

Fall 2019

# Chemical Hygiene Plan

Hobart and William Smith Colleges  
Geoscience Department

# Hobart and William Smith Colleges

## Geoscience Department

### CHEMICAL HYGIENE PLAN

The Occupational Safety and Health Administration (OSHA) mandates the development of a Chemical Hygiene Plan (CHP) which is capable of protecting employees from health hazards associated with specific hazardous chemicals in the laboratory and capable of keeping exposures below OSHA Permissible Exposure Limits. The Chemical Hygiene Plan shall be readily available to employees, employee representatives and, upon request, to the Assistant Secretary.

The materials contained in this plan have been compiled for use in Hobart and William Smith Colleges (HWS) Geoscience laboratories. It is intended to serve as a baseline for good practices and does not intend to serve as legal standards. Not all warning and precautionary measures are contained in this document and additional information or precautions may be required. HWS students that are in an academic laboratory are not considered laboratory workers unless they are employed by HWS. It is the policy of the HWS Geoscience Department that all students involved in laboratory operations (regardless of employment status), however, must be included in all appropriate safety programs and training.

The following are elements of the Hobart and William Smith Colleges (HWS) Geoscience Department Chemical Hygiene Plan:

- Exposure Determination
- Standard Operating Procedures
- Control Measures
- Fume Hoods
- Information & Training
- Prior Approval for High Hazard Work
- Medical Consultations & Medical Examinations
- Additional Employee Protection for Work with Particularly Hazardous Substances
- Personnel Responsible for the Chemical Hygiene Plan

#### 1) Exposure Determination

Prior to conducting any operations in a laboratory, the professor responsible will conduct an exposure determination for any hazardous substances used in these operations and define/implement appropriate hazard controls (i.e., fume hood use, personal protective equipment, etc.). These hazardous substances include those which are considered flammable, combustible, corrosive, caustic, toxic, or environmentally hazardous. Any concentrated corrosive chemicals, including corrosives utilized for dissolving purposes, chemicals which are combined/heated, and/or otherwise added to other reactives, shall be used inside fume hoods at all times. Dilute corrosives/caustics may be used outside of the hood, either in the exterior or on a bench.

#### 2) Standard Operating Procedures

It is the responsibility of the professor of any particular courses or research project to develop Standard Operating Procedures (SOP) that are adequate to protect laboratory workers who use hazardous chemicals. All standard operating procedures (SOPs) should consider at least the following safety considerations: lab hood use, PPE usage, adding acid to water, potential chemical reactions, and

other rules as listed in the Lab Safety Manual. These SOPs will be made available to laboratory workers in the Geoscience Lab Safety Manual for each appropriate procedure and copies will be maintained in each Geoscience laboratory.

It is the HWS Geoscience Department's policy to develop and maintain a list of all chemicals used in each laboratory area and provide access to appropriate Safety Data Sheets (SDS) in those areas. The Geoscience laboratory technician is responsible for maintaining the overall inventory and inventories for teaching labs. Each faculty member is also responsible for informing the lab technician what chemicals are to be utilized.

### **3) Control Measures**

The basic routes for a chemical to enter the body in a laboratory setting are through inhalation, skin and eye contact, ingestion, and injection. The exposure to hazardous chemicals in the laboratory shall be controlled through the use of engineering controls, personal protective equipment, and good general laboratory practices specific to an individual laboratory or procedure.

- Engineering controls: The engineering controls used in the Geoscience laboratories may include local exhaust ventilation (fume hoods, see Section 4) and proper storage facilities such as cabinets specifically designed for storage of Acid and Flammable Materials. These controls will be used in all laboratories where they are necessary to reduce employee exposure to hazardous chemicals.

- Personal protective equipment: Appropriate Personal Protective Equipment (PPE) will be available to laboratory workers for use to reduce exposures to hazardous chemicals in the laboratory. Common PPE such as goggles, gloves, face shields, and aprons which are recommended for use with hazardous chemicals will be made readily available when deemed necessary and equipment will be provided at no cost to the worker. Appropriate clothing and footwear will be worn at all times. Where the use of respirators is necessary to maintain exposure below permissible exposure limits, the employer shall provide, at no cost to the employee, the proper respiratory equipment. No faculty/staff/students shall use respirators (cartridge type) unless enrolled in a formal Respiratory Protection Program.

