

University of Saint Francis Chemical Hygiene Plan

July 1, 2013



<u>In case of an Emergency:</u>	
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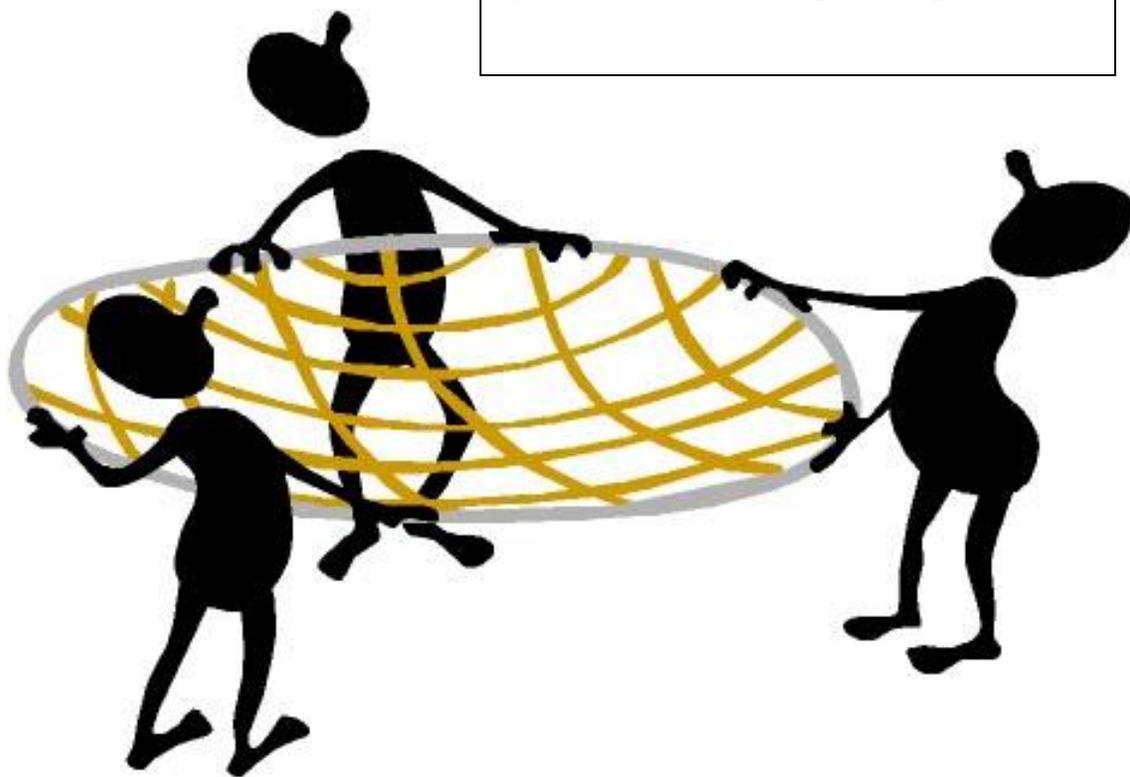


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UNIVERSITY OF SAINT FRANCIS

CHEMICAL HYGIENE PLAN

1.0 INTRODUCTION

The Chemical Hygiene Plan (CHP) defines work practices and procedures to help ensure that employees, students, and the environment are protected from hazards associated with the handling, storage, and use of chemicals. Each laboratory workspace where hazardous chemicals are used has relevant references to proper use, storage, and disposal of such substances. These issues are addressed in the Chemical Hygiene Plan (CHP) with its associated Standard Operating Procedures (SOPs) and reference Safety Data Sheets (SDSs). This plan follows the guidelines of the OSHA¹ Laboratory Standard in the Code of Federal Regulations² (CFR) Title 29 (29 CFR 1910.1450).

1.1 Purpose

The United States Department of Labor's Occupational Safety and Health Administration (OSHA) issued a rule in 1991 regulating occupational exposures to hazardous chemicals in laboratories (commonly known as the Laboratory Standard). It requires, among other things, that a written Chemical Hygiene Plan (CHP) be developed and carried out where there are laboratories that use hazardous chemicals. OSHA standard not only has the focus of "right to know" but also "right to understand". Also, three recent accidents³ in Academic laboratories have motivated agencies, particularly the American Chemical Society (ACS) to focus on creating a culture of safety in universities. At the University of Saint Francis (USF) the mission and Franciscan values enhance the culture of safety by the deep respect for others and the care of creation. This CHP is a guide to safe use, storage and disposal of chemicals and a valuable resource for locating other resources relevant to best practices in creating a culture of safety.

