Chemical Engineering Safety and Health Plan

A. Scope and Responsibility

1. Scope

The policies and procedures described in this Safety and Health Plan apply to the Chemical Engineering Department, College of Engineering, at the University of Washington.

2. Safety and Health Policy

It is the policy of the University of Washington to create and maintain a safe and healthful work place free from recognized hazards that may cause harm to faculty, employees, students, and visitors. This policy is consistent with the University-wide safety and health policy (UW OPS 10.3) and applicable Washington Industrial Safety and Health Act (WISHA) regulations (WAC 296-24 and 296-62).

3. Responsibilities

Responsibility for safety programs and safety performance lies with each Dean, Director, Chairperson and Supervisor. Everyone with supervisory responsibility is expected to participate directly in assuring that safe working conditions are maintained. Supervisors provide health and safety training for those working under their direction. It is University policy that this responsibility can neither be transferred nor delegated.

Each University employee is required to comply with occupational safety and health regulations, with departmental policies and procedures that apply to their own actions and conduct on the job, and to report accidents, injuries, and unsafe conditions to his or her supervisor (University Handbook, Vol. 4, Part VI, Chapter 4) (UW OPS D10.3).

4. Safety Coordinator

The Safety Coordinator for the Department of Chemical Engineering is Professor James Davis, with administrative assistance from Arne Biermans. Their responsibilities are to:

- Keep the department Chair aware of current safety concerns.
- Audit compliance with the emergency plan, and the safety and health plan.
- Schedule employee health and safety training as required.
- Work as a liaison with Environmental Health and Safety.
- Work with supervisors and employees to resolve safety complaints.
- Maintain safety records such as copies of accident reports, training records, safety inspection reports, safety procedures, immunization records, etc.

B. Steps to Assure Employee Health and Safety

1. Safety Training

All new graduate students are required to attend the Environmental Health and Safety laboratory safety training classes each fall before they are allowed to work in any Chemical Engineering laboratory. The assigned faculty advisor will provide training on the use of personal protective equipment and safety considerations unique to each laboratory. New staff and faculty are expected to attend EHS classes as needed, and all those working in labs are expected to complete the employee safety orientation checklist located on the last page of this document. Specialized training, such as fire extinguisher safety and floor monitor responsibilities, may be provided on-site upon request.

2. Safety Bulletin Boards

Chemical Engineering safety bulletin boards are used for posting WISHA posters, safety notices, safety newsletters, safety committee minutes, training schedules, safety posters, accident statistics and other safety education material. Safety bulletin boards and notices are located in the departmental copy room, 101, Benson Hall, where all employees can see them (WAC 296-24-055).

3. Emergency Evacuation and Operations Plan

All University departments develop an Emergency Operations Plan (EOP) which contains procedures for emergency evacuation and for responding to fires, bomb threats, chemical spills, earthquakes, etc. The Chemical Engineering EOP contains building floor plans of life (fire) safety equipment and exit pathways; evacuation procedures; evacuation assembly point(s); methods of accounting for staff, students, and visitors; and areas of refuge for occupants with a mobility impairment. Upon hiring, all new staff are directed to the department's emergency evacuation plan on the department website at http://depts.washington.edu/chemeng/; copies of each floor's evacuation route and a checklist of lab safety requirements are also posted at this website. The evacuation route for each floor is also posted by each exit from the building and by all fire extinguisher stations.

Departmental personnel must make sure that all doors, exit pathways, and stairs are kept clear of all obstructions that could impede safe exiting. Fire separation doors, particularly stairway doors, shall not be blocked or wedged open.

If the fire alarm is activated, all affected employees shall immediately leave the alarmed area, closing doors behind them. Never use the elevator during an alarm.