- General laboratory practices: The Geoscience Department Lab Safety Manual provides information about general laboratory work practices and rules that are recognized as effective control measures to minimize exposure to hazardous chemicals in the laboratory as well as providing more general safety procedures. These general procedures include guidelines on use of chemicals, accidents and spills, personal protection, use of fume hoods, use of Safety Data Sheets (SDS) and other good laboratory practices information. All employees will be required to be familiar with the Geoscience Lab Safety Manual and its contents.

- Specific laboratory practices: Individual professors or laboratory supervisors must develop and train employees in additional written safety procedures whenever necessary to protect laboratory workers from specific chemical hazards that are unique to their particular area of research. Particular attention should be given to exposure control measures for operations that involve the use of particularly hazardous substances such as select carcinogens, reproductive toxins, and/or acutely toxic chemicals. The employer shall establish and maintain for each employee an accurate record of any measurements taken to monitor employee exposures and any medical consultation and examinations including tests or written opinions required for such monitoring. If a chemical produced in a Geoscience laboratory is a byproduct whose composition is not known, the professors or laboratory supervisors shall assume that the

substance is hazardous and shall implement appropriate safety procedures. If the chemical substance is produced for another user outside of the laboratory, the professors or laboratory supervisor shall comply with the OSHA Hazard Communication Standard (29 CFR 1910.1200) including the requirements for preparation of Safety Data Sheets and labeling.

□ Other: Other control methods that will be used to determine and reduce employee exposures to hazardous chemicals in the laboratory may include testing eyewash and emergency shower facilities, developing emergency procedures, proper container selection, and substitution of less toxic chemicals whenever possible.

□ Hazardous waste shall be stored in a designated and marked location of the preparation area prior to disposal. Buildings and Grounds or other competent persons should be contacted for proper handling and disposal of the waste.

#### **4) Fume Hoods and Other Protective Equipment**

Fume hoods, emergency eyewash and showers, and fire extinguishers are maintained and inspected annually by Buildings and Grounds personnel and/or their contractors. The proper functioning, periodic inspection and maintenance of other protective equipment such as spill response kits and PPE used in the lab is the responsibility of the professor of the course and/or research or the laboratory supervisor.

- The fume hoods located in Geoscience Laboratories will be inspected annually by Air Systems Balancing & Testing Service Inc. The test procedure used for this inspection as provided by the contractor is attached in Appendix A.

#### **5) Information and Training**

Federal and state laws and HWS policy require all laboratory workers receive Laboratory Safety and Chemical Waste Disposal training and be informed of the potential health and safety risks that may be present in their workplace. It is the responsibility of professors and laboratory supervisors to ensure personnel working in laboratories under their supervision have been provided with proper training, have received information about the hazards in the laboratory they may encounter, and have been informed about ways the employees can protect themselves. The HWS Geoscience Department will provide employees with information and training to ensure that they are aware of the hazards of chemicals present in their work area. This training will occur before the employee is allowed to work in any area where hazardous chemicals may be encountered.

The information provided will include but may not be limited to:

- the Geoscience Department CHP and Lab Safety Manual
- the permissible exposure limits for OSHA regulated substances (as provided in OSHA Regulation 29 CFR 1910.1450) or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard
- signs and symptoms associated with exposures to hazardous chemicals used in the laboratory
- The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, Safety Data Sheets (SDS) received from the chemical supplier.

The employee training will include but not be limited to:

- Familiarization with the Geoscience Department CHP and Lab Safety Manual
- Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.)
- The physical and health hazards of chemicals in the work area
- The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used
- The appropriate handling of empty containers in a manner consistent with RCRA (Resource Conservation and Recovery Act)

Documentation will be maintained by the Geoscience Dept. to demonstrate that such training was provided and received.

Each Geoscience laboratory will have readily available records or electronic access to Safety Data Sheets (SDS) for chemicals used in the lab. Employees are encouraged to consult the SDS before working with new chemicals. Containers of all hazardous chemicals will have clear labels identifying the contents.