¹ Occupational Safety & Health Administration is a Federal Agency which is a division of the United States Department

of Labor. The URL of OSHA is: <http://www.osha.gov/>

² <http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR>

³ Link to video by Chemical Safety Board (CBC) describing these accidents.

http://www.youtube.com/watch?v=ALBWxGik64A&list=UUXlkr0SRTnZO4_QpZozvCCA&index=7

1.2 Elements of Chemical Hygiene Plan (CHP)⁴

- i. Standard Operating Procedures (SOPs) specify use, storage, and waste disposal as well as directions for keeping records and reports.
- ii. Description of implementing control measures designed to reduce exposure and to insure laboratory protocols, housekeeping and personal hygiene practices meet specifications.
- iii. Verification that protective equipment, such as fume hoods, safety showers, volatile storage, fire extinguishers, alarms, etc. are functioning properly.
- iv. Provisions for user training. This will include location and explanation of Safety Data Sheets⁵ (SDSs), as well as proper labeling of containers according to the Globally Harmonized System (GHS).
- v. Circumstances where laboratory procedures requires prior approval.
- vi. Provisions for medical consultation and examinations.
- vii. Provision for additional protection for employees when working with particularly hazardous substances, including: carcinogens, reproductive toxins, radioactive substances and substances with acute toxicity.
- viii. Designation of personnel responsible for implementation of CHP.

1.3 Scope and Application

This CHP contains guidelines useful for avoiding accidents and reducing laboratory injuries and illnesses. The University of Saint Francis (USF) has academic laboratories, and research laboratories that use hazardous chemicals. Employees including work study students will be provided with information and training to ensure that they know and understand the hazards present in their work area. Such information will be provided at the time of employees/students initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations. Information and training includes:

- i. Location and access to the Chemical Hygiene Plan (CHP): The CHP is located electronically on the Risk and Safety Management website with hard copies located in the chemical stockroom and main office of Achatz Hall of Science.
- ii. Safety Data Sheets (SDSs): The SDS sheets can be accessed by using the MSDS Online© software accessible through Cougar Connection⁶. Hard copies of SDSs are available in the chemical stockroom and laboratories. The information contained in the sixteen sections is reviewed.
- iii. Sixteen specific sections of the SDS: Training in where to locate specific information in the sixteen specific sections of the SDS. For example: The permissible exposure limits (PELs) for an OSHA regulated substances⁷ (PELs)

⁴ <http://www.osha.gov/Publications/laboratory/OSHAfactsheet-laboratory-safety-chemical-hygiene-plan.pdf>

⁵ The Safe Data Sheets are also knows as Material Safety Data Sheets (MSDSs) containing information similar to the SDS. The SDS has a standard organization of information in its sixteen sections.

⁶ Cougar Connection is USF's portal available to all employees and students of the University of Saint Francis.

⁷ Exposure limit is defined by recommended time and amount. OSHA PELs are based on an 8 hour time weighted average (TWA) for air born exposure. Some PELs may be "ceiling" limits or short-termed exposure limits (STELs). <http://www.osha.gov/dsg/topics/pel/index.html>

- are found in Section 8 of the SDS. Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory are found in Section 11.
- iv. Additional reference materials on the hazards, safe handling, storage and disposal procedures for hazardous chemicals found in the laboratory and stockroom. Students enrolled in laboratory courses will be instructed in best practices in chemical hygiene and safety. Safety guidelines are also provided for specific experiments in the laboratory manual.

1.4 Permissible Exposure Limit (PEL)

The USF Chemical Hygiene Plan strives to ensure that laboratory use of OSHA regulated substances does not exceed the permissible exposure limits (PEL) specified in 29 CFR § 1910, Subpart Z.⁸ PEL refers to the eight-hour time-weighted average for airborne concentrations of hazardous chemicals. PELs of hazardous chemicals in the USF chemical inventory are found on the respective SDS sheet. Instrumental monitoring will be done to obtain a base line if there is reason to suspect a PEL is exceeded. Employees who were exposed will be provided medical consultations and remediation.

