Safety precautions for working in urban water systems

Faculty and students are encouraged to visit the urban streams around campus. Please be sure to take these practical precautions. A pre-trip checklist and orientation, an in-field safety kit, and a post-trip cleaning activity are advised to ensure safe and educational trips to streams.

- Wear rubber boots if you will be entering the stream.
- Be aware of and avoid broken glass and other potentially harmful objects in streams.
- Do not enter the stream if you have any cuts or open wounds; these might become infected.
- Do not enter a stream if the water seems to be moving too swiftly (especially if it has recently rained).
- Wash your hands and other body parts exposed to the stream w/ disinfectant immediately upon exiting.
- If you smell sewage be sure you use gloves before taking water samples and don't otherwise enter the stream.

Safety precautions for working in waters with known or suspected human sewage contamination

Pre-trip:

Students should be aware of potential hazards associated with working in urban streams.
If students plan to enter streams, they should wear rubber boots and avoid skin to water contact.
If a student has any cuts or open wounds, they are advised to avoid exposure to the water in the stream.

Field Safety Kit:

Bringing alcohol to the field is a more practical alternative to bleach as it eliminates the possibility of bleaching clothes. Faculty should bring a 500mL bottle of 70-95% ethanol or isopropyl alcohol with cotton pads, a box of large nitrile laboratory gloves, and a trash bag into the field (for disposal of wipes and gloves). Using hand gel is not advised. After being in the stream or getting wet, students should use the cotton pads to wipe hands with alcohol. If students get wet or fall in, they are encouraged to go home and wash thoroughly with warm soapy water. Encourage students to use good hygiene practices, such as keeping hands away from their face and mouth until they have a chance to wash with soap. If students want to put their hands in the stream, they are encouraged to use nitrile gloves and wipe with 70-95% ethanol or isopropyl alcohol afterwards. Heavy duty rubber gloves can also be worn over nitrile gloves to provide coverage for forearms. If rubber gloves are worn, they should be wiped down with 10% bleach solution between sites.

After the Trip:

Students should wash their hands and any other areas directly exposed to water with warm soapy water. If handwashing is not available, wipe hands with the 70-95% ethanol or isopropyl alcohol, wait 10 minutes and then wash hands later. Students should use a 10% bleach solution in a spray bottle to spray down their boots and gloves.

NOTE: Mixing bleach and alcohol is dangerous; the chemicals react to make chloroform.

Alcohols:

Contact time: immediate to 10 minutes. A 70% ethanol or isopropyl solution can be made by adding three parts water to seven parts 95% ethanol. Methanol should *not* be substituted for ethanol or isopropyl, because it is less effective and is a health hazard. Always keep ethanol and isopropyl solutions away from potential sources of ignition as they are flammable. Keep these labeled and dated, with an expiration date of 180 days.

Hypochlorite (Clorox Bleach is suggested)**:**

Contact time: 10 minutes. A 10:1 bleach solution/Sodium Hypochlorite (also called 10% bleach solution) is made by adding nine parts water to one part laboratory bleach (sodium hypochlorite). Bleach solution is corrosive to stainless steel; therefore, thorough rinsing must follow its use in the biosafety cabinet. Do not autoclave bleach solutions. The present stock bleach solution is 12.5% Sodium Hypochlorite, so a 10:1 solution will result in a final concentration of 1.25%. The diluted solution should be labeled and dated, with an expiration date of 30 days. Note that household bleach is 5.25% Sodium Hypochlorite and can be used in a 10:1 solution, but has an expiration date of one day. To be an effective disinfectant for most non-HIV pathogens (HBV, HCV, etc.), the solution should be at least 0.5% but less than 2%.

Hypochlorite solutions are classified as irritant and corrosive. Appropriate precautions should be taken when using hypochlorite products:

- Read labels carefully, adhering to cautionary warnings and following usage directions.
- Chlorine solutions should never be mixed or stored with cleaning products containing ammonia, ammonium chloride, or phosphoric acid. Combining these chemicals will result in the release of a chlorine gas, which can cause nausea, eye irritation, tearing, headache, and shortness of breath. These symptoms may last for several hours.
- If you are exposed to an unpleasantly strong odor following the mixing of a chlorine solution with a cleaning product, leave the room or area immediately until the fumes have cleared completely.