



Portland State
Civil & Environmental
Engineering

Laboratory Safety Plan and Procedures

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1 INTRODUCTION

The Department of Civil & Environmental Engineering (CEE) at Portland State University (PSU) is committed to the health and safety of students, faculty, staff and visitors. This document describes the laboratory safety plan and procedures for teaching and research laboratories. An electronic copy of this plan is available on the Department of Civil & Environmental Engineering website:

- <https://www.pdx.edu/cee/lab-safety>

PSU's Environmental Health and Safety office provides support for lab safety campus wide. Additional information can be found on the website at:

- <https://www.pdx.edu/environmental-health-safety/research-safety>

Nothing in this document supersedes any approved PSU policy. PSU's Office of General Council maintains the University's policy inventory:

- <https://www.pdx.edu/ogc/university-policy-library>

2 LAB SAFETY CONTACTS

In addition to a Principal Investigator (PI), supervisor, or lab instructor, any of the following may also be contacted to report a laboratory safety or hazard issue:

- MCECS Operations and Facilities Manager: Don Mueller, 503-725-4646
- CEE Department Chair: Chris Monsere, 503-725-9746
- CEE Development Engineer: Tom Bennett, 503-725-4279
- PSU Environmental Health and Safety: 503-725-3738

EMERGENCY: Police / Fire / Ambulance call 9-1-1.

PSU Campus Public Safety Emergency: 503-725-4404, Non-Emergency: 503-725-4407

3 LAB INVENTORY

CEE laboratories are categorized into teaching laboratories and research laboratories. CEE and the faculty member who oversees the laboratory jointly share responsibility for compliance with safe procedures and policy. For teaching labs, CEE is the lead. For research labs, the faculty member(s) is the lead. The lead is responsible for complying with applicable safety procedures or guidelines.

3.1 Teaching Laboratories

The following table identifies the teaching labs for which CEE is the lead.

Laboratory and Location	Course(s)	CEE Faculty Overseeing	PPE that May Be Required	Chemical Hygiene Plan
EB130 /120– Hydraulics and Fluids	CE 361, CE 362, CE 489	Talke, S. Jay, D.	Safety glasses	NO
EB225 – Water Quality Control	ENVE 368, ENVE 369, ENVE 370	Dietz, A.	Nitrile/latex gloves Safety goggles Lab coat Wash apron Butyl gloves	YES
EB270 – Soil Mechanics	CE 321, CE 341, CE 345, CE 444	Khoshravifar, A. Moug, D.	Dust masks Safety glasses Latex gloves	NO
EB 270 – Surveying	CE 211, 212	McLaughlin, P.	Hard hats Safety vests	NO
EB-370 – Infrastructure Materials	CE 321	Kristof, E.	Safety glasses	NO
South Green House	CE 321, CE 434, CE 435, CE 437	Kristof, E.	Dust masks Work gloves (rubber over cotton) Ear plugs Safety glasses Latex gloves Heavy gloves	NO

3.2 Research Laboratories

The following table identifies the research labs for which faculty PI(s) is the lead.

Location	Lab Name	CEE Faculty Lead	PPE that May Be Required	Chemical Hygiene Plan (CHP) or Lab-Specific Safety Procedures (LSSP)
EB 210	Water and Soil Quality	Fish, W.	Nitrile/latex gloves Safety goggles Lab coat Wash apron Butyl gloves	CHP
EB 220/275	Water Quality Research Group	Wells, Scott	None –office space	NO
EB 226	Water Resources and Remote Sensing	Vacant	None –office space	NO
EB 230	Air Quality Monitoring	Pankow, J.	None –office space	NO

