dive supervisor evaluates effect of sudden adverse conditions (weather, sea state, currents, lightning, winds, methane/swamp gas and dangerous marine life) on dive operations to determine the need to abort dive.
Diving Supervisor	2. Dive supervisor informs primary diver of plan of action. Dive supervisor directs standby diver and topside crew.
Diving Supervisor	3. When primary diver acknowledges he/she is ready, dive supervisor terminates dive using appropriate decompression schedule.
Diving Supervisor	4. Dive supervisor completes internal reporting for Stop Work Authority.
24. CRITICAL EQUIPMENT FAILURE WITH DIVER(S) IN THE WATER	
Diving Supervisor	1. Dive supervisor evaluates effect of equipment failure on primary diver. **If possible, dive supervisor records all activities from this point on with audio/video if not already doing so. Dive supervisor informs primary diver of problem and plan of action.*
Diving Supervisor Standby Diver	2. Dive supervisor directs standby diver and crew to stand ready to assist primary diver as required. Dive supervisor deploys standby diver if applicable.
Diver Diving Supervisor	3. When primary diver acknowledges he is ready, dive supervisor activates plan and terminates dive if required.

Diving Supervisor	4. Dive supervisor completes internal reporting if applicable.
25. FIRE IN EQUIPMENT OR ONBOARD A DIVE PLATFORM	
Topside Crew Diving Supervisor	1. Topside crew extinguishes fire and secures equipment if possible. Dive supervisor informs the primary diver of the situation.
Diving Supervisor	2. Dive supervisor to ascertain damage and effects on the current operation prior to determining the best way to proceed. If required, dive supervisor terminates dive using appropriate decompression schedule.
Diver Chamber Operator	**If inside PVHO:** 1. Chamber occupant notifies topside of fire, evacuates to another lock if possible and extinguishes fire by way of hyperbaric fire extinguisher.
Chamber Operator	2. Chamber operator is to immediately secure topside oxygen supply to BIBS and activate emergency air supply to BIBS. Diver is to don BIBS. Chamber operator must be aware that depth may be compromised due to fire, and that opening valves could induce air (fuel) to the fire.
Diving Supervisor	3. Dive supervisor secures electrical power to non-essential systems.
Chamber Operator	4. Assess state of fire before venting. Vent chamber, assess condition of chamber occupants, complete decompression and monitor condition.
Diving Supervisor	5. Dive supervisor completes internal reporting
26. SEVERED DIVE UMBILICAL	
Partial Severance:	
Diver	1. Diver reports umbilical is partially severed
Diver	2. Diver goes on EGS
Diving Supervisor	3. Supervisor notifies standby diver and crew.
Standby Diver	4. Standby diver leaves surface to locate diver
Diving Supervisor Diver	5. Supervisor and diver determine if current gas flow is sufficient. If not standby diver inserts pneumo in diver's neck dam. EGS is saved for last.
Standby Diver	6. Standby diver assist's diver back to the down line or stage for recovering to the surface.
Diving Supervisor	7. Supervisor is to evaluate the situation as to decompression requirements and the ability to supply the diver with breathing media after stabilization.
Diving Supervisor	8. Supervisor follows omitted decompression protocols if necessary or if possible decompress on the appropriate schedule.
Complete Severance:	
Diver	1. Diver initiates EGS
Standby Diver	2. Standby diver leaves surface to locate diver.
Diving Supervisor	3. Gas flow delivered through standby diver pneumo.
Standby Diver	4. Standby diver locates diver to insert pneumo in the diver's neck dam.
Diver	5. Diver secures EGS system and breathers pneumo gas from standby diver.
Standby Diver	6. Standby diver assist's diver back to the down line or stage for recovering to the surface.

Diving Supervisor	7. Supervisor is to evaluate the situation as to decompression requirements and the ability to supply the diver with breathing media after stabilization.
Diving Supervisor	8. Supervisor follows omitted decompression protocols if necessary or if possible decompress on the appropriate schedule.

Notes:

- If an additional umbilical is available a change out in the water may be done to re-establish breathing media and communication, and allow for decompression if necessary.
- The standby divers pneumo should always be considered as a gas supply to the diver to avoid completing the EGS supply and omitted decompression
- *Stage gas should be of sufficient quantity to permit in water decompression when required.*

7. HEALTH, SAFETY AND ENVIRONMENTAL MISSION STATEMENT

Global Diving & Salvage, Inc. has and will continue to place the safety of its employees in the highest regard. Our employees are the very backbone of this company. Global Diving & Salvage, Inc. has developed this Company Injury and Illness Prevention Program to further this aim. Acknowledgment of this commitment is imperative to a sound policy of hazard control and employee safety.

This commitment provides a safe workplace for all employees by developing a written plan for accident prevention, identifying and eliminating workplace hazards through management and employee cooperation, and proactive training to inform employees of potential hazards associated with their work.

It is the basic safety policy of this company that no task is so important that it puts the employee at risk. This is the foundation of an effective safety program. If there is any question regarding proper procedure, wait and ask someone who knows. Global Diving & Salvage, Inc. will provide the necessary resources needed to implement this program.

With this proactive approach to safety and health come expectations for the concerned individuals who are to participate in the program. Only through group effort and cooperation can the safety program serve its intended purpose: protect employees from workplace hazards.

Employees are required to comply with all company safety rules and are encouraged to actively participate in identifying ways to make our company a safer place to work. Our Behavior Based Safety program TEAM (Together Everyone Achieves More) furthers our commitment in working collaboratively as a cohesive TEAM and empowering employees in driving the safety culture. Every employee is empowered to exercise their Stop Work Authority should there be a safety concern.

Supervisors are responsible for the safety of their employees and must monitor the workplace for potential hazards and eliminate them as a part of their daily duties.

Management will insure the implementation of this program by devoting the resources necessary to carry out the objectives outlined in this Injury, Illness and Prevention Plan. These include but are not limited to: supporting the safety committee, developing procedures for identifying and correcting hazards, providing the necessary training for employees and supervisors, providing the forum for open discussion and correction of potential safety concerns, and administering a disciplinary policy to ensure company safety policies are followed.

Safety is always of the utmost importance; both employee and employer benefit in a safe working environment. Let's keep Global Diving & Salvage, Inc. a safe and healthy place to work.

In addition, Global believes that protection of the environment is of equal importance; we foster a culture of environmental responsibility. It is through managed, proactive efforts that we continue our operations, mindful of the collateral consequences our actions might bring. In continuing this goal, Global provides continued training and an environment where we attempt to reduce our negative impact on the environment in which we operate.