#### **6) Prior Approval for High Hazard Work**

High hazard types of activities should be identified by the professor and/or laboratory supervisor. The professor of each lab is the authorizing authority for procurement of materials, as well as determining who is authorized for special equipment/procedures. General guidelines and recommendations for the safe handling, use and control of high hazard materials can be provided through SDS, and reference sources such as the Geoscience Department Lab Safety Manual, Safety in Academic Chemistry Laboratories, and other resources.

#### **7) Medical Consultations and Medical Examinations**

HWS provides employees who work with hazardous chemicals an opportunity to receive medical attention or, in some cases, surveillance, if the worker complains of symptoms resulting from any exposure. Employees, if necessary, should go to the emergency room at Geneva General Hospital.

After any acute exposure event, you should immediately utilize the nearest emergency eyewash station and/or emergency shower. Call Campus Safety (x3333 or 315-781-3333) as soon as possible. Campus Safety will advise if the building's Fire Alarm System should be activated by pulling the Fire Alarm Pull Station. You will be transported to Geneva General Hospital for decontamination and treatment.

The exposure incident should be reported immediately to the person's supervisor and the CHO. If the treating physician so advises, additional appropriate medical attention will be provided.

It is important to provide the attending physician with the following information:

- The identity of the substance(s) to which the patient has been exposed. An SDS for each substance should be included.

- A description of the conditions, time, and date of the exposure. This should include all pertinent information including quantity of hazardous substance, duration of exposure, location of injuries or sites of contact.
- A description of the symptoms the student is experiencing. This should include an indication of the time elapsed from exposure for the first appearance of the symptoms.

This information should be provided by completing the Initial Investigation Form, a copy of which is to be given to the physician (see Appendix B). A copy of this form should remain on file in the Geoscience Department for at least three years. The physician will be requested to provide a written report (see Physician's Written Opinion Form, Appendix B) to the student/employee as well as to the Director of Campus Security.

### **8) Additional Employee Protection for Work with Particularly Hazardous Substances**

Specific procedures shall be developed by the professor of the laboratory and documented in order to operate with particularly chemicals safely. All areas (i.e., labs, hoods, storage areas) housing particularly hazardous substances, such as select carcinogens, reproductive toxins or acute toxins shall be labeled designated areas. In the Geoscience Department, these designated areas are the Hydrofluoric Fume Hood Lab, Lansing Hall, Room 109, the Geochemistry Lab, Lansing Hall, Room 103 and the Sedimentology Lab, Lansing Hall, Room 101. Research involving the use of these substances may require prior review by the professor of the course or research activity to ensure adequate controls are in place which will protect the worker. Additional employee protection may require the use of additional provisions such as establishment of a designated area, use of special containment devices such as fume hoods or glove boxes, procedures for safe removal of contaminated waste, and/or decontamination procedures.

The provision for additional controls may require the expertise and recommendations of various groups including the Chemical Hygiene Officer, members of the Geoscience Department and/or outside consulting companies. All additional provisions for work with particularly hazardous substances must be incorporated into the laboratory SOP for those materials.

### **9) Personnel Responsible for the Chemical Hygiene Plan**

Certain aspects of the Chemical Hygiene Plan may be delegated to others as indicated throughout this document. However, the overall responsibility for the execution of the CHP rests with the CHOs. All student workers and employees are also expected to actively participate in the program to ensure its success. The CHOs for HWS are:

Chemical Hygiene Officer, Jason Woodruff  
 Greystone Environmental Management  
 jwoodruff@greystone-env.com  
 (315) 212-4053

Vice-President for Student Affairs, Robb Flowers  
 Hobart and William Smith Colleges  
 Geneva, NY 14456  
 flowers@hws.edu  
 (315) 781-3900

The Geoscience Department personnel responsible for providing technical guidance in the development and implementation of the CHP for the Geoscience Department are the following:

Chair of Geoscience Department, Dr. Nick Metz  
108 Lansing Hall  
Geneva, NY 14456  
laird@hws.edu  
(315) 781-3603

Geoscience Lab Technician, Barb Halfman  
003 Lansing Hall  
Geneva, NY 14456  
bhalfman@hws.edu  
(315) 781-3606