Location	Lab Name	CEE Faculty Lead	PPE that May Be Required	Chemical Hygiene Plan (CHP) or Lab-Specific Safety Procedures (LSSP)
EB 260 / 265	Geotechnical Research	Khoshravifar, A. Moug, D.	Dust masks Safety glasses Latex gloves Heavy gloves	LSSP
EB 280	Fluvial, Oceanic, and Water-level Sciences (FLOWS) Laboratory	Jay, D. Talke, S.	None – office space	NO
EB 285	Contaminant Transport	Johnson, G.	Nitrile/latex gloves Safety goggles Lab coat Wash apron Butyl gloves	CHP
EB 375/380 /390	Transportation Research	Clifton, K Figliozzi, M Unnikrishnan, U. Monsere, C.	None –office space	NO
EB 490	Advanced Instrumentation Laboratory for Environmental Chemical Analysis	Pankow, J.	Nitrile/latex gloves Safety goggles Insulated gloves Lab coat Wash apron Butyl gloves	CHP
SRTC B232C	Non Destructive Testing	Schumacher, T.	Safety glasses Leather heavy gloves Safety shoes	LSSP
SRTC B242	infrastructure Testing and Applied Research (iSTAR)	Dusicka, P.	Dust masks Ear plugs Safety glasses Heavy gloves Safety shoes Hard hats	

4 GENERAL LAB SAFETY PROCEDURES

Prior to beginning any experiment or beginning work in a lab, it is required to check in with the lab instructor or supervisor.

- ✔ The lab instructor or supervisor will:
 - Provide any training you may need for the safe conduct of the experiment.
 - Notify you if any hazardous chemicals or materials will be used in your experiment and the necessary precautions.
 - Notify you if any personal protective equipment (PPE) is required for the experiment. PPE may include eye protection, gloves, aprons, or dust masks.

4.1 Basic Lab Safety Expectations

The following are expected of all students, staff, faculty and visitors in CEE research and teaching lab spaces:

- ✔ Wear required PPE.
- ✔ Read all procedures and associated safety information prior to the start of an experiment.
- ✔ Listen and comply with all instructions.
- ✔ Place all belongings in the designated space to keep walkways and paths clear.
- ✔ Only use equipment for its designed purpose.
- ✔ Know the location of safety equipment in and near the laboratory such as:
 - fire extinguishers
 - eyewash stations and/or safety showers (if you are working with chemicals)
 - spill kits and first aid stations
 - all exits.
- ✔ Assist others in maintaining a safe working environment.
- ✔ Wash your hands before you leave the lab, especially after chemical use.

4.2 Eye Wash Stations and Safety Showers

When working with hazardous chemicals, it is important to know the location and how to use the nearest eye wash and safety shower. Use of an eye wash station is illustrated below (*image source: Oregon State University EH&S*)



Eye wash stations are located in CEE labs where chemical use or other eye hazards may be present. The following lab spaces have eye wash stations:

- EB 210 Water and Soil Quality
- EB 225 Water Quality Control
- EB 270 Soil Mechanics (planned for installation in summer 2018)
- EB 285 Contaminant Transport
- EB 370 Infrastructure Materials
- EB 490 Advanced Instrumentation Lab for Environmental Chemical Analysis
- South Green House
- SRTC B242 infrastructure Testing and Applied Research (iSTAR)

Safety showers may be needed if highly corrosive or highly toxic chemicals splash over substantial areas of the body. Safety showers are located in the following areas:

- Outside in the hallway between EB 210 Water and Soil Quality and EB 285 Contaminant Transport
- Inside EB 370 Materials Lab
- Inside EB 490 Advanced Instrumentation Lab for Environmental Chemical Analysis

4.3 Chemical and Waste Disposal

Appropriate and safe disposal procedures of chemicals and other waste will be used in all CEE labs. Material waste tags are available in the CEE mailroom.

4.4 Clothing

Each laboratory will identify appropriate clothing and when it is required (see Section 9.1 in PPE). In active research labs, this generally means closed-toed footwear and close-fitting clothing that covers the skin.

4.5 Laboratory Refrigerators

No food or drink may be stored in refrigerators that also store chemicals or samples. All refrigerators located in laboratories for the purposes of storing chemicals or samples must display a warning sign on the outside doors.



4.6 Working Alone

Working alone in a laboratory can pose additional risks depending on the condition. Some activities will require the presence of two persons or approval from the PI as outlined in the lab-specific safety procedures (LSSP).