4. Departmental Participation in Health and Safety Committees

Health and safety committees, as required by Washington State regulations (WAC 296-24-045), are an advisory group of management appointed and employee elected representatives who help determine unsafe conditions and methods of work, suggest corrective measures, and obtain the participation of all personnel.

a. Organizational Health and Safety Committees

Members from the College of Engineering, who are elected on a yearly basis to the College of Engineering Health and Safety Committee, represent department employees on the University's Organizational Health and Safety Committees. Chemical Engineering is represented through Health and Safety Committee Organizational Unit #9; contact group9@engr.washington.edu with questions and concerns.

b. University-wide Health and Safety Committee

In addition, to provide campus-wide consistency and oversight, a University-wide Health and Safety Committee is established and composed of members from the official organizational committees.

5. Access to First Aid and CPR

University employees are to be afforded quick and effective first aid in the event of an injury. This is accomplished by the strategic location of first-aid kits in most laboratories, and the availability of first aid certified individuals at or near where the employees are working. In addition, UW Police officers are first aid and CPR certified and can respond within two to three minutes if notified by calling 9-911.

First aid kits are located in most of the Benson Hall laboratories, as well as in room 101. A door sign notes each room containing a first aid kit. All employees are encouraged to obtain first aid and CPR training. The following employees in Benson Hall are first aid certified:

- Wanda Prong Room 105
- Dave Gery Room B37
- Arne Biermans Room B49
- LaDonna Kennedy Room 303

6. Hazard Assessment and Reduction

In order to assure a safe and healthful work environment, the Chemical Engineering Department has established the safe work practices and policies listed in this section. These practices and policies were developed after an assessment of the faculty, staff, student, and visitor exposures to worksite hazards. Identified hazards were documented and reduced or corrected either by making engineering changes to eliminate the hazard or by establishing these safe work practices and policies.

To maintain a safe and healthful work place, Chemical Engineering supervisors are required to conduct periodic inspections of the work areas under their supervision. In addition, supervisors and employees continually check work areas for unsafe conditions and practices so immediate corrective action can be taken (UW OPS D10.3). Employees are encouraged to report any safety concerns to 1) their supervisor, 2) the department's Safety Coordinator, James Davis, or 3) the Building Coordinator for Benson Hall, Michelle Blanchette.

Standard operating procedures and safe work practices for each laboratory in Benson Hall are developed by each researcher and detailed in the Laboratory Safety Manual located in each lab. In addition, each year all labs are recertified for training in the use of personal protective equipment.

Also each year, the department performs a self-audit inspection of all laboratories for safety purposes. The inspection checklist is posted on the department's website at http://depts.washington.edu/chemeng/labsafe.html. Finally, annual inspections of Benson Hall are conducted by the City of Seattle Fire Department and by Environmental Health and Safety.

a. Chemical Hazard Communication

Hazard Communication (Worker Right-to-Know) Washington State Occupational Safety and Health Standard requires that employees be informed of and receive information about hazardous chemicals in the work place through labeling, material safety data sheets, and training (WAC 296-62-054). The UW Hazard Communication Program is described in the UW Operations Manual, Section D 12.5. Lab Safety Manuals contain a chemical hygiene plan and all employees are required to be familiar with this plan for their labs.

(1) Labeling

Information about hazardous chemicals is found on manufacturers' labels on chemical (or chemical products) containers. If chemicals are transferred from a labeled container to an unlabeled container, the secondary container must be labeled with the identity of the chemical and the appropriate hazard warnings.

When a chemical is purchased, the designated laboratory contact must mark the container with a date and enter it into the UW MyChem database (https://cspc.admin.washington.edu/mychem/uwnetid/home/greeting.aspx). The MyChem database must also be updated when chemicals are removed from the lab.

(2) Material Safety Data Sheets (MSDSs)

Another required method for informing employees about hazardous chemicals is through the availability of Material Safety Data Sheets (MSDSs). MSDS information for most chemicals can be downloaded at any time from the MyChem database (https://cspc.admin.washington.edu/mychem/uwnetid/home/greeting.aspx).