8. FORMS & TEMPLATES (ATTACH IF NECESSARY)

Each project requires documentation for preplanning including hazard mitigations, safety meetings, and pre-work checks to ensure safety. Additional documentation may be warranted based on the project or if an incident occurs.

Standard forms and templates on each project site shall be at a minimum:

Forms:

a) Pre-Post Diver Condition
b) Lockout Tag- Out Permit
c) Diver Attention Sheets
d) Job Safety Analysis (blank)
e) Management of Change
f) General Hot Work Permit
g) Daily Tailgate Safety
h) Pre-Dive Checklist
i) Chamber Checklist
j) Dive Log
k) Record of Chamber Time
l) Neurological Examination
m) Incident Report
n) Injury/Illness Report
o) TEAM card/Near Miss

Template:

- Anticipated Job Safety Analysis

9. SITE SPECIFIC HEALTH & SAFETY PLAN ACKNOWLEDGEMENT SHEET

This is to certify that I have read the Site Specific Health and Safety Plan for Dive Operations and understand its contents. Failure to comply with the requirements contained in this plan may result in disciplinary action, including removal from this project.

Print Name	Signature	Date

9.1 *Table B - Emergency (GDS) Phone Numbers*

PROJECT CONTACTS			
GDS, Inc.	Alex Hess	Project Manager	Phone # (b) (6)
GDS, Inc.	TBD	Dive Supervisor	Phone #
Gravity Marine	Shawn Hinz	Project Manager	Phone #

Global Diving & Salvage, Inc – HQ Contacts – Report all incidents to:				
Incident Management Team		&	Supervisor, Regional or Service Line Manager	
Primary	Jeff Birchfield, HSE Program Manager	Incident Contacts (206) 432-3545 incidents@gdiving.com	Mike Langen, Vice President Marine Construction	(b) (6)
Alternates	Sarah Burroughs , Compliance Group Manager		Aaron Harrington, PNW General Manager	

OTHER EMERGENCY		
Spill	1. Report to GDS. – (phone call to incidents, #'s above) 2. Report to National Response Center	See Incident Management team #'s 800-424-8802
Other	Emergency/Police Services	911

MEDICAL EMERGENCY

Hyperbaric Emergencies (DCS or other diving related)
- Press tender with diver in chamber to 60', perform Neuro once at 60'
-
- Follow hyperbaric consult for additional treatment and care.

Hyperbaric Consult:
Dr. Joseph Serio
Occupational Clinic of Acadiana, Lafayette, LA
(b) (6) ell or 337-233-4480 Office
Dr. Tony Alleman
Occupational Clinic of South Louisiana, New Iberia, LA
(b) (6) ell or 337-365-5484 Office
lert Network (DAN)
800-446-2671 or 919-684-4326

Topside Emergencies
- Provide care and first aid
- Seek medical assistance
  - Call 911 if available
  - Seek care from onsite DMT or Medic
  - Call Medical Consult
  - Transport to clinic/ if applicable
- Report to Incident Team for assistance with transport, and facilitation at care facility.

Topside Consult #'s:
Primary:
All One Health
1-800-350-4511

Nearest Chamber Location	Global or Virginia Mason	**Nearest Clinic/Hospitals**	**Clinic:** **Concentra Urgent Care** 3449 N Anchor St. Suite 300A Portland, OR 97217 (503) 285-6627 **Hospital:** **Oregon Health & Science University** (Level I) 3181 S.W. Sam Jackson Park Rd. Portland, OR 97239 (503) 494-7551
Local Hyperbaric Facilities	**Providence Medical Center** 4805 N.E. Glisan St. Portland, OR 97213 (503) 215-1111 (main hospital) (503) 215-6061 (hyperbaric) Fax (503) 215-6012 66 fsw max. Monoplace Chamber, 3 patient max ; Contact : kathryn.witkowski@providence.org tally.mcclain@providence.org		

Medi-vac
Low elevation flight may be needed for diving related incidents.
US Coast Guard Channel 16 and command "Pan, Pan, Pan"

Address or Latitude/Longitude:

GLOBAL

JSA – 00xx

JOB SAFETY ANALYSIS

The purpose of a JSA is to identify hazards associated with specific tasks and the proper techniques for mitigating, controlling, and eliminating those hazards.

JOB SAFETY ANALYSIS (TITLE):		**Client:**	
Task Description:		**Job #**	**Date:**
Date of Initial Development:	**By:**	**Last Revised/Reviewed:**	**By:**

To request a revision of this document, or to assign a number, please contact the HSE Program Group at safety@gdiving.com

Task Based JSA (List all principal steps required to complete the task; **all** hazards and/or potential causes of injury; detailed plans to control, mitigate or eliminate the hazard)

PRINCIPAL STEPS	HAZARD OR POTENTIAL FOR INJURY	PLAN TO CONTROL, MITIGATE OR ELIMINATE THE HAZARD

Site Specific Hazards and Requirements (List any items not addressed in the task based JSA that are specific to your worksite)

