

Decontamination SOP

Due to the nature of scientific diving work at Superfund Sites, there is a high likelihood of contamination of diving equipment when conducting dive operations that interact with bottom sediment. This decontamination SOP has been generated to target the most likely contaminants, but has not been tested quantitatively as to its effectiveness.

Planning:

1. It is recommended that the ideal project team for a dive project in contaminated seas should consist of six (6) members: the boat skipper, a non-diving dive master and unsuited, and four (4) divers grouped as two 2-person teams. However, if available divers are limited, or a project is remote, the non-diving buddy team (if the team is comprised of the boat operator and two buddy teams) will implement decontamination (decon) of the returning divers (the divemaster will be one of the 4 divers in this case).
2. Identify exposure (e.g., microbial pathogens, petroleum waste, PCBs, etc.) well in advance of the dive and completion of the dive plan. The likely contaminants of concern for this dive project include organic contaminants, including creosote, and potential contact with diluted sewage discharge.
3. Identify appropriate decontamination procedures for contaminant exposure well in advance of the dive and completion of the dive plan
4. Prior to the dive and at the dive briefing, each member of the mission should review and become familiar with decon procedures applicable to the exposure. The project leader or designated dive master should review potential contaminants, health risks, exposure paths, exposure control procedures, decon procedures, and medical care appropriate to contamination with project members at the dive briefing.
5. Assemble, prepare and gather together all necessary decon equipment and supplies at least three days prior to the dive. Compare this assemblage with the list of equipment and supplies listed below. If anything is missing, ensure that it is obtained. Make a list and assign procurement amongst boat operator and divers.
6. Load and transport decon equipment and supplies along with other dive gear and equipment to the dive site.
7. Assign decon roles to tenders, Assign a designated tender to each diver to promote continuity of decon care throughout the dive project. The nondiving buddy team will be responsible for decon of returning divers, if an extra buddy team is not available.
8. Locate and establish the different decon zones on the boat or at the dive site. The hot zone

on the boat will be limited to the swim step and the aft gunnel. The decon zone would be the swim step, the aft gunnel and the elevated aft deck of the boat stern of the hoist/steering column where the gear soak tubs are placed. The midship deck, cabin and bow of the boat are designated as the clean zone and every effort should be made to insure sanitary conditions in this clean zone.

9. Decide on the timing of when handling food (eating lunch or snacking by those persons diving and tendering) is permissible and no longer permissible and review this at the dive briefing. After decon, divers will be allowed to consume food, beverages in the “clean” areas designated by this SOP.
10. Once the diver has been in the water, or in the “hot zone” on the boat, no dive gear on or off the diver, will be allowed inside the cabin. Dive tracking forms and other essentials should be positioned for convenient use that respects this prohibition.
11. All non-diving personnel, unless appropriately dressed, should stay clear of the hot and decon zones.

Project Checklist:

Provide the following for the dive project:

Divemaster

- Betadine - 0.9 oz betadine per 1.5 gallons of fresh water
- Decon sprayers (one 2 gallon sprayers - fill to 1.5 gallons and use 0.5 gal for air pressure)
- Decon “citrus-wipes” for obvious areas of organic (e.g. Creosote) contamination on the diver.
- Hand “wipes” for redundant washing of divers/tenders hands before consuming food.
- Ensure adequate supply of viking and nitrile dry gloves.

Boat Operator

Provide/conduct the following for the dive project:

- Fresh water (make sure the boat’s fresh water tank is filled prior to the dive and bring three five-gallon jugs of fresh water to fill betadine sprayers and soak-tubs for equipment; reserving the limited volume of boat water for the hose wash-downs)
- Installation of weight belt retainer (e.g. line with karabiner) for swim step such that two weight belts from returning divers may be taken off and secured in the “hot zone” during decon.
- Fresh water hose on boat
- Tub or cooler for fresh water soak of camera equipment
- Verify water pump operation on the boat
- Protective gloves for tenders (at least 2 pairs/diver)

- Eye shields for tenders (at least one pair/diver plus one spare)
- Long-handled brushes with two-inch bristles for scrubbing down divers in drysuits with minimum contamination of tenders
- Trash bags for the disposal of gloves or other contaminated articles and for the packing of breathing apparatus after dive and decontamination (a box of ten 5-gal plastic draw string trash bags, opened and made available before divers commence suiting up)

Procedures:

1. Before divers get in the water, tenders mix betadine solution in one of the sprayers. Third sprayer is a spare and can be stored above cabin with a tie-down.
2. Before divers get into the water, divers will don “nitrile” over viking dry gloves such that these may be disposed of after each dive, rather than the viking gloves. This system also allows redundant protection in the likely event of glove puncture.
3. Upon completion of dive and reboarding the vessel, Divers will remove belts and clip them on the swim step before climbing up - each diver stands on the swim-step in full dive gear and gets a fresh water rinse from head-to-toe by his designated tender who is fully protected (wearing protective gloves, dive suit fully zipped and hooded, and eye protection). IF organics are noted on glove ring cuffs, these should be removed at this time and decontaminated. If the diver or divemaster believes there is a substantial risk of “dropping” the weight belt to the bottom via this technique, the divers will retain their weight belts through the next two steps, after which the tenders will remove and stow the belts in the “warm zone.”
4. Place camera gear in one tub (filled with freshwater) and sampling gear in another tub, in the “warm zone”. Beta-spray, let sit (3 minutes), then freshwater rinse, inspect for organics, and finally (if applicable) wipe off organics at the end of the day before removing them from the warm zone.
5. Remove and dispose of “nitrile” over liners.
6. While remaining on the swim step, divers are sprayed with betadine solution and scrubbed down with brushes; particular care is given to the divers face-mask, head, neck, hands, lower arms, and cuff seals. The betadine solution is left on divers for three (3) minutes before the AGA face mask is rinsed with fresh water and removed by the tender. Tenders will wipe down the returning divers with decon wipes to remove any obvious organic contamination.
7. First one and then the other diver is rinsed by his designated tender with the ship’s fresh water hose and scrubbed down while that diver stands on the high swim-step above the contaminated sea surface water. When a diver has been thoroughly rinsed and scrubbed down with freshwater, his/her tank is placed on the high swim-step and rinsed and scrubbed down (careful with the tank valve and its O-ring. The tank is stored by the tender before the second diver is rinsed and scrubbed. The equipment is decontaminated once it has had a

freshwater rinse and any organics have been scrubbed off. For equipment that has become hopelessly contaminated (where decon is not effective) with organics (such as the pore-water sampling device) through direct contact with the bottom sediments as determined by visual examination, these will be bagged prior to diving completion, and properly disposed of.

8. Divers can now proceed into the aft deck of the boat and remain there.
9. One tender should spray down the transom of the vessel with the water. Any obvious organic staining will be decontaminated with citrus-wipes.
10. Betadine and freshwater rinsed weight belts may be removed from the swim step and placed in the warm zone for the next dive.
11. Breathing apparatus - AGA face masks and regulators - should be stored in five-gallon draw-string plastic trash bags or rubbermaid tubs to prevent contamination by splashing sea water in the contamination area.
12. Divers should wipe their hands down with an antibacterial wipe before consuming any food or beverage, or going into the cabin.
13. Ensure thorough treatment of the inside of buoyancy compensators (BCs) with the freshwater hose. Use tank supplied air to aid in rinsing; do not inflate the BC orally.
14. Debrief dive project for any procedure decontamination procedure modifications.