(3) Hazard Communication Training

Employees who work with hazardous chemicals receive training on:

- how to read labels and how to label secondary containers
- how to read an MSDS and where MSDSs are located
- the physical and health hazards of the chemicals they work with and how to work safely with those chemicals

Staff receive information about the UW Hazard Communication Program during Personnel's New Employee Orientation. Faculty and students are required to attend classes provided by the Environmental Health and Safety Department on laboratory safety and how to work safely with chemicals. More specialized training for each graduate student is provided by the faculty advisor for each laboratory. Office staff are provided with information on hazardous chemicals in the workplace as part of their departmental orientation. All training is documented and records kept by the Assistant to the Chair in room 105, Benson Hall.

b. Personal Protective/Safety Equipment

The University provides personal protective/safety equipment for its employees when required by regulation or when a determination has been made that personal protective equipment is needed for an extra level of employee protection. Employees are informed of the specific personal protective/safety equipment requirements for their position on the following occasions:

- during the departmental New Employee Safety Orientation conducted by their supervisor
- when a job procedure changes requiring a change in personal protective/safety equipment
- as a regular part of any written safety procedures or standard operating procedures

Each department/supervisor is required to conduct a hazard assessment of the work area and identify all hazards that require personal protective equipment. If hazards are identified, then specific personal protective equipment must be selected for each hazard and the affected employees trained on the safe use, care, and maintenance for each piece of equipment. Hazard identification, personal protective equipment selection, and employee training must be documented. Changes in processes or worksites may require a new hazard assessment, selection, and/or training.

7. Reporting and Resolving Safety Problems

Employees are encouraged to report safety concerns to their supervisors. If employees do not feel they can report the safety problem to their supervisor or have done so and do not feel the problem has been resolved, the employee may discuss the situation directly with the department's Safety Coordinator, James Davis, or with the COE safety committee (group9@engr.washington.edu). Any party may request EH&S assistance if internal procedures cannot resolve the problem. The appropriate UW Incident/Accident/Quality Improvement Report form may be used to report safety problems.

8. Accident Reporting and Investigation

a. Medical Emergencies

All medical emergencies are reported to the nearest Emergency Medical Services (EMS).

- On the University Campus 9-911

b. Report to Supervisor

All accidents and near misses should be reported to the employee's supervisor as soon as possible and recorded on the appropriate UW Incident/Accident/ Quality Improvement Report form. The employee and the supervisor must both fill out this form. Provide a copy to the departmental Administrator.

UW Incident Report form #1428 can be downloaded from http://www.ehs.washington.edu/Forms/Index.htm.

c. Accident Investigation

All accidents and/or near accidents are investigated by the supervisor. The investigation results and remedial measures will be summarized on the Incident/Accident report form. Supervisors may request the assistance of EH&S to investigate any accident and especially to recommend any corrective action to prevent a recurrence of the accident. Accident investigation reports are reviewed by EH&S and the College of Engineering's organizational health and safety committee. Assistance with accident investigations is available from EH&S by calling 543-7388.

9. Employee Occupational Health Requirements

No Chemical Engineering employees are included in Employee Occupational Health Programs for periodic medical examinations or immunizations.

10. Employee Safety Training

a. Department Safety and Health Orientation for New Employees

All new employees, including permanent, temporary, and part-time employees, receive the following instruction:

(1) Reporting procedures for fire, police, or medical emergencies.
(2) Evacuation procedures during an emergency.
(3) The locations of fire alarm pull stations and fire extinguishers. Employees should not attempt to use a fire extinguisher unless trained to do so.
(4) Procedures for reporting all accidents and incidents to their supervisors and filling out a UW Incident/Accident/Quality Improvement Report form #1428, which is available from the EHS website.
(5) Procedures for reporting unsafe conditions or acts to their supervisors and, when possible, taking action to correct unsafe conditions (e.g., wiping up small, non-toxic spills or removing a tripping hazard).
(6) The location and identification of first-aid kits and first aid certified employees.
(7) Description of UW and departmental Hazard Communication Program, including:
    - ? Identification of areas where hazardous materials are stored or used
    - ? Location and availability of Material Safety Data Sheets (MSDSs)
    - ? An explanation of Hazard Communication labeling requirements and any labeling system used by the department
    - ? Notification that additional training will be provided, if needed, covering health effects of hazardous chemicals and how to work with chemicals safely.
(9) Identification and explanation of all warning signs and labels used in their work area.
(10) Instruction in the use and care of any personal protective equipment required
(11) A description of safety training they will be required to attend for their job.

