

Water Quality Laboratory Guidelines for Analysis

Introduction

The Water Quality Laboratory (WQL) in the Biological Systems Engineering (BSE) department provides support for BSE students and faculty involved in stream and wetland ecology engineering research, and extension projects related to water quality. Specifically, the physical, ecological, and biogeochemical processes within stream and wetland systems that alter the transport of material from the landscape through river networks is explored. The Water Quality Laboratory is in the HABB1 building, rooms 352 and 358.

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I. Sample Preparation and Submission

- A. Samples to be analyzed must be prepared by the researcher and delivered with a completed WQL Request for Analysis form. Sample container, preparation, storage, and volume required vary by analysis. Consult the WQL Request For Analysis sheet for more information. Samples can be analyzed either by a trained researcher (unassisted rates) or by laboratory personnel (assisted rates). Current rates are listed in the WQL Request For Analysis sheet.
- B. The WQL can advise on sampling procedures and supplies needed to collect and prepare samples for analysis, but it is the researcher's responsibility to provide needed sampling supplies and purchase if necessary.
- C. All WQL analyses must be scheduled in advance. At least two weeks notice is required. Contact the lab manager to make arrangements for analysis.
- D. Completion date for samples performed by laboratory will be determined at the time of planning analyses. Completed results will be sent to the researcher, along with a description of the method, detection limits, and QA/QC results.

II. Laboratory Use

If you are not confident about the operation and performance of an instrument or procedure, or have a question about anything in the laboratory, please ASK! If you make a mistake or anything unexpected happens, please notify the laboratory manager immediately. It is easier (and quicker) to fix a problem when the cause is known. Failure to comply with this request could result in danger to you or the instruments, loss of precious samples, and/or unusable results. Additionally, future work in the laboratory may be prohibited.

- A. WQL operating hours are from 8am to 5pm Monday through Friday. For your own safety, after hours work is not allowed unless prior permission is given by the laboratory manager or supervisor.

- B. Guests are not allowed in the laboratories unless prior arrangements have been made with the laboratory manager and/or supervisor. The WQL doors should always be locked when the laboratory is unattended.
- C. Users of the WQL must have safety training and demonstrate competency prior to working independently in the laboratory. The following safety training is required before working in the WQL:
 - 1. General Laboratory Safety
 - 2. Personal Protective Equipment (PPE) Awareness
 - 3. Hazardous Waste Management

Users of the following specific equipment will also need to complete the following as relevant:

- 1. Flammable Liquid Safety
 - 2. Compressed Gas Cylinder Safety
 - 3. Safe Autoclave Use and Verification
- D. Each user is financially accountable for the equipment they are using. If any equipment or an instrument breaks, or is not operating as usual, it is the responsibility of the user to notify the laboratory manager immediately and not attempt to fix problems on his or her own. The user and user's supervisor acknowledge their financial responsibility should a user need to replace any damaged equipment or instrument parts due to user negligence when using the WQL.
- E. Users are required to document instrument status and use in corresponding logs. Repeated failure to do so will result in loss of laboratory privileges.
- F. Before leaving the WQL users must check the following: General surroundings for potential safety hazards; Equipment placed in assigned locations in clean working order; Instruments are properly shut down or in standby if not being used; Work areas are clean and orderly; All chemicals, standards, samples, etc. are labeled and stored properly; Lights and monitors are turned off; Doors are locked.

III. Safety

This document is not intended to replace detailed laboratory and safety training but to highlight important safety regulations and procedures for all workers in the WQL. The guidelines below are intended to reinforce Virginia Tech Environmental Health and Safety and OSHA regulations. It is expected that these guidelines will be followed in the WQL and all VT laboratories. For a complete description of Virginia Tech Laboratory safety guidelines, consult: <http://www.ehss.vt.edu/>.

- A. General Laboratory Safety
 - 1. Do Not Work Alone
 - a. Working with chemical or physical hazards (e.g. high voltage, mechanical hazards not known to be intrinsically safe), or any other work that might prove immediately dangerous to life and health shall not be conducted alone in any Virginia Tech laboratory. It is recommended that *all* laboratory work be conducted with a partner or co-worker, or in proximity to others, in case of emergency.
 - b. Headphones effectively isolate an individual from their surroundings. Headphone use is not allowed in the WQL.