2.0 RESPONSIBILITIES

To achieve the goal of the Laboratory Standard⁹, USF appoints a qualified¹⁰ Chemical Hygiene Officer (CHO) to develop, implement, and monitor the Chemical Hygiene Plan (CHP) (29 CFR 1910.1450).

2.1 University Administration

- i. The President of the University has the ultimate responsibility for chemical safety. This responsibility is delegated to the deans of each school and to department chairs and specific officers. The CHO for the sciences and the Director of Safety and Security (DSS) are appointed by the President or a delegated administrator.
- ii. The President or the designees have the responsibility for providing appropriate resources to ensure regulatory compliance. This includes a budget allocation for health and safety resources and supplies.
- iii. Chemical Hygiene and Safety is also under the purview of the Risk and Safety Management Committee.
- iv. Department chairs or supervisors, appointed by the dean or administrator, are responsible to seek and make use of the health and safety resources through appropriate administrative channels and to support compliance and awareness of the CHP. The dean or department chair may appoint support personnel for compliance.

2.2 Chemical Hygiene Officer (CHO)

- i. As mandated by the standard, the CHO is appointed by the university. The CHO provides technical guidance in the development and implementation of the

⁸ Z lists are available at the URL <http://www.osha.gov/SLTC/hazardoustoxicsubstances/index.html>

⁹ <http://www.osha.gov/Publications/laboratory/OSHA3404laboratory-safety-guidance.pdf>

¹⁰ Information on the certification of CHO's can be found at <http://www.nrcc6.org>

provisions of the CHP. Other staff members maybe appointed to assist in some of the duties of the CHO.

- ii. Develop and coordinate implementation of the CHP.
- iii. Know and understand all elements of the CHP.
- iv. Investigate and document all chemical incidents.
- v. Provide technical assistance to laboratory, work area supervisors and departments concerning appropriate storage, handling, and disposal of hazardous chemicals.
- vi. Remain current on rules and regulations concerning chemicals used in laboratories on campus.
- vii. Conduct Laboratory Safety Surveys (LSSs) to assess level of compliance with the CHP.
- viii. Inform and train faculty and staff, especially new employees on the information contained in the CHP.
- ix. Maintain a library of SDSs and other laboratory health and safety literature.
- x. Maintain a chemical inventory and database of chemicals in the sciences.
- xi. Be available for consultation and contact.

CHO Contact Information

Sr. Carol Meyers D.A., CHO: email cmeyers@sf.edu
 Office Phone: 260-399-7700 extension 8223 during business hours.
 After business hours, contact Security Department 260-399-7888

2.3 Director of Safety and Security (DSS)

The DSS works closely with the Risk and Safety Management Committee, CHO, and other appointed staff members. Additional persons may be appointed to assist in the duties of the DSS. The DSS:

- i. Knows and understands all elements of the CHP.
- ii. Investigates and documents all chemical incidents and accidents at all emergency levels.¹¹
- iii. Coordinates and schedules disposal of laboratory waste.¹²
- iv. Remains current on rules and regulations concerning OSHA and EPA compliance related to chemicals used in laboratories on campus.
- v. Verifies the maintenance of a library of SDSs and other laboratory health and safety literature.
- vi. Interacts with regulators and agencies, and maintains records, and files of required reports.
- vii. Acts as a liaison with OSHA, EPA and other agencies that work for the cause of safety and security.

¹¹ Defined in the Emergency Response Plan

¹² Drug & Laboratory Disposal is the preferred vendor. Health Care Waste Management handles biological waste.

DSS Contact Information

Richard Robins, Director of Safety & Security: email rrobins@sf.edu

Office phone during Business hours: 260-399-7700 X 6120 during business hours.

After Business hours, contact Campus Security: 260-399-7888.

2.4 Risk & Safety Management Committee

The Risk & Safety Management Committee provides oversight and direction in the assessment of risk and plans for management of risk. The committee develops and prepares emergency response and recovery plans, as well as establishes business continuity plans. The Risk & Safety Management Committee:

- i. Provides peer review of all internal safety audits, training reviews, accident reports, and other safety related actions as deemed necessary by the committee and in accordance with regulatory and Environmental Health and Safety (EH&S) mandates.
- ii. Supports each department's safety plans and programs, making recommendations to the CHP and DSS for implementations.
- iii. Updates changes made by regulatory agencies and the university.
- iv. Is comprised of faculty and staff members from a variety of campus departments. An external representative of the Wells Fargo Insurance Services is also present.
- v. Consults the CHO and DSS on any matter involving interpretation and application of OSHA or EH&S in laboratories.
- vi. Conducts safety surveys to assess level of compliance with the CHP.