Further information is provided to new graduate students and new employees via handouts and periodic memos distributed departmentwide to clarify safety procedures. In addition, the department's Health and Safety Plan, Emergency Evacuation Plan, and Lab Safety Checklist are posted on the department's website at http://depts.washington.edu/chemeng/.

b. Employee Health and Safety Training

To ensure an effective program, employees are trained in safe work practices. Supervisors are responsible for seeing that these practices are followed. EH&S will assist departments in implementing safety training and education programs upon request.

New graduate students are provided with detailed lab safety training during the first week of Fall Quarter, supplemented by follow-up classes or procedures outlined in the Lab Safety Manual.

C. Safety Program Record Keeping and Documentation

To meet State requirements, the department maintains records of all safety activities covering the previous twelve months. These records will be made available to EH&S personnel and representatives from the Department of Labor and Industries at their request.

Records of general health and safety compliance activities include the following:

* Accident Reports
* Departmental Health and Safety Plan
* Department Emergency Operations Plan
* Employee health and safety training records
* External Inspection/Audit Records
* Internal Safety Inspection/Audit Records
* Laboratory Safety Manua1
* Radiation Safety Manual

D.Building Safety Procedures

1. Floors

The floor and floor covering must be protected against attack by corrosive material, solvents, and water. All spilled liquids must be removed at once. Any acids or base that spills on the floor should be neutralized at once by using a suitable reagent such as sodium bicarbonate. The floor must be kept clear, and accumulation of bottles and apparatus on the floor itself should be avoided.

2. Water

Water should never be left running unless it is for a specific purpose, particularly if the lab is unattended. Water left running in equipment should be drained through well-secured “wired” hose and tubing in good condition. Outlet hoses into sinks or drains should be anchored to prevent variations in water pressure ejecting them from drains, and no rags or other materials should be left in the sink that will cause blockage. If a drain is leaking, it should be reported to the Business Office, room 105.

3. Natural Gas

Natural gas, when not in use, should be turned off at cocks, not only at burner or torch.

4. Compressed Gas

Contents of the gas cylinder should be clearly labeled. Those with no labels or whose contents are unknown should be returned to the loading dock cylinder rack for return to University Stores.

a. Know the properties of the gas: flammability, corrosive or oxidation potential, toxicity, anesthetic, irritating or cryogenic.
b. Transport safety. Bottle gas trucks are available from the Machine Shop for transporting large cylinders. They should be securely chained or strapped to the truck. Do not slide or roll.
c. Fasten cylinders securely in use or in storage. Chains with bench clamps are available in all labs.
d. Do not tamper with any part of a cylinder valve. A wrench should never be used on a valve to close or open it.
e. Use the regulator designed for the gas involved. Stop the flow of gas at the cylinder valve when not in use, not at the regulator.
f. When cylinders are empty close the valves and mark the cylinder tag “Empty” before returning it to the locking dock lockup.

5. Drains

Drains in sinks and floors are designed for the disposal of liquid waste only. Sink strainers should always be in place and kept free of solid debris. Liquids and solutions safe for drain disposal include any non-toxic, non-flammable, non-corrosive matter. Corrosive reagents may be capable of sufficient dilution to be innocuous; toxic materials may be capable of reduction; each requires judgment. Material Safety Data Sheets are available from the MyChem database to answer questions.

The following classes of liquids should never be put in drains; they should be collected and handled as hazardous waste disposal through EHS.

a. Radioactive materials
b. Flammable liquids (solvents)
c. Undiluted corrosive reagents
d. Noxious materials
e. Undissolved or insoluble solids

Drain traps for sink and floor drains are not automatically primed. When not used for long periods, they dry out and permit sewer gas to escape. Filling them with water once per month may prevent this.