4.7 Security

Doors to lab spaces should not be propped open unattended at any time. If you are unsure of the identity of a visitor in the lab, ask them for identification and the purpose of their visit or ask them to contact the supervisor or laboratory instructor. **Call CPSO at 5-4404** for urgent security concerns.

4.8 Power Tool Usage

Individuals must have specific training or show proficiency to the supervisor or lab instructor prior to use of any tool. Students or employees may be required to take the MME machine shop class (see Section 8.2.5).

Power tools will not be used while tired or under the influence of drugs, alcohol, or medication. It is expected that all users follow tool-specific rules and use personal protective equipment/safety equipment as required.

Power tool users must report any damaged equipment or tools to the supervisor or lab instructor and take it out of service. Under no circumstances may a tool that has been “locked out” for repair be used.

4.9 Reporting of Hazards or Near Miss Events

The purpose of near miss reporting and investigating is to identify deficiencies in the management of health and safety, take steps to correct these deficiencies, and prevent similar incidents from occurring in the future.

An employee or student must report all incidents/accidents to their supervisor or lab instructor as soon as possible following the incident. Events should also be reported using the PSU Near-Miss and Incident report form located on EHS website:

- <https://www.pdx.edu/environmental-health-safety/research-safety>.

All questions are voluntary and form can be submitted anonymously. There will be no impacts on grades or student status for reporting safety issues.

5 CHEMICAL HYGIENE PLANS

See the lab inventory section for which lab spaces have a Chemical Hygiene Plan (CHP). All employees or students conducting research or experiments in these labs must be familiar with the CHP.

OR-OSHA requires that all laboratories with chemicals have a written Chemical Hygiene Plan (CHP). CHP's must include laboratory-specific hazard and safety information. All lab employees must read this document and supplemental online information and sign the last page of the CHP. The CHP Flipchart should then be prominently displayed in the laboratory and its provisions enforced.

Safety Data Sheets (SDS) (previously known as Material Safety Data Sheets or MSDS's) are OSHA-mandated forms that contain information relevant to a hazardous chemical. This form must include both acute and chronic health hazard information, recommended personal protective equipment (PPE), and emergency response procedures. All chemicals must have an SDS. EH&S provides an online database of SDS:

- <https://www.pdx.edu/environmental-health-safety/msds-search>

6 LAB-SPECIFIC SAFETY PROCEDURES

See the lab inventory section for which lab spaces have lab-specific safety procedures (LSSP). All employees or students conducting research or experiments in these labs must be familiar with the LSSP.

7 FIELDWORK

Fieldwork may consist of class-related trips, investigations and surveys in the community, or actual field research. To promote safe working conditions and prevent mishaps, PSU EH&S has a “*Safety Guidelines for Fieldwork*” document. This document is intended as a tool for helping researchers and instructors consider the risks that arise in nearly every fieldwork assignment.

- https://www.pdx.edu/environmental-health-safety/sites/www.pdx.edu.environmental-health-safety/files/Safety.Guidelines.for_.Fieldwork.pdf

8 TRAINING REQUIREMENTS

8.1 Basic Training

8.1.1 Students Enrolled in Courses

Students enrolled in any course that requires a lab will be briefed on safety procedures prior to participating in an experiment. All students, prior to admission to the upper division, must acknowledge that they have read and agree with the “*Teaching Laboratory Safety Information Sheet*.” A copy of this document is posted on the CEE lab safety web page.

- <https://www.pdx.edu/cee/lab-safety>

8.1.2 Persons in Research Labs

All persons employed by CEE or students conducting research work for academic credit or experience in laboratories with a CHP or LSSP are required to read and understand both those procedures and this document. Before beginning any work in the lab, approval from the principal investigator (PI) is required.

8.1.3 Student Groups

Students participating in projects or activities outside of the required courses may be required to obtain additional training. This training will be specified by the faculty advisor.

8.2 Additional Training

Additional safety training depends on student and employment status and the laboratory or required duties. Some common trainings that may be required in labs with LSSPs or CHPs are briefly described.

8.2.1 First-Aid / CPR / AED Training

Campus Recreation offers an American Red Cross First Aid/CPR/AED program is to help participants recognize and respond appropriately to cardiac, breathing and first aid emergencies. The course is available for a fee.

