



Health and Safety Guide

Exposure to toxins produced by harmful algal blooms (HABs), even at low concentrations can present potential risks to the sampler. The purpose of these sampling-specific health and safety (H&S) guidelines is to provide information for personnel protection to minimize the risks that may arise during site visits and field sampling.

HAZARDS OF TOXIN EXPOSURE

California water bodies under the effect of HABs present different hazards to samplers including skin rashes (contact dermatitis), upper respiratory irritation, and other effects from recurring low level (chronic) exposures. Routes of exposure include dermal (skin) contact, ingestion (e.g., from splashing into the mouth or being in the water accidentally), and inhalation of aerosolized water (e.g., toxins present in water droplets carried by the wind, such as from motorboats, jet skis or air boats). Caution should be exercised when sampling water bodies having HAB events (Chorus et al. 2000, Cheng et al. 2007). The water may contain toxins, so avoid contact with the water. Personnel with pre-existing respiratory conditions should not conduct HAB sampling.

In addition to exposure to toxins, there are inherent dangers associated with sampling work, especially in and around water. No measurement or sample is worth putting yourself or your fellow employees in danger. Safety must be the first consideration in deciding if, when, where, and how to take a measurement or collect a sample. When preparing for a sampling event, always consider the possible hazards and prepare for the worst cases with regard to personal safety and the safety of others.

LOCATION INFORMATION FOR EMERGENCY PERSONNEL

Most cell phones have a GPS feature on them that can transmit your location if it is enabled. Otherwise you will need to know your location in order to get Emergency Personnel to you in a reasonable time. Keep a GPS running during your trip so it is initialized; and be ready to give your location. Check the batteries (if not hard wired in) before setting out and have spare batteries on hand if needed. In most cases, sampling will be in close proximity to the shoreline so on-shore landmarks (e.g., a pier or distinctive building) would be effective for providing location information to emergency personnel.

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Below are general precautions to take when sampling from land or from a boat, and typical PPEs for sampling HABs. Samplers should have field plans specifying sampling and safety protocols, including identification of appropriate PPEs to minimize exposure while sampling. Sampling agencies are responsible for ensuring staff has training in accordance with applicable requirements (federal, state, and/or local).

Samplers are encouraged to minimize potential for contact with HAB impacted water. Before approaching water to be sampled, put on safety glasses, gloves that cover the entire arm (if dipping arm into the water to sample), or nitrile gloves, and rubber boots or waders. Samplers should wear

appropriate PPE throughout sample handling, including sample collection and processing (labeling, packaging for shipment, etc.). In order to minimize dermal and inhalation contact while collecting samples nearshore, the best option is to use an extension sampler (Figure 9) and remain on land while extending the pole of the sampler into the water. After sampling, discard all single-use items and consumables (paper towel used for wiping, gloves, syringes, etc.) into garbage bags or zip-top bags and close bags immediately.

If you do come into contact with the water, skin should be washed with soap and water, and thoroughly flushed with clean water.

List of typical PPE and other equipment for HAB sampling:

- Gloves that cover entire exposed area of the arm (forearm or arm-length)
- Safety glasses/goggles
- Eye Wash Bottle (filled)
- First aid kit
- Plenty of potable water and soap for rinsing the body should an exposure occur
- Change of clothes
- Paper towels for wiping
- Waders/Rubber boots
- Extension Sampler (example device shown in Figure 1)
- Personal Flotation Device (PFD) if working on a vessel, dock, or near turbulent water
- Garbage bags / zip-top bags to dispose of gloves and other disposable materials
- Cell phone or other communication tools

Figure 1. Nasco™ Swing Extension Sampler for taking grab samples of contaminated water sources





SAFE SAMPLING

Safety plans, including sampling safety requirements and risk prevention, are the responsibility of the agency or organization conducting the sampling and include factors such as: identification of potential hazards (e.g., weather, animals, flow/discharge schedules), emergency contacts and their phone numbers, and the location of the nearest emergency facilities. A few universal rules for safe sampling are identified below:

- Do not work alone. A sampling buddy should be within direct visual observation and earshot at all times, especially during potentially hazardous activities.
- When selecting sampling locations, look for safe access, and make sure there are no physical safety barriers, and wade or boat slowly to the sampling location
- For sampling, particularly waters with algal blooms or confirmed toxin concentrations:
 - Avoid water contact with skin and protect your eyes and face from exposure
 - Avoid splashing and other inadvertent exposure
 - Wear appropriate personal protective equipment (PPE) while sampling, including gloves and splash goggles.
 - Avoid inhaling spray from boats or wind.
 - Always wash hands and other exposed areas (arms, legs, etc.) with soap and water after collecting samples, and before starting any other activities, especially before eating.
 - Clean boots and waders using the decontamination protocol between each station to prevent cross contamination and the spread of invasive species.
 - If using a boat, always use approved personal flotation devices (PFDs); and boat operators should have completed an approved boating safety course or be able to prove their experience in the waters they will be navigating.

Field Crew Exposure

In the event that water potentially containing toxins comes in contact with the skin, rinse the exposed area right away with fresh water to minimize uptake of the toxin, clean with soap, and rinse again multiple times. If the eyes are exposed, immediately use the eyewash bottle to rinse out the eyes.

In the event that a field crew member exposed to toxin becomes ill, seek medical attention and inform them of potential exposure to cyanobacteria, algae, and/or toxins. Report all incidents to your agency, supervisor and/or Health and Safety Officer.

Boating Safety and Emergency Protocols

If using a boat to collect samples in open water, know and become familiar with boating safety and emergency protocols. Bring and wear the same PPE, at a minimum, onboard the boat as described above for HAB sampling.

All boat operators should have an operator's certificate and verify their qualifications. All persons aboard should wear PFDs. Samplers are encouraged to have a Float Plan, whenever boat-based monitoring activities are initiated. A [Project Float Plan Template](#) is available from the U.S. Coast



Guard. The following sections provide detail on specific aspects of vessel-related emergency procedures.

Man Overboard

A person overboard is a real emergency situation that should never happen, but does. Sampling personnel should be made aware of actions to take in case of a person overboard situation, and the boat should be equipped with appropriate emergency equipment. In larger water bodies, particularly during rough waters, all persons on deck should have proper tie offs and/or supervision. Personnel on the vessel should stay in visual contact with the person overboard and communicate location information to the boat operator. If you find yourself in the water, keep your head above water and try not to ingest any water. Once you have returned to the dock or shore, it is highly advisable to shower and change clothes as soon as possible.

Radios and Phones

The boat operator (or captain) and at least one other crew member should know how to operate the radio and what channels to use. Channel 16 is designated the 911 of the radio world. Use it in an emergency and get off it when you hear “Emergency Traffic”. Monitoring this channel is strongly encouraged in case you can be of assistance or are called in to help. VHF Radios are for public use; know the etiquette that goes with it.

Breakdowns

The boat operator will be responsible for any on-water repairs to the vessel. Should a breakdown occur, the boat operator should notify the contact person on shore if they will be returning late to port, or docking at a different location than the one identified in the float plan.

References

- Chorus I, Flaconer IR, Salas HJ, Batram J. 2000. Health risks caused by freshwater cyanobacteria in recreational waters. *J Toxicol Environ Health (B)* 3:323-347.
- Cheng US, Zhou Y, Mitch Irvin C, Kirkpatrick B, Backer LC. 2007. Characterization of aerosols containing microcystin. *Mar Drugs* 5:136-150.