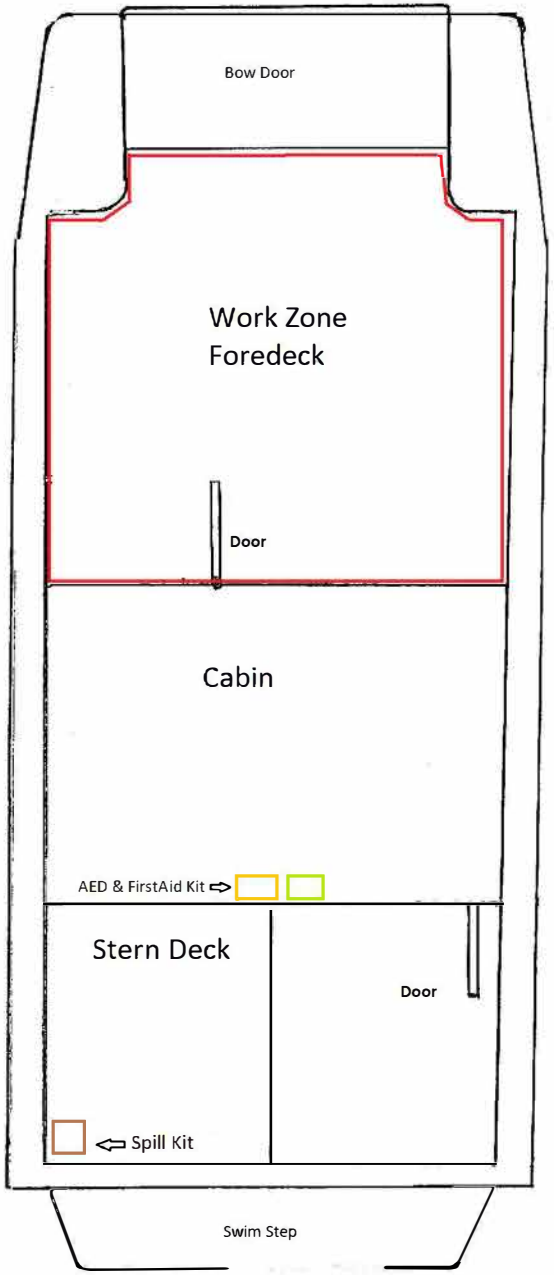
Site Specific Required Personnel Qualifications	***Site specific required personnel qualifications may include:*** *any qualifications necessary that exceed Globals normal personnel requirements for the task.*
Site Specific Personal Protective Equipment (PPE)	***Site specific PPE may include:*** *Hard Hat, Eye Protection (Safety Glasses, Goggles, Face Shield), Steel Toe Boots, Ear Plugs, Gloves (Nitrile, PVC, Leather Work), Personal Flotation Device (PFD), Respiratory Protection, Fall Protection, Chemical Protection, Reflective Vests, etc.*
Site Specific Permits	***Site specific permits may include:*** *Confined Space, Hot Work, Lock Out/Tag Out, Client Required Permits, etc.*
Site Specific Equipment	***Site specific equipment may include:*** *Dive Flag, Site Control/Warning, First Aid Kit, Anvil Case, Communication Radio, AED, Stokes Litter, Spill Kit, etc.*
Site Specific Work Practices	***Site specific work practices may include:*** *(Procedures, Methods, and Stop Work Authority)*
Site Specific Concurrent Activities	***List applicable site specific concurrent activities:***
Site Specific Hazards	***Site specific hazards may include:*** *Sound, Motion, Mechanical, Electrical, Gravity, Pressure, Differential Pressure, Heat/Cold, Chemical, Biological, Vessel Traffic, Road Traffic, Weather, Environmental, etc.*
Other	***List anything else applicable:***

Documentation of Personnel in attendance of Site Specific JSA Meeting:

PRINTED NAME	SIGNATURE		PRINTED NAME	SIGNATURE

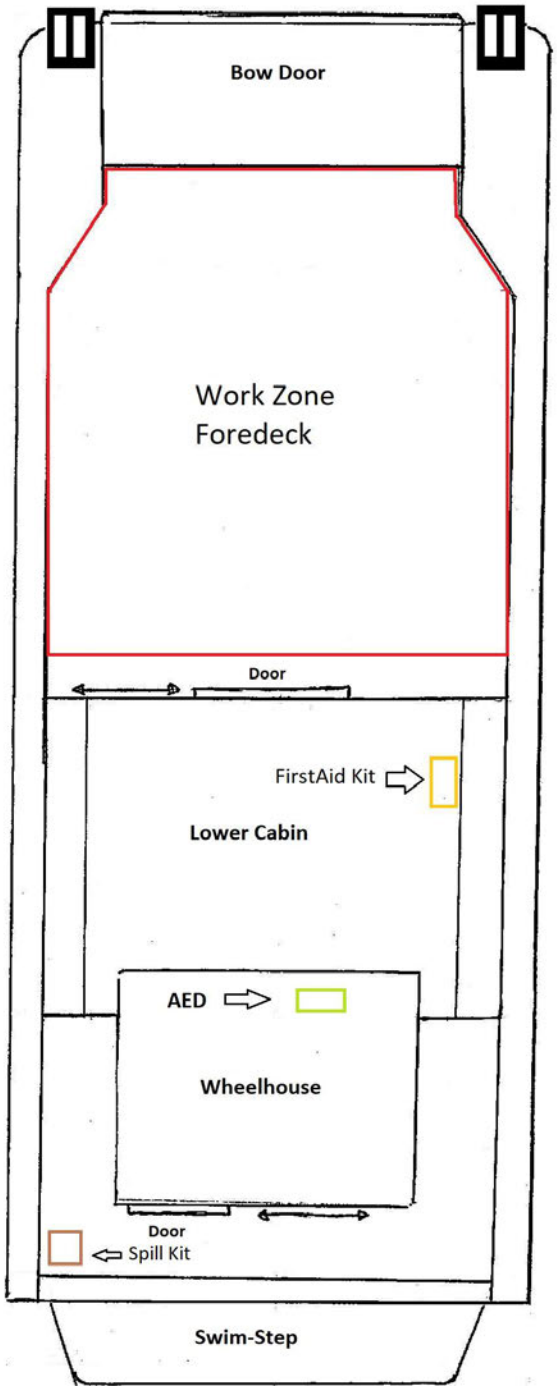
RV Cayuse

Gravity Marine



RV - Tieton

Gravity Marine



Safety Data Sheet

according to 29CFR1910/1200 and GHS Rev. 3

Effective date : 01.08.2015

Methanol, Lab Grade, 4L

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : **Methanol, Lab Grade, 4L**

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: S25426A

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

Supplier Details:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:

Flammable
Flammable liquids, category 2

Toxic
Acute toxicity (oral, dermal, inhalation), category 3

Health hazard
Specific target organ toxicity following single exposure, category 1

AcTox Dermal. 3
Flammable liq. 2
AcTox Oral. 3
AcTox Inhaln. 3
Stot SE. 1

Signal word :Danger

Hazard statements:
Highly flammable liquid and vapour
Toxic if swallowed
Toxic in contact with skin
Toxic if inhaled
Causes damage to organs
Precautionary statements:
If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use

Wear protective gloves/protective clothing/eye protection/face protection
Wash skin thoroughly after handling
Do not eat, drink or smoke when using this product
Avoid breathing dust/fume/gas/mist/vapours/spray
Keep away from heat/sparks/open flames/hot surfaces. No smoking
Do not breathe dust/fume/gas/mist/vapours/spray
Specific treatment (see supplemental first aid instructions on this label)
IF ON SKIN: Wash with soap and water
Call a POISON CENTER or doctor/physician if you feel unwell
Specific measures (see supplemental first aid instructions on this label)
Take off contaminated clothing and wash before reuse
Wash contaminated clothing before reuse
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
IF exposed: Call a POISON CENTER or doctor/physician
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing
Store locked up
Store in a well ventilated place. Keep cool
Dispose of contents and container as instructed in Section 13

Other Non-GHS Classification:

WHMIS

B2

D1B

D2B

NFPA/HMIS

NFPA SCALE (0-4)

Health	2
Flammability	3
Physical Hazard	0
Personal Protection	X

HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:		
CAS 67-56-1	Methanol	>90 %

Percentages are by weight

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Move exposed individual to fresh air. Loosen clothing as necessary and position individual in a comfortable position.Get medical assistance.If breathing is difficult, give oxygen

After skin contact: Wash affected area with soap and water. Rinse/flush exposed skin gently using water for 15-20 minutes. Seek medical attention if irritation persists or if concerned.