An Automated External Defibrillators (AEDs) is located in the atrium of the Engineering Building on the first floor to the left of the elevator and on the first floor of the Science Research and Training Center First Floor near room C103.

8.2.2 Chemical Training

The PSU Chemistry Department provides training for employees new to working in a research lab that utilizes chemistry techniques or are in need of an annual lab safety refresher. A link to the course is posted on the CEE Lab Safety webpage.

8.2.3 Radiation Training

PSU EH&S administers the Radiation Safety Program and manages the safe use of radioactive material on campus. Training is available and may be requested.

8.2.4 Transportation Fieldwork

Principal Investigators and research assistants who work with the Oregon Department of Transportation (ODOT) are required to be familiar with safety operations near traffic and on ODOT's right-of-way prior to any fieldwork. Students and others conducting fieldwork near traffic may also need this information. ODOT has prepared resources and a training video.

- [Oregon DOT Safety Guidelines for Transportation Researchers](#) and [Goal One training video](#)

8.2.5 Machine Shop Class

The PSU Mechanical and Materials Engineering (MME) provides a machine shop class. The course covers all of the safety requirements and rules of the shop and a brief description of the various machinery and tools.

8.2.6 Working at Heights

PSU EH&S administers or arranges for training prior to working on ladders or at height. The training may include the use of fall protection equipment.

9 PERSONAL PROTECTIVE EQUIPMENT



CEE will provide personal protective equipment (PPE) required during teaching labs except PPE that must be provided by the user such as closed toed shoes and clothing. PPE that CEE will provide includes safety glasses, hand protection, ear protection, hard hats, dust masks, and high-visibility vests. CEE suggests that each student purchase his or her own personal protective equipment. CEE works with the PSU Bookstore to stock and sell a low cost PPE package including vest, hard-hat, and safety glasses.

LSSPs and CHPs will have further information on required PPE in research labs.

9.1 Appropriate Clothing

Appropriate clothing and attire must be worn in laboratories when required. In most labs with chemical or physical hazards, clothing that covers the skin may be required to reduce exposure. Excessively loose or restrictive clothing such as ties, scarves, fringe, and loose drawstrings should be avoided. Always check with the lab instructor, lab procedures, or PI on clothing requirements.

9.2 Eye Protection

When required, safety glasses are to be worn at all times. Additional eye protection (goggles or face shield) will be required whenever there is a potential for splashing of chemicals or biological substances.

9.3 Gloves

There are two types of gloves. The first type protects against cuts and abrasions and are usually made of leather or canvas. The second type protects against chemicals. These can be made of several kinds of plastic or latex materials. The PSU EH&S website provides glove selection guidelines:

- <https://www.pdx.edu/environmental-health-safety/sites/www.pdx.edu.environmental-health-safety/files/chemical%20glove%20safety.pdf>

9.4 Safety Vests

For visibility, fieldwork may require the use of a high visibility safety vest. All students or employees who are exposed to the risks of moving traffic must wear high-visibility safety apparel meeting the requirements of American National Standard for High-Visibility Safety Apparel and Accessories (ANSI/ISEA 107-2015) appropriate for the level of risk exposure (Class 1, 2, or 3).

9.5 Hard Hats

When hazards exist overhead in fieldwork or in a laboratory setting, hard hats may be required. Hard hats must meet approved safety standards.

9.6 Hearing Protection

Hearing protection is required when operating machinery and power hand tools.

9.7 Footwear

Closed-toed footwear that completely encloses the foot may be required to protect against the hazards commonly encountered in laboratories. Open toe, open heel sandals or shoes with a ventilated construction do not meet this requirement.

Closed-toe footwear is required in all undergraduate teaching labs when experiments are active. In some labs or field contexts, closed-toed footwear equipped with steel toes may be required.

9.8 Respiratory Protection

Dust masks may be required in the materials labs when mixing concrete and in the soils lab when handling soils. Appropriate use of snorkels or other ventilation equipment may also be required in CHPs and LSSPs.