2.5 Laboratory Assistants

Laboratory Assistants receive training and are assigned various tasks in preparing for labs, managing equipment and chemicals, ordering supplies. Safety and standard operating procedures are a part of their assigned duties.

The following is a list of lab assistants and their contact information:

Paula Avila, Lab Assistant, email: pavila@sf.edu

Office Phone: 260-399-7700 ext. 8205

Jenny Maldonado, Lab Assistant email: jmaldonado@sf.edu

Office Phone: 260-399-7700 ext. 8209

2.6 Employees, Students and Visitors

Employees are any paid personnel, staff and faculty part-time or full-time status, including graduate students, and work-study students. All applicable safety training must take place before the employee or volunteer begins working in the laboratory where hazardous materials are in use. No one is exempt from following:

- i. Responsibility for understanding the hazards involved with chemicals they use.
- ii. Familiarity with the location and contents of the SDS of the chemicals they use.
- iii. Consulting the manager if they are uncertain of the safe handling, use, disposal, and storage of the hazardous chemicals.

- iv. Immediately reporting any job-related injury, illness, accident, or chemical spill to your supervisor and seek treatment.
- v. Ensuring that chemical hazards and safety polices are communicated to students and visitors entering the workspace.

2.6.1 Department Chairs

The department chair or designee is the employee assigned to maintain, manage, and direct the laboratory workspace(s) of their respected academic school or department. This could include staff or faculty appointed by the department chair to work or oversee function of laboratory space. It is the responsibility of each designee to understand the provisions of this plan and ensure that employees are aware of dangers involved in the handling and use of hazardous chemicals or materials.

- i. Required to notify the CHO, DSS if there is reason to believe that an employee's exposure level to a hazardous chemical that exceeds the action level (or in the absence of an action level, the permissible exposure limit).
- ii. Must ensure that SDSs are available for every chemical in the workplace.
- iii. Ensure proper procedures are in place for disposal, storage, handling, and laboratory hygiene. SOPs should meet requirements of this CHP.
- iv. Notify the CHO prior to beginning of any new process or activities that might require a new SOP.
- v. Must see that inspections and surveys of the laboratory work area are conducted.
- vi. Ensure that protocols and SOPs are followed.
- vii. Ensure personal protective equipment (PPE) is available and used.

Department Chairs Contact Information

Dr. Jean Elick PhD, Chair of the Department of Chemistry email: jelick@sf.edu
Office Phone: 260-399-7700 ext. 8221

Dr. Teri Beam, PhD, Chair of the Department of Biology email: tbeam@sf.edu
Office Phone: 260-399-7700 ext. 8206

2.6.2 Responsibilities of Teaching Faculty

- i. Communicate to students chemical hazards and safety polices.
- ii. Train students in the handling, use, disposal of chemicals and use of safety equipment.
- iii. Administer safety agreement with students.
- iv. Ensure that hygiene is maintained in all workspaces assigned.
- v. Are familiar with the location and contents of the SDSs relative to their work.
- vi. Inform department chair of any safety procedures or polices of concern.
- vii. Assist in the implementation of policies or procedures for workspaces assigned.

2.6.3 Responsibilities of Students

Students have the responsibility to learn and understand safety protocols and techniques in the labs. Even though they are relatively inexperienced they should enter into the culture of safety and grow in their knowledge and care for the safety of themselves and others. The Franciscan values “Respect Creation” and “Reverence the Unique Dignity of Each Person” are relevant to the collaborative and safe work in science laboratories. Students must follow and adhere to the safety agreement they sign when enrolled in a laboratory course. They must report any chemical spills or incidents to faculty or staff immediately.

2.6.4 Vendors, Contractors, and Visitors

USF is responsible for ensuring that vendors, contractors, and visitors understand the dangers involved in the area they are working in or visiting.