After eye contact: Protect unexposed eye. Rinse or flush eye gently with water for at least 15-20 minutes, lifting upper and lower lids.Seek medical attention if irritation persists or if concerned

After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water. Dilute mouth with water or milk after rinsing.Get medical assistance.

Most important symptoms and effects, both acute and delayed:

Poison. Toxic by ingestion, absorption through skin and inhalation, potentially causing irreversible effects. Irritating to eyes, skin, and respiratory tract. Irritation- all routes of exposure.Shortness of breath.Nausea.Headache.May be fatal or cause blindness if swallowed. Cannot be made non-poisonous. May cause gastrointestinal irritation, vomiting, and diarrhea. Central nervous system disorders. Skin disorders, preexisting eye disorders, gastrointestinal tract;Toxic: danger of very serious irreversible effects by inhalation, ingestion or absorption through skin. Experiments have shown reproductive toxicity effects on laboratory animals. May cause adverse kidney and liver effects

Indication of any immediate medical attention and special treatment needed:

If seeking medical attention, provide SDS document to physician.Physician should treat symptomatically.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: Dry chemical, foam, dry sand, or Carbon Dioxide.Water spray can keep containers cool.

For safety reasons unsuitable extinguishing agents: Water may be ineffective.

Special hazards arising from the substance or mixture:

Risk of ignition. Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back. Containers may explode when heated

Advice for firefighters:

Protective equipment: Wear protective eyeware, gloves, and clothing. Refer to Section 8.

Additional information (precautions): Remove all sources of ignition. Avoid contact with skin, eyes, and clothing.Ensure adequate ventilation.Take precautions against static discharge.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Use spark-proof tools and explosion-proof equipment.Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor and mists below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.Ensure adequate ventilation.

Environmental precautions:

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

Methods and material for containment and cleaning up:

If necessary use trained response staff or contractor. Remove all sources of ignition. Contain spillage and then

collect. Do not flush to sewer.Absorb with a noncombustible absorbent material such as sand or earth and containerize for disposal. Ventilate area of leak or spill.Use spark-proof tools and explosion-proof equipment.Follow proper disposal methods. Refer to Section 13.

Reference to other sections:

SECTION 7 : Handling and storage

Precautions for safe handling:

Use in a chemical fume hood. Wash hands before breaks and immediately after handling the product.Avoid contact with skin, eyes, and clothing.Take precautions against static discharge.

Conditions for safe storage, including any incompatibilities:

Store in a cool location. Provide ventilation for containers. Avoid storage near extreme heat, ignition sources or open flame. Keep container tightly sealed.Store with like hazards. Protect from freezing and physical damage.

SECTION 8 : Exposure controls/personal protection

Control Parameters:	67-56-1, Methanol, ACGIH: 250 ppm STEL; 200 ppm TWA 67-56-1, Methanol, NIOSH: 250 ppm STEL; 325 mg/m3 STEL 67-56-1, Methanol, NIOSH: 200 ppm TWA; 260 mg/m3 TWA
Appropriate Engineering controls:	Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling. Ensure that dust-handling systems (exhaust ducts, dust collectors, vessels, and processing equipment) are designed to prevent the escape of dust into the work area.
Respiratory protection:	Use in a chemical fume hood. If exposure limit is exceeded, a full-face respirator with organic cartridge may be worn.
Protection of skin:	Select glove material impermeable and resistant to the substance.Select glove material based on rates of diffusion and degradation.
Eye protection:	Safety glasses with side shields or goggles.
General hygienic measures:	Wash hands before breaks and at the end of work. Avoid contact with the eyes and skin.Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices.Perform routine housekeeping.

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	Clear colorless liquid	**Explosion limit lower:** **Explosion limit upper:**	6 31
Odor:	Alcohol	**Vapor pressure:**	128 hPa @ 20°C
Odor threshold:	Not Available	**Vapor density:**	1.11
pH-value:	Not Available	**Relative density:**	0.79
Melting/Freezing point:	-98°C	**Solubilities:**	Miscible at 20 °C

Boiling point/Boiling range:	64.7°C @ 760mmHg	**Partition coefficient (n-octanol/water):**	Not Available
Flash point (closed cup):	12°C	**Auto/Self-ignition temperature:**	455°C
Evaporation rate:	5.2	**Decomposition temperature:**	Not Available
Flammability (solid,gaseous):	Flammable	**Viscosity:**	a. Kinematic:Not Available b. Dynamic: Not Available
Density: Not Available			

SECTION 10 : Stability and reactivity

Reactivity: Vapours may form explosive mixture with air.
Chemical stability: Stable under normal conditions.
Possible hazardous reactions: None under normal processing.
Conditions to avoid: Excess heat, Incompatible Materials, flames, or sparks.
Incompatible materials: Oxidizing agents, reducing agents, alkali metals, acids, sodium, potassium, metals as powders, acid chlorides, acid anhydrides, powdered magnesium, and aluminum.
Hazardous decomposition products:carbon monoxide, formaldehyde.

SECTION 11 : Toxicological information

Acute Toxicity:		
Dermal:	(rabbit)	LD-50 15800 mg/kg
Oral:	(rat)	LD-50 5628 mg/kg
Inhalation:	(rat)	LC-50 130,7 mg/l
Chronic Toxicity: No additional information.		
Corrosion Irritation:		
Ocular:		Irritating to eyes
Dermal:		Irritating to skin
Sensitization:		No additional information.
Single Target Organ (STOT):		Classified as causing damage to organs:Eyes, skin, optic nerve, gastrointestinal tract, central nervous system, respiratory system, liver, spleen, kidney, blood
Numerical Measures:		No additional information.
Carcinogenicity:		Teratogenicity : has occurred in experimental animals.
Mutagenicity:		Mutagenetic effects have occurred in experimental animals.