The appropriate HWS Science Department's Faculty/Staff, personnel from Buildings & Grounds, and where appropriate, outside contractors, will form the CHC (Chemical Hygiene Committee). The task of this committee is to review and evaluate the Geoscience Department's CHP annually and update it as necessary. Personnel included in (but not limited to) the CHC may be:

HWS CHO  
Chemistry CHP representative  
Biology CHP representative  
Geoscience CHP representative  
Human Resources CHP representative

## **APPENDICES**

APPENDIX A - Air Systems Balancing & Testing Service Inc. Fume Hood Test Procedures

APPENDIX B – Medical Evaluation Forms

## APPENDIX A

### NEBB PROCEDURAL STANDARDS PROVIDED BY Air Systems Balancing & Testing Service Inc.

#### 8.15 LABORATORY FUME HOODS

NEVER ENTER OR WORK IN A CLEAN SPACE OR BIOLOGICAL LABORATORY WITHOUT PERMISSION, AND ONLY AFTER APPROPRIATE SAFETY AWARENESS TRAINING

##### **8.15.1 FUME HOOD PERFORMANCE**

Containment of contaminants within the fume hood is based on the principle that a flow of air entering at the face, passing through the enclosure, and exiting into the exhaust system will prevent the escape or airborne contaminants from the hood into the room. The degree to which this is accomplished depends on the design of the hood, its installation, and its operation.

Air currents external to a hood easily disturb the hood's air pattern and may cause contaminants into the breathing zone of the researcher. Cross currents are generated by movements of the researcher, people walking past the hood, thermal convection, supply air movement, and a rapid operation of room doors and windows. Terminal supply air velocity in the location of the hood should be limited to 35 fpm (0.175 m/s). It is very important to avoid the location of the hoods near doors and active aisles.

Performance criteria for fume hoods are flow control / face velocity and spillage. Flow control (regulation of flow over the face opening of a hood) is obtained by adjusting the horizontal slots in the back baffle. One slot is at the bottom of the back baffle to draw air across the working surface; another is at the top to exhaust the canopy; and the third is frequently midway on the baffle. These adjustable openings permit regulation of exhaust distribution for specific operations.

Spillage (leakage outward through the face opening) of contamination from hoods in the laboratory can be caused by drafts in the room; eddy currents generated at the hood opening edges; surface projections or depressions; thermal heads; and high turbulence operations (blenders, mixers) within the hood.

##### **8.15.2 FUME HOOD PERFORMANCE TESTING**

When conducting TAB procedures for fume hoods the NEBB Certified TAB Firm shall either:

1) Consult with the engineer of record to determine the specific criteria for acceptance of the fume hood performance tests (generally applicable to new construction) or 2) consult with the supervisory personnel for the laboratory where the fume hoods to be tested are located to determine the specific criteria for acceptance of the performance tests (generally applicable to existing facilities).

Fume hood performance testing should be performed when the lab is operating under the following conditions:

- a) Room operating under normal conditions
- b) All air systems balanced
- c) Pressure gradients to adjoining spaces at proper values
- d) Laboratory exhaust fume hood fans are operating satisfactorily



### **8.15.3 FACE VELOCITY MEASUREMENT PROCEDURES**

The intent of this test is to determine the actual average velocity of the hood as it is typically used. The following procedures are the minimum recommended steps to achieve satisfactory fume hood performance, if any specific information regarding the face velocity measurements techniques for a fume hood is not available.

- a) Verify that the room conditions are satisfactory.
- b) Select the calibrated instrument for taking measurements
- c) Set the fume hood sash to the specified operating height.
- d) A maximum 1.0 square foot (300mm x 300mm) grid pattern shall be formed by equally dividing the hood opening dimensions. Velocity readings shall be taken with a calibrated instrument at the center of the grid spaces. The instrument shall be mounted in a ring stand, or other appropriate device, in the plane of the hood sash and perpendicular to the opening. The technician shall not hold the instrument while taking the velocity reading. The technician shall assume a position away from the face of the hood to avoid influencing velocity measurements.
- e) Face velocities shall be integrated over a period of at least five seconds. If an anemometer is used that measures instantaneous point velocities, a minimum of four readings shall be taken at each point.
- f) The average of the velocity measurements shall be calculated, and the highest and lowest readings shall be noted.
- g) If a Pitot tube traverse is taken in the exhaust duct prior to measuring face velocities, it may be necessary to allow approximately 10% to 15% for cabinet leakage, or a value as determined by the fume hood manufacturer.
- h) Mark the hood sash opening and/or damper setting when final adjustments are made on fume hoods.