3.0 CHEMICAL INVENTORY

Each Department is required to submit an annual inventory of chemicals in their respective work spaces to the Risk & Safety Management Committee. The CHO or designee will update the chemical stockroom inventory annually and incorporate the individual inventories of the labs. These inventories are searchable in the database. The chemical inventory will include all chemicals, including non-hazardous items. The inventory requires notation of the following items:

- An alphabetized list of chemicals. International Union of Pure and Applied Chemistry (IUPAC) names or acceptable trade chemical names or common names.
- Chemical Abstracts Service (CAS) number that uniquely identifies each chemical.
- Supplier and contact information, the main resource for SDS sheets.
- Quantity stored and location of chemical storage (room number, section and shelf).
- Notation of expiration dates, scan codes or any other data related to proper management of the chemicals.

The screenshot shows a web-based database interface for the 'Achatz Chemical Stock Room'. The main menu includes 'Chemical Stock Room' and 'Biology and Chemistry Labs'. Under 'Chemical Stock Room', there are tabs for 'Chemical Demos and Kits', 'Inorganic Chemicals', and 'Miscellaneous and Household'. The 'Inorganic Chemicals' tab is active, displaying a table with the following data:

Room	Name	IUPAC name
46	Acetate Buffer pH = 2.2	Acetate Buffer pH = 2.2
46	Acetate Buffer pH = 4.0 (0.5 M)	Acetate Buffer
46	Acetate Buffer pH = 4.0 (0.5 M)	Acetate Buffer
46	Acetate Buffer pH = 4.0 (0.5 M)	Acetate Buffer pH = 4.0
46	Acetate Buffer pH = 4.0 (0.5 M)	Acetate Buffer pH = 4.0
46	Acetate Buffer pH = 4.0 (0.5 M)	Acetate Buffer pH = 4.0
46	Acetate Buffer pH = 4.0 (0.5 M)	Acetate Buffer pH = 4.0
46	Acetate Buffer pH = 4.7 (0.5 M)	Acetate Buffer pH = 4.0

The chemical inventory of Achatz Hall of Science contains around 4,000 bottles. The searchable data base is shown in the figure on the left. The database enables reports to be made and printed. There are special storage areas for chemicals: volatile storage, desiccators, explosion proof refrigerators, special low temperature refrigerators, and acid storage. The database contains a search menu; (shown below). An electronic copy is available on the shared drives for both chemistry and biology departments. The CHO or designee is responsible for maintaining the databases. Hard copy is available in the chemical stock room.

The screenshot shows a search dialog box with the following fields and options:

- Find What: iodine
- Look In: Current field
- Match: Any Part of Field
- Search: All
- Match Case:
- Search Fields As Formatted:

Buttons: Find Next, Cancel

3.1 Procurement of Hazardous Chemicals

All chemical purchases are approved by the appropriate department chair or designee and are reviewed by the CHO or designee. The purchase of and use of carcinogens, explosive, highly toxic chemicals, and reproductive hazardous substances must be closely coordinated with CHO. Anyone planning an operation that will generate an acute hazardous waste must consult the CHO before beginning in order to confirm that we have the ability to ensure proper storage and disposal. Where possible, the smallest quantity will be purchased. Materials will be evaluated according to need, hazard, and subject to approval by the department chair and CHO.

4.0 STANDARD OPERATING PROCEDURES (SOP)

Laboratories that have specific hazards such as pyrophoric, flammables, toxics, carcinogens, teratogens, or mutagens must have designated areas and specific procedure for care and use of these chemicals. An example of a designated area is the fume hood. Each particularly hazardous class is based on the nine pictograms of the GHS and shall have a SOP including:

- i. Working location: procedures that may result in a generation of aerosols or vapors shall be performed in a properly working fume or bio-safety hood.
- ii. PPE: procedures must identify the appropriate PPE such as gloves and other protective apparel to avoid direct skin contact. Any protective clothing must be removed and placed in proper location to avoid contamination of other work spaces.
- iii. Storage: The SOP must be in compliance with the recommendations for handling and use that are given in the SDS. Chemicals are to be stored in appropriate containers and labeled. Immediately upon completion of a project or lab all unused hazardous materials must be disposed or stored according to specific procedures.