Reproductive Toxicity:	Developmental Effects (Immediate/Delayed) have occurred in experimental animals

SECTION 12 : Ecological information

Ecotoxicity

Freshwater Fish: 96 Hr LC50 Pimephales promelas: 28200 mg/L

Freshwater Fish: 96 Hr LC50 Oncorhynchus mykiss: 19500 - 20700 mg/L

Freshwater Fish: 96 Hr LC50 Pimephales promelas: >100 mg/L

Freshwater Fish: 96 Hr LC50 Oncorhynchus mykiss: 18 - 20 mL/L

Freshwater Fish: 96 Hr LC50 Lepomis macrochirus: 13500 - 17600 mg/L

Persistence and degradability: Not persistant.
Bioaccumulative potential: Not Bioaccumulative.
Mobility in soil: Aqueous solution has high mobility in soil.
Other adverse effects:

SECTION 13 : Disposal considerations

Waste disposal recommendations:

Methanol RCRA waste code U154. Do not allow product to reach sewage system or open water.It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities (US 40CFR262.11). Absorb with a noncombustible absorbent material such as sand or earth and containerize for disposal. Provide ventilation. Have fire extinguishing agent available in case of fire. Eliminate all sources of ignition.Use spark-proof tools and explosion-proof equipment.Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations. Ensure complete and accurate classification.

SECTION 14 : Transport information

UN-Number

UN1230

UN proper shipping name

Methanol

Transport hazard class(es)

Class:
3 Flammable liquids

Class:
6.1 Toxic substances

Packing group:II
Environmental hazard:
Transport in bulk:
Special precautions for user:

SECTION 15 : Regulatory information

United States (USA)

SARA Section 311/312 (Specific toxic chemical listings):

Acute, Chronic, Fire

SARA Section 313 (Specific toxic chemical listings):

67-56-1 Methanol

RCRA (hazardous waste code):

67-56-1 Methanol RCRA waste code U154

TSCA (Toxic Substances Control Act):

All ingredients are listed.

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):

67-56-1 Methanol 5000 lbs

Proposition 65 (California):

Chemicals known to cause cancer:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for females:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for males:

None of the ingredients is listed

Chemicals known to cause developmental toxicity:

67-56-1 Methanol

Canada

Canadian Domestic Substances List (DSL):

All ingredients are listed.

Canadian NPRI Ingredient Disclosure list (limit 0.1%):

None of the ingredients is listed

Canadian NPRI Ingredient Disclosure list (limit 1%):

67-56-1 Methanol

SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.Note:. The responsibility to provide a safe workplace remains with the user.The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment.The information contained herein is, to the best of our knowledge and belief, accurate.However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material.It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

GHS Full Text Phrases:

Abbreviations and acronyms:

IMDG: International Maritime Code for Dangerous Goods
PNEC: Predicted No-Effect Concentration (REACH)

CFR: Code of Federal Regulations (USA)
SARA: Superfund Amendments and Reauthorization Act (USA)
RCRA: Resource Conservation and Recovery Act (USA)
TSCA: Toxic Substances Control Act (USA)
NPRI: National Pollutant Release Inventory (Canada)
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)

Effective date : 01.08.2015
Last updated : 03.27.2015

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
Alconox, Inc.
30 Glenn Street
White Plains, NY 10603
1-914-948-4040

Supplier
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.

NFPA: 1-0-0

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

Nitric Acid, 3M

SECTION 1 : Identification of the substance/mixture and of the supplier

Product name : **Nitric Acid, 3M**

Manufacturer/Supplier Trade name:

Manufacturer/Supplier Article number: **S25860**

Recommended uses of the product and uses restrictions on use:

Manufacturer Details:

AquaPhoenix Scientific
9 Barnhart Drive, Hanover, PA 17331

Supplier Details:

Fisher Science Education
15 Jet View Drive, Rochester, NY 14624

Emergency telephone number:

Fisher Science Education Emergency Telephone No.: 800-535-5053

SECTION 2 : Hazards identification

Classification of the substance or mixture:

Oxidizing
Oxidizing liquids, category 3

Corrosive
Serious eye damage, category 1
Skin corrosion, category 1B

Ox. liq. 3
Skin corrosion/irritation - Skin Corr. 1B
Eye Damage 1

Signal word :Danger

Hazard statements:
May intensify fire; oxidizer
Causes severe skin burns and eye damage
Causes serious eye damage
Precautionary statements:
If medical advice is needed, have product container or label at hand
Keep out of reach of children
Read label before use
Keep away from heat/sparks/open flames/hot surfaces. No smoking
Wear protective gloves/protective clothing/eye protection/face protection
Do not breathe dust/fume/gas/mist/vapours/spray
Do not eat, drink or smoke when using this product
Take any precaution to avoid mixing with combustibles
Keep/Store away from clothing/combustible materials
Wash skin thoroughly after handling
IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing
Immediately call a POISON CENTER or doctor/physician
IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower
Wash contaminated clothing before reuse
IF SWALLOWED: Rinse mouth. Do NOT induce vomiting
Specific treatment (see supplemental first aid instructions on this label)
In case of fire: Use agents recommended in section 5 for extinction
Store locked up
Dispose of contents/container to ...

Other Non-GHS Classification:

WHMIS

C

E

NFPA/HMIS

NFPA SCALE (0-4)

Health	3
Flammability	0
Physical Hazard	2
Personal Protection	X

HMIS RATINGS (0-4)

SECTION 3 : Composition/information on ingredients

Ingredients:		
CAS 7697-37-2	Nitric Acid	26.03 %
CAS 7732-18-5	Deionized Water	73.97 %
		Percentages are by weight

SECTION 4 : First aid measures

Description of first aid measures

After inhalation: Move exposed individual to fresh air. Loosen clothing as necessary and position individual in a comfortable position.Seek medical advice if discomfort or irritation persists.

After skin contact: Wash affected area with soap and water. Rinse or flush skin/hair gently with water for at least 30 minutes.Seek immediate medical attention

After eye contact: Protect unexposed eye. Remove contact lens(es) if able to do so during rinsing. Rinse or flush eye gently with water for at least 30 minutes, lifting upper and lower lids.Seek immediate medical attention (ophthalmologist)

After swallowing: Rinse mouth thoroughly. Do not induce vomiting. Have exposed individual drink sips of water. Seek medical attention if irritation, discomfort or vomiting persists.

Most important symptoms and effects, both acute and delayed:

Headache, Shortness of breath.Irritation/burns, all routes of exposure.May cause severe burns, blindness and/or permanent damage. May cause burns, deep penetrating ulcerations of the skin, delayed tissue destruction, redness, pain. May cause gastrointestinal irritation with nausea, vomiting and diarrhea;

Indication of any immediate medical attention and special treatment needed:

If seeking medical attention, provide SDS document to physician.

SECTION 5 : Firefighting measures

Extinguishing media

Suitable extinguishing agents: Does not burn. Use extinguishing media appropriate for surrounding fire.If in laboratory setting, follow laboratory fire suppression procedures. Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition

For safety reasons unsuitable extinguishing agents:

Special hazards arising from the substance or mixture:

Combustion products may include carbon oxides or other toxic vapors.Nitrogen oxides (NOx)

Advice for firefighters:

Protective equipment:

Additional information (precautions): Move product containers away from fire or keep cool with water spray as a protective measure, where feasible.