### **8.15.4 VISUAL METHOD PROCEDURES (IF REQUIRED)**

The intent of this optional test is to render a visual observation of the hood performance as it is typically used. Smoke can be provided by means of a plastic bottle that contains an ampoule of liquid Titanium Tetrachloride. Other sources of persistent, neutral buoyancy aerosols could provide the same visualization of airflow.

- a) A suitable source of smoke shall be in the center of the sash opening on the work surface 6" (150 mm) inside the rear edge of the sash. Note: Some smoke sources generate a jet of smoke that produces an unacceptably high directional component that may overcome the hoods exhaust air pattern leading to an erroneous conclusion.

- b) Observe the air pattern from the side of the hood face. A release of smoke from the hood that is steady and visible is an indication of failure.
- c) Airflow patterns and time for hood clearance shall be observed and noted.
- d) Mark sash opening and / or damper setting when final adjustments are made on fume hoods.

**APPENDIX B**

**HWS GEOSCIENCE DEPARTMENT  
INITIAL INVESTIGATION OF  
POSSIBLE OVER-EXPOSURE FORM  
(Page 1 of 2)**

Date of incident: \_\_\_\_\_ Date of interview: \_\_\_\_\_  
Name of Student: \_\_\_\_\_ Phone No.: \_\_\_\_\_  
Course: \_\_\_\_\_ Faculty: \_\_\_\_\_

Name of chemical(s) in use: (Attach SDS to this report)  
\_\_\_\_\_  
\_\_\_\_\_

Time of incident: \_\_\_\_\_  
Duration of exposure: \_\_\_\_\_  
Amount of chemical involved: \_\_\_\_\_  
Control measures used at time of accident: \_\_\_\_\_  
Personal protective equipment: \_\_\_\_\_

Description of incident: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Witnesses: \_\_\_\_\_

Location of injuries or sites of contact, e.g. eyes, skin:  
\_\_\_\_\_  
\_\_\_\_\_

Signs and symptoms developed, if any:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Elapsed time for signs and symptoms to develop:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**HWS GEOSCIENCE DEPARTMENT  
INITIAL INVESTIGATION OF  
POSSIBLE OVER-EXPOSURE FORM  
(Page 2 of 2)**

Are signs and symptoms same as indicated on SDS?

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Conclusions of investigation:

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Medical examination recommended:

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Name of Investigator

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Signature

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Date

**NOTE:** This information should be provided to the examining physician and returned to the Geoscience Department Chair.

**HWS GEOSCIENCE DEPARTMENT  
PHYSICIAN'S WRITTEN OPINION FOR  
MEDICAL CONSULTATION**

Physician's Name: \_\_\_\_\_

Student's Name: \_\_\_\_\_

Date of Visit: \_\_\_\_\_

Description of incident: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Results of medical examination and any associated tests: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Medical conditions revealed upon examination that may place the employee at increased risk as a result of exposure to a hazardous chemical in their workplace:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Additional recommended follow-up:

\_\_\_\_\_

\_\_\_\_\_

Comments:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

The above referenced student has been informed by me of the results of this consultation and any medical condition that may require further examination or treatment.

\_\_\_\_\_

Date

\_\_\_\_\_

Physician's Signature

NOTE: This written opinion shall not reveal specific findings of diagnoses unrelated to occupational exposure. Return to the Geoscience Department, Hobart and William Smith Colleges, Geneva, NY 14456.



**HWS GEOSCIENCE DEPARTMENT  
ACCIDENT REPORT FORM**

Student Name: \_\_\_\_\_  
Professor Name: \_\_\_\_\_  
Course: \_\_\_\_\_  
Date: \_\_\_\_\_  
Time: \_\_\_\_\_

Description of  
Incident: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Chemicals  
involved: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Physician consulted:      Yes      No

Corrective measures  
taken: \_\_\_\_\_  
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