The Hazard Classes are:

Physical Hazards



Health Hazards



Acute
Toxicity

Skin Corrosion

Skin Irritation

CMR¹, STOT²,
Aspiration Hazard

Env. Hazards



Hazardous to the
Aquatic Environment

The University of Saint Francis collaborates with Drug & Laboratory Disposal (DLD) and Healthcare Waste Management to manage and dispose of hazardous waste in accordance with the University Waste Disposal Policy.¹³

The Chemical Stockroom since 1970 has been arranged according to the Flinn Scientific recommendation for storage of chemicals. The chemical storage has a large fume hood, dry boxes, an acid storage room and a volatile storage room. Besides these special storage areas, the chemicals are stored in sections: inorganics, organics, elements, dyes and indicators, biochemical, miscellaneous and demonstrations and solutions. In 2005, working with the environmental consultants, Industrial Solutions Group, Inc. the university completed a major cleaning and disposal in the chemical stockroom. In the years following, semi-annual disposal of chemicals and waste was in collaboration with DLD. The university has developed an environment management system.¹⁴

5.0 INSPECTIONS, COMPLIANCE, REPORTS

Periodic laboratory and work space inspections are done to determining individual laboratory compliance.

5.1 Routine checks

Routine checks are done in laboratories after use. A check list of actions and visual inspection includes: General cleaning of tables and equipment, verifying that all electrical resistance devices are unplugged, see that sinks are cleared, water and gas is off, and checking to see if waste generated is disposed of properly, etc.¹⁵ Personnel in charge of the laboratory space are responsible for checks.

5.2 Audits and CHP review

The CHO annually evaluates the effectiveness of the CHP and changes to the CHP if needed. Suggestions for revisions of the CHP should be sent to the CHO. Audit is usually done in May or early summer by the CHO. Departmental communications about chemical safety inspections and suggestions are kept by means of a simple publication called *Safety Notes*, located in the chemistry shared drive or shared during departmental meetings.

5.3 Laboratory use evaluation

Laboratory housekeeping is done at the end of the semester by the laboratory assistant or faculty in charge. This includes inspections of PPEs, laboratory student lockers, etc.

6.0 RECORDKEEPING

Required documentation and records are to be kept to demonstrate compliance with applicable laboratory standard mandates. Refer to the Environmental Management System for length of

¹³ Link to the Waste Disposal Policy: <http://riskandsafety.sf.edu/environment/>

¹⁴ HRP Associates, Inc. Halloran & Sage LLP Attorneys of Law with Independent Colleges of Indiana (3135 North Meridian, Indianapolis, IN

¹⁵ A check list record is available.

time and disposal method in reference to hazardous waste. This is in the purview of the Risk & Safety Management Committee.

6.1 Chemicals

Logs of chemical procurement and disposal are kept in the stockroom and on the shared drive by the CHO, designee¹⁶ or other personnel. SDSs are kept in binders in the stockroom and in the laboratory where needed. SDSs are available and updated electronically by using the commercial software licensed “MSDS-on-Line”© The SDSs are maintained by the CHO or designee.

6.2 Engineering Protection

Records of inspection of room air exchange, hoods, deionized water are kept by the Operations Department. Fire extinguisher, safety showers, and eye wash are regularly inspected and records are maintained by Director of Safety and Security.

6.3 Audits, Inspection, Training

Internal reports and routine checks are kept within the chemistry department. External reports and training records are kept by the Risk Management Committee. Incident reports and disposal waste records are kept by the DSS and the chemistry department. The CHO reviews these reports.

7.0 SAFETY DATA SHEETS (SDS)

The laboratories must maintain a collection of SDSs for all chemicals in the laboratory and ensure that they are readily accessible to all users of the laboratory. The collection is maintained as an electronic and/or a paper copy in alphabetical order. The SDS is obtained from the manufacturer at the time of purchase. Any user may contact the CHO or DSS for a SDS. They are also available electronically on line.

7.1 Components of Safety Data Sheets

SDSs must be readily available to laboratory employees for each hazardous chemical used in the work area. The SDS is designed to uniformly present information in sixteen sections.

- Section 1. Identification (Name, CAS, manufacturer (including contact information))
- Section 2. Hazard Identification (GHS pictogram, precautionary statements, etc.)
- Section 3. Composition/ information on ingredients
- Section 4. First aid measures
- Section 5. Firefighting measures (NFPA)
- Section 6. Accidental release measures
- Section 7. Handling and storage
- Section 8. Exposure controls, personal protection
- Section 9. Physical and chemical properties (vapor, pressure, flash point and color)
- Section 10. Stability and reactivity

¹⁶ Currently Paula Avila is the designee.