SECTION 6 : Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Wear protective equipment. Use respiratory protective device against the effects of fumes/dust/aerosol. Keep unprotected persons away. Ensure adequate ventilation.Keep away from ignition sources. Protect from heat.Stop the spill, if possible. Contain spilled material by diking or using inert absorbent. Transfer to a disposal or recovery container.

Environmental precautions:

Prevent from reaching drains, sewer or waterway. Collect contaminated soil for characterization per Section 13

Methods and material for containment and cleaning up:

If in a laboratory setting, follow Chemical Hygiene Plan procedures.Collect liquids using vacuum or by use of absorbents. Place into properly labeled containers for recovery or disposal. If necessary, use trained response staff/contractor.

Reference to other sections:

SECTION 7 : Handling and storage

Precautions for safe handling:

Prevent formation of aerosols. Follow good hygiene procedures when handling chemical materials. Do not eat, drink, smoke, or use personal products when handling chemical substances. If in a laboratory setting, follow Chemical Hygiene Plan.Use only in well ventilated areas.Avoid splashes or spray in enclosed areas.No smoking.Keep away from heat and sources of ignition.

Conditions for safe storage, including any incompatibilities:

Store in a cool location. Provide ventilation for containers. Avoid storage near extreme heat, ignition sources or open flame. Store away from foodstuffs. Store away from oxidizing agents.Store in cool, dry conditions in well sealed containers. Keep container tightly sealed.Store with like hazards. Storage class (TRGS 510): Oxidizing

hazardous materials

SECTION 8 : Exposure controls/personal protection

Control Parameters: 7697-37-2, Nitric Acid, NIOSH 4 ppm STEL; 10 mg/m3 STEL
7697-37-2, Nitric Acid , NIOSH 2 ppm TWA; 5 mg/m3 TWA
7697-37-2 , Nitric Acid , ACGIH 4 ppm STEL
7697-37-2, Nitric Acid , ACGIH 2 ppm TWA

Appropriate Engineering controls: Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use/handling.Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor or mists below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.

Respiratory protection: Not required under normal conditions of use. Use suitable respiratory protective device when high concentrations are present. Use suitable respiratory protective device when aerosol or mist is formed. For spills, respiratory protection may be advisable.

Protection of skin: The glove material has to be impermeable and resistant to the product/ the substance/ the preparation being used/handled.Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation.

Eye protection: Safety glasses with side shields or goggles.

General hygienic measures: The usual precautionary measures are to be adhered to when handling chemicals. Keep away from food, beverages and feed sources. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work. Do not inhale gases/fumes/dust/mist/vapor/aerosols. Avoid contact with the eyes and skin.

SECTION 9 : Physical and chemical properties

Appearance (physical state,color):	colorless liquid	**Explosion limit lower:** **Explosion limit upper:**	Not Determined Not Determined
Odor:	strong acrid	**Vapor pressure:**	49 hPa (37 mmHg) at 50 °C (122 °F)
Odor threshold:	0.29 ppm	**Vapor density:**	2.5 (Air = 1)
pH-value:	<1.0	**Relative density:**	1.413 g/cm3 at 20 °C (68 °F)
Melting/Freezing point:	-41.6°C (-42.9°F)	**Solubilities:**	Soluble
Boiling point/Boiling range:	120.5 °C (248.9 °F)	**Partition coefficient (n-octanol/water):**	Not Determined
Flash point (closed cup):	Not Determined	**Auto/Self-ignition temperature:**	Not Determined

Evaporation rate:	Not Determined	**Decomposition temperature:**	Not Determined
Flammability (solid,gaseous):	Not Determined	**Viscosity:**	a. Kinematic:Not Determined b. Dynamic: Not Determined
Density: Not Determined			

SECTION 10 : Stability and reactivity

Reactivity: Oxidizer.Reacts violently with alcohol, organic material, turpene, charcoal. Violent reaction with Nitric acid + Acetone and Sulfuric acid. Nitric Acid will react with water or steam to produce heat and toxic, corrosive and flammable vapors. (Nitric acid, fuming)
Chemical stability: No decomposition if used and stored according to specifications.
Possible hazardous reactions: Oxidizer: Contact with combustible/organic material may cause fire
Conditions to avoid:excess heat.combustible materials.Incompatible Materials.
Incompatible materials: Highly reactive with alkalis.Reactive with reducing agents. combustible materials. organic materials,metals. Acids.Reducing agents.aldehydes.
Hazardous decomposition products: Nitrogen oxides (NOx)

SECTION 11 : Toxicological information

Acute Toxicity:		
Inhalation:	67 ppm 4 h	Inhalation LC50 Rat
Chronic Toxicity: No additional information.		
Corrosion Irritation:		
Dermal:		Rabbit: Corrosive
Ocular:		Rabbit: Corrosive to eyes
Dermal:	Section 2	Classified as causing severe skin burns and eye damage.
Ocular:	Section 2	Classified as causing serious eye damage
Sensitization:		No additional information.
Single Target Organ (STOT):		No additional information.
Numerical Measures:		No additional information.
Carcinogenicity:		No additional information.
Mutagenicity:		No additional information.
Reproductive Toxicity:		Experiments have shown reproductive toxicity effects on laboratory animals.

SECTION 12 : Ecological information

Ecotoxicity Persistence and degradability: Readily degradable in the environment.
Bioaccumulative potential:
Mobility in soil: Aqueous solution has high mobility in soil.

Other adverse effects:

SECTION 13 : Disposal considerations

Waste disposal recommendations:

Product/containers must not be disposed together with household garbage. Do not allow product to reach sewage system or open water.It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities (US 40CFR262.11). Consult federal state/ provincial and local regulations regarding the proper disposal of waste material that may incorporate some amount of this product.

SECTION 14 : Transport information

UN-Number

2031

UN proper shipping name

Nitric Acid

Transport hazard class(es)

Class:
8 Corrosive substances

Packing group:II
Environmental hazard:
Transport in bulk:
Special precautions for user:

SECTION 15 : Regulatory information

United States (USA)

SARA Section 311/312 (Specific toxic chemical listings):

Acute, Chronic

SARA Section 313 (Specific toxic chemical listings):

7697-37-2 Nitric Acid

RCRA (hazardous waste code):

None of the ingredients is listed

TSCA (Toxic Substances Control Act):

All ingredients are listed.

CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act):

7697-37-2 Nitric acid 1000 lbs

Proposition 65 (California):

Chemicals known to cause cancer:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for females:

None of the ingredients is listed

Chemicals known to cause reproductive toxicity for males:

None of the ingredients is listed

Chemicals known to cause developmental toxicity:

None of the ingredients is listed

Canada

Canadian Domestic Substances List (DSL):

All ingredients are listed.

Canadian NPRI Ingredient Disclosure list (limit 0.1%):

None of the ingredients is listed

Canadian NPRI Ingredient Disclosure list (limit 1%):

7697-37-2 Nitric Acid

SECTION 16 : Other information

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.Note:. The responsibility to provide a safe workplace remains with the user.The user should consider the health hazards and safety information contained herein as a guide and should take those precautions required in an individual operation to instruct employees and develop work practice procedures for a safe work environment.The information contained herein is, to the best of our knowledge and belief, accurate.However, since the conditions of handling and use are beyond our control, we make no guarantee of results, and assume no liability for damages incurred by the use of this material.It is the responsibility of the user to comply with all applicable laws and regulations applicable to this material.

GHS Full Text Phrases:

Abbreviations and acronyms:

IMDG: International Maritime Code for Dangerous Goods
PNEC: Predicted No-Effect Concentration (REACH)
CFR: Code of Federal Regulations (USA)
SARA: Superfund Amendments and Reauthorization Act (USA)
RCRA: Resource Conservation and Recovery Act (USA)
TSCA: Toxic Substances Control Act (USA)
NPRI: National Pollutant Release Inventory (Canada)
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)

Effective date : 12.29.2014
Last updated : 03.23.2015

ThermoFisher SCIENTIFIC

SAFETY DATA SHEET

Creation Date 03-Dec-2010 **Revision Date** 12-Oct-2017 **Revision Number** 4

1. Identification

Product Name	**Sodium azide**
Cat No. :	**S227I-1; S227I-25; S227I-100; S227I-500; S227I-500LC**
Synonyms	Sodium salt of hydrazoic acid; Smite
Recommended Use	Laboratory chemicals.
Uses advised against	Not for food, drug, pesticide or biocidal product use

Details of the supplier of the safety data sheet

Company
Fisher Scientific
One Reagent Lane
Fair Lawn, NJ 07410
Tel: (201) 796-7100

Emergency Telephone Number
CHEMTREC®, Inside the USA: 800-424-9300
CHEMTREC®, Outside the USA: 001-703-527-3887

2. Hazard(s) Identification

Classification
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute oral toxicity	Category 2
Specific target organ toxicity - (repeated exposure)	Category 2

Target Organs - Central nervous system (CNS), Cardiovascular system, Liver, Kidney, Heart, spleen.

Label Elements

Signal Word
Danger

Hazard Statements
Fatal if swallowed
May cause damage to organs through prolonged or repeated exposure

Precautionary Statements
Prevention
Wash face, hands and any exposed skin thoroughly after handling

Do not eat, drink or smoke when using this product
Do not get in eyes, on skin, or on clothing
Response
Get medical attention/advice if you feel unwell
Ingestion
IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
Rinse mouth
Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed
Disposal
Dispose of contents/container to an approved waste disposal plant
Hazards not otherwise classified (HNOC)
Contact with acids liberates very toxic gas
Very toxic to aquatic life with long lasting effects

3. Composition / Information on Ingredients

Component	CAS-No	Weight %
Sodium azide	26628-22-8	>95

4. First-aid measures

Eye Contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Immediate medical attention is required.

Skin Contact Wash off immediately with plenty of water for at least 15 minutes. Immediate medical attention is required.

Inhalation Move to fresh air. If breathing is difficult, give oxygen. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Immediate medical attention is required.

Ingestion Do not induce vomiting. Call a physician or Poison Control Center immediately.

Most important symptoms and effects No information available.

Notes to Physician Treat symptomatically

5. Fire-fighting measures

Suitable Extinguishing Media Dry chemical, CO_2, water spray or alcohol-resistant foam. Use water spray or fog; do not use straight streams.

Unsuitable Extinguishing Media Do not use a solid water stream as it may scatter and spread fire

Flash Point No information available
Method - No information available

Autoignition Temperature No information available
Explosion Limits
Upper No data available
Lower No data available
Sensitivity to Mechanical Impact No information available
Sensitivity to Static Discharge No information available

Specific Hazards Arising from the Chemical

In the event of fire, cool tanks with water spray. Containers may explode when heated or if contaminated with water. Thermal decomposition can lead to release of irritating gases and vapors. Runoff to sewer may create fire or explosion hazard. Flammable/toxic gases may accumulate in confined areas (basements, tanks, hopper/tank cars etc.). Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous Combustion Products
Nitrogen oxides (NOx) Sodium oxides
Protective Equipment and Precautions for Firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

NFPA

Health	Flammability	Instability	Physical hazards
4	1	2	N/A

6. Accidental release measures

Personal Precautions Use personal protective equipment. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Keep people away from and upwind of spill/leak. Avoid dust formation. Do not subject to grinding/shock/friction.

Environmental Precautions Do not flush into surface water or sanitary sewer system. Do not allow material to contaminate ground water system. Prevent product from entering drains. Local authorities should be advised if significant spillages cannot be contained. See Section 12 for additional ecological information. Avoid release to the environment. Collect spillage.

Methods for Containment and Clean Up Sweep up or vacuum up spillage and collect in suitable container for disposal. Avoid dust formation.

7. Handling and storage

Handling Wear personal protective equipment. Use only under a chemical fume hood. Avoid dust formation. Do not breathe dust. Keep away from open flames, hot surfaces and sources of ignition.

Storage Keep in a dry, cool and well-ventilated place. Keep container tightly closed.

8. Exposure controls / personal protection

Exposure Guidelines

Component	ACGIH TLV	OSHA PEL	NIOSH IDLH	Mexico OEL (TWA)
Sodium azide	Ceiling: 0.29 mg/m³ Ceiling: 0.11 ppm	Skin (Vacated) Ceiling: 0.1 ppm (Vacated) Ceiling: 0.3 mg/m³	Ceiling: 0.1 ppm Ceiling: 0.3 mg/m³	

Legend

ACGIH - American Conference of Governmental Industrial Hygienists
OSHA - Occupational Safety and Health Administration
NIOSH IDLH: The National Institute for Occupational Safety and Health Immediately Dangerous to Life or Health

Engineering Measures Use only under a chemical fume hood. Ensure that eyewash stations and safety showers are close to the workstation location. Use explosion-proof electrical/ventilating/lighting/equipment.