6. Glass Disposal

Laboratory glass must be placed in sturdy cardboard boxes for safety during transport through the building. University Stores carries a cardboard box (Stores #0737-235) that can be used for this purpose. Any cardboard box may be used, provided it is sturdy and of a size that will not weigh more than 40 pounds when full. Boxes must be labeled with the room number and principal investigator's name and sealed with a special "laboratory glass" tape. This tape is available from

South Campus Stores (Stores #0020- 350). The sealed box is placed alongside the regular waste container for collection by Custodial Services

7. Hoods

Hoods should be used when noxious liquids or gases are being handled or evolved; these include acids, bases, poisons, and lachrymators. Hoods are not to be used as permanent storage places, and apparatus set up in a hood should be removed as soon as the operation is completed in order that the hood may be available in case of an emergency. Under no circumstances should acid baths be allowed to reach smoking temperature. Baths should be stirred continuously to avoid local overheating.

Fume hoods do not work properly if they are fully open during use. Most hoods achieve the calibrated airflow only when closed to a position marked on each one. It is a good practice to leave the hood at that level or lower when not in use. However, they are also designed to permit airflow to continue when closed. Power surges, power outages and work by Physical Plant can all cause shutdown of the hoods and all require manual restarts of the system. Notify the Business Office, room 105, if airflow in the fume hood is not functioning properly.

8. Doors

Doors must be kept closed unless held open with an electromagnetic device connected to the building fire alarm system. Wedging a lab door open or blocking an exit pose significant fire safety hazards and are violations of the Fire Code.

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EMPLOYEE SAFETY ORIENTATION CHECKLIST

Date Completed

_____1. Is there a sticker on your telephone with instructions to report Police/Medical/Fire emergencies? _____ To what number? _____

_____2. Find the emergency evacuation plan posted on the department's website at http://depts.washington.edu/chemeng/. What does the plan say should be done after an earthquake?_____

_____3. Find the floor evacuation plan posted near your worksite and walk through the evacuation route indicated. Which door should you exit through?_____ Should you leave your office/lab door open or closed? _____What is the assembly point for Benson Hall occupants after evacuating the building?_____

_____4. Where is the closest fire alarm pull station and fire extinguisher near your workspace?_____
You will activate the alarm in the event of a fire, major chemical spill, or other major emergency. Fire extinguishers can be used if the fire is small (waste basket size) and you have been trained to use them.

_____5. Download a copy of the Accident/Incident Report form from http://www.ehs.washington.edu/Forms/Index.htm. Fill it out as though you've had an accident and attach it to this checklist. Even if no personal injury is sustained, it is required that you immediately report any accidents, incidents, near misses, motor vehicle accidents and any unsafe conditions or acts related to University of Washington functions with this form to your supervisor, and Michelle Blanchette, Room 105, Benson Hall, 685-8364

_____6. Go to the Environmental Health and Safety website at http://www.ehs.washington.edu/training/corsdesc.htm. Which EHS safety classes have you taken?_____
What additional classes would be relevant to your work?_____

_____7. Where is the nearest first aid kit for your workspace?_____

_____8. Who is listed in the department's emergency plan as qualified to administer first aid care?_____

_____9. Where is the closest eyewash/safety shower for your workspace?_____

_____10. Have you received orientation from your supervisor on:

- **_____a. Hazardous materials used or stored in your work area, and how they are labeled.**
- **_____b. Where material safety data sheets for the work area are kept.**
- **_____c. What special training classes are required and how to enroll.**
- **_____d. How to respond to hazardous materials emergencies, like spills.**
- **_____e. How to dispose of hazardous wastes properly.**
- **_____f. The meaning of worksite warning signs and labels.**
- **_____g. The use of personal protective equipment for the worksite.**

_____ _____

Signature Date