2. Minimize Chemical Exposure
 - a. Avoid contact with skin (absorption hazard). Use appropriate personal protective equipment (PPE) and apparel. PPE includes gloves, laboratory coats and safety glasses, at a minimum. Closed-toed shoes are also required. Refer to EHS's Personal Protective Equipment Program for more information:
http://www.ehss.vt.edu/programs/personal_protective_equipment.php
 - b. Avoid inhalation. Never purposely sniff chemicals. When possible, work with hazardous chemicals/products inside a properly functioning fume hood, snorkel, or a well-ventilated area.
 - c. Avoid ingestion. Never taste chemicals. Never pipette laboratory chemicals by mouth suction. Do not eat or drink in areas where chemicals are in use. Thoroughly wash hands after handling or using chemicals.

3. Be Aware of Your Surroundings and Yourself. Are you too tired to be working? Is another laboratory user working with a hazardous material? What are the safety hazards in the laboratory? Etc.

B. Chemical Hygiene Plan

The Chemical Hygiene Plan (CHP) outlines procedures applicable to all university laboratory researchers. The intent of the CHP is to ensure that personnel at Virginia Tech are made aware of the hazardous chemicals and products they work with, and are informed of the necessary precautions that must be taken to prevent, reduce, or eliminate adverse effects. The CHP can be found online at: http://www.ehss.vt.edu/programs/HCM_program_online.php.

C. Safety Data Sheets

Chemical manufacturers and importers must evaluate their products to determine if they are hazardous. If they are considered to be hazardous, a Safety Data Sheet (SDS) must be prepared and sent to the end users. SDSs are located in HABB1 358 on the safety shelf (with first aid kit, CHP, building emergency plan, etc.), as well as on-line at www.hazard.com. SDSs must contain the following sections:

Section 1: Identification includes product identifier; manufacturer or distributor name, address, phone number; emergency phone number; recommended use; restrictions on use.

Section 2: Hazard(s) identification includes all hazards regarding the chemical; required label elements.

Section 3: Composition/information on ingredients includes information on chemical ingredients; trade secret claims.

Section 4: First-aid measures includes important symptoms/ effects, acute, delayed; required treatment.

Section 5: Fire-fighting measures lists suitable extinguishing techniques, equipment; chemical hazards from fire.

Section 6: Accidental release measures lists emergency procedures; protective equipment; proper methods of containment and cleanup.

Section 7: Handling and storage lists precautions for safe handling and storage, including incompatibilities.

Section 8: Exposure controls/personal protection lists OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).

Section 9: Physical and chemical properties lists the chemical's characteristics.

Section 10: Stability and reactivity lists chemical stability and possibility of hazardous reactions.

Section 11: Toxicological information includes routes of exposure; related symptoms, acute and chronic effects; numerical measures of toxicity.

Section 12: Ecological information

Section 13: Disposal considerations

Section 14: Transport information

Section 15: Regulatory information

Section 16: Other information including the date of preparation or last revision.

D. Hazardous Chemical Management

1. Hazardous Material Use

Most materials used in the laboratory are considered hazardous materials. Laboratory users must act responsibly when using, handling, or storing hazardous products, and shall be informed of:

- a. The location and contents of the Chemical Hygiene Plan
(http://www.ehss.vt.edu/programs/HCM_program_online.php)
- b. Any labeling systems used in the laboratory and how to understand them
- c. The location of Safety Data Sheets and how to use them
- d. Information relative to laboratory specific hazards and procedures (i.e. task specific training)

2. Hazardous Waste Disposal

All hazardous waste must be properly disposed of through EHS. Hazardous waste containers in the laboratory are labeled with the specific waste they contain and must remain closed unless actively disposing of waste. When containers are full, EHS is notified to collect them.
(http://www.ehss.vt.edu/programs/waste_removal.php)

E. Emergency Action Plan (EAP)/Building Plan

Each department is required to have an Emergency Action Plan specific to the building where employees are located. This plan provides detailed information regarding actions to be taken by personnel in the event of an emergency, such as fire, explosion, injury, medical emergencies, chemical exposures, chemical spills, acts of terrorism, acts of nature (severe weather), etc. A copy of the EAP for HABB1 is located with other lab safety information on the safety shelf.