Personal Protective Equipment

Eye/face Protection Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin and body protection	Wear appropriate protective gloves and clothing to prevent skin exposure.
Respiratory Protection	Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.
Hygiene Measures	Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Physical State	Powder Solid
Appearance	White
Odor	Odorless
Odor Threshold	No information available
pH	10 1M aq.sol
Melting Point/Range	275 °C / 527 °F
Boiling Point/Range	300 °C / 572 °F @ 760 mmHg
Flash Point	No information available
Evaporation Rate	Not applicable
Flammability (solid,gas)	No information available
Flammability or explosive limits	
Upper	No data available
Lower	No data available
Vapor Pressure	No information available
Vapor Density	Not applicable
Specific Gravity	1.850
Solubility	420 g/L (17°C)
Partition coefficient; n-octanol/water	No data available
Autoignition Temperature	No information available
Decomposition Temperature	> 275°C
Viscosity	Not applicable
Molecular Formula	N3 Na
Molecular Weight	65.01

10. Stability and reactivity

Reactive Hazard	Yes
Stability	Risk of explosion by shock, friction, fire or other sources of ignition.
Conditions to Avoid	Incompatible products. Heat, flames and sparks. Avoid shock and friction. Avoid dust formation.
Incompatible Materials	Acids, Oxidizing agents, Peroxides, Acid chlorides, Metals
Hazardous Decomposition Products	Nitrogen oxides (NOx), Sodium oxides
Hazardous Polymerization	Hazardous polymerization does not occur.
Hazardous Reactions	Contact with acids liberates very toxic gas. Do not flush down the drain. Sodium azide may react with plumbing systems to form highly explosive compounds.

11. Toxicological Information

Acute Toxicity

Product Information
Component Information

Component	LD50 Oral	LD50 Dermal	LC50 Inhalation
Sodium azide	LD50 = 27 mg/kg (Rat)	-	Not listed

Toxicologically Synergistic Products No information available

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation May cause eye, skin, and respiratory tract irritation

Sensitization No information available

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Component	CAS-No	IARC	NTP	ACGIH	OSHA	Mexico
Sodium azide	26628-22-8	Not listed	Not listed	Not listed	Not listed	Not listed

Mutagenic Effects Mutagenic effects have occurred in experimental animals.

Reproductive Effects Experiments have shown reproductive toxicity effects on laboratory animals.

Developmental Effects No information available.

Teratogenicity No information available.

STOT - single exposure None known

STOT - repeated exposure Central nervous system (CNS) Cardiovascular system Liver Kidney Heart spleen

Aspiration hazard No information available

Symptoms / effects,both acute and delayed No information available

Endocrine Disruptor Information No information available

Other Adverse Effects See actual entry in RTECS for complete information. Tumorigenic effects have been reported in experimental animals.

12. Ecological Information

Ecotoxicity

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. The product contains following substances which are hazardous for the environment.

Component	Freshwater Algae	Freshwater Fish	Microtox	Water Flea
Sodium azide	Not listed	LC50: = 0.7 mg/L, 96h (Lepomis macrochirus) LC50: = 5.46 mg/L, 96h flow-through (Pimephales promelas) LC50: = 0.8 mg/L, 96h (Oncorhynchus mykiss)	Not listed	Not listed

Persistence and Degradability Soluble in water Persistence is unlikely based on information available.

Bioaccumulation/ Accumulation No information available.

Mobility Will likely be mobile in the environment due to its water solubility.

13. Disposal considerations

Waste Disposal Methods Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. Chemical waste generators must also consult local, regional, and national hazardous waste regulations to ensure complete and accurate classification.

14. Transport information

DOT

UN-No	UN1687
Proper Shipping Name	SODIUM AZIDE
Hazard Class	6.1
Packing Group	II

TDG

UN-No	UN1687
Proper Shipping Name	SODIUM AZIDE
Hazard Class	6.1
Packing Group	II

IATA

UN-No	UN1687
Proper Shipping Name	SODIUM AZIDE
Hazard Class	6.1
Packing Group	II

IMDG/IMO

UN-No	UN1687
Proper Shipping Name	SODIUM AZIDE
Hazard Class	6.1
Packing Group	II

15. Regulatory Information

International Inventories

Component	TSCA	DSL	NDSL	EINECS	ELINCS	NLP	PICCS	ENCS	AICS	IECSC	KECL
Sodium azide	X	X	-	247-852-1	-		X	X	X	X	X

Legend:
X - Listed
E - Indicates a substance that is the subject of a Section 5(e) Consent order under TSCA.
F - Indicates a substance that is the subject of a Section 5(f) Rule under TSCA.
N - Indicates a polymeric substance containing no free-radical initiator in its inventory name but is considered to cover the designated polymer made with any free-radical initiator regardless of the amount used.
P - Indicates a commenced PMN substance
R - Indicates a substance that is the subject of a Section 6 risk management rule under TSCA.
S - Indicates a substance that is identified in a proposed or final Significant New Use Rule
T - Indicates a substance that is the subject of a Section 4 test rule under TSCA.
XU - Indicates a substance exempt from reporting under the Inventory Update Rule, i.e. Partial Updating of the TSCA Inventory Data Base Production and Site Reports (40 CFR 710(B).
Y1 - Indicates an exempt polymer that has a number-average molecular weight of 1,000 or greater.
Y2 - Indicates an exempt polymer that is a polyester and is made only from reactants included in a specified list of low concern reactants that comprises one of the eligibility criteria for the exemption rule.

U.S. Federal Regulations

TSCA 12(b) Not applicable

SARA 313

Component	CAS-No	Weight %	SARA 313 - Threshold Values %
Sodium azide	26628-22-8	>95	1.0

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	Yes
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	Yes

CWA (Clean Water Act) Not applicable

Clean Air Act Not applicable

OSHA Occupational Safety and Health Administration
Not applicable

CERCLA
This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Component	Hazardous Substances RQs	CERCLA EHS RQs
Sodium azide	1000 lb	1000 lb

California Proposition 65 This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Component	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Sodium azide	X	X	X	-	X

U.S. Department of Transportation

Reportable Quantity (RQ): N
DOT Marine Pollutant N
DOT Severe Marine Pollutant N

U.S. Department of Homeland Security
This product does not contain any DHS chemicals.

Other International Regulations

Mexico - Grade No information available

16. Other Information

Prepared By Regulatory Affairs
Thermo Fisher Scientific
Email: EMSDS.RA@thermofisher.com

Creation Date 03-Dec-2010
Revision Date 12-Oct-2017
Print Date 12-Oct-2017
Revision Summary This document has been updated to comply with the US OSHA HazCom 2012 Standard replacing the current legislation under 29 CFR 1910.1200 to align with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

Disclaimer
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 a 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

End of SDS