- Section 11. Toxicological information, including signs and symptoms of exposure
OSHA (PELs), the threshold limit value (TLVs)
- Section 12. Ecological information
- Section 13. Disposal consideration
- Section 14. Transportation information
- Section 15. Regulatory information
- Section 16. Other information

7.2 Management of Safety Data Sheets

The University has the right to request SDSs from any third party vendors. MSDSONLINE® web link is currently available to all USF employees via the campus portal. Any USF personnel may submit request a helpdesk ticket to University Technology Services (UTS) to have the desktop icon installed on their office computer. Management of the software is kept with the chemistry department laboratory assistant.

8.0 COMMUNICATION

Each department communicates health and safety issues to users of chemicals. The CHO assists in ensuring effective communication. The focus is to create a university culture of safety and to share best practices. The availability of the SDS and knowledge of the specifications of each section is the major way of communicating the hazards of specific chemicals.

The chemistry department has telephones in the laboratory to support communication and safety. Instructors in 3rd floor labs have contact with security, the stockroom and other labs.

List of phone numbers for inter-lab communication

Achatz 220	4204 (Physical/Analytical Lab)
Stockroom	4343 (two wireless units – inner chemical stock room and outer prep room)
Prep Rm 217	4333 (short distance mobile phone)
Prep Rm 218	4332 (Cisco IP phone)
Achatz 204	4205 (Physics, Geology, Earth Science Lab)
Achatz 044	8230 (Biotech Lab)

9.0 MINORS IN THE LABORATORY

The university prohibits anyone under the age of 18 to enter a laboratory. Exemptions are minors that are participating in educational programs or receiving college credit. All exemptions are approved by the program director and must have a parent consent permission form.

10.0 PROTECTIVE EQUIPMENT

Care should be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards in the laboratory. Adequate protection against the highest level of each of the hazards should be provided. It should also be noted that protective devices do not guarantee complete protection.

10.1 Eye Protection

Appropriate eye protection must be worn by all persons (including visitors) where chemicals are handled. Normal prescription eyeglasses do not provide appropriate laboratory eye protection. Wearers of contact lenses must also wear appropriate eye and/or face protection in a hazardous environment. The general types of eye protection in student laboratories are safety glasses or goggles with splash protection.

10.2 Gloves

Wear appropriate gloves when the potential for contact with toxic materials exists. The type of glove needed for protection is provided in the SDS. Gloves used as PPE must be checked for cracks and small holes before use. To avoid spreading of contamination by chemicals, remove your gloves before leaving the work area and before handling such things as telephones, doorknobs, writing instruments, and laboratory notebooks. Inspect the gloves before each use, wash non-disposal gloves before removal, and replace them periodically. Be aware that no glove material can provide complete protection. If you are unsure of what glove to wear please check the SDS. Contaminated gloves should be treated as hazardous waste.

10.3 Respiratory Equipment

Appropriate respiratory equipment is required when air contaminant concentrations are not sufficiently restricted by engineering controls. For protection against certain types of chemicals, a mask that filters particles is not sufficient. A face mask with appropriate filters is available for use in laboratories and the stockroom. These are organic vapor/ acid gas/ and ammonia half face masks with changeable filters. These masks must be stored in airtight containers so the filters remain active.

10.4 Lab Coats and other Apparel

Laboratory aprons that are water proof and fire resistant are provided for student uses of chemicals in science labs. A lab coat may be used but it must be water resistant and buttoned or fastened when handling hazardous chemicals. In the laboratory, wear closed toe shoes. Do not go barefoot or wear sandals. Do not wear shoes that have high heels or open toes. Wear long pants and long sleeve shirts.

10.5 Clean Areas

Remove laboratory coats immediately upon significant contamination. Avoid taking lab coats to clean areas. Clean areas are workspaces or dining spaces where there should be no potential of contamination from hazardous chemicals or other laboratory materials. Examples of a clean area are an office space, lounge, computer lab, etc. Specific clean areas may be designated in a laboratory.

10.6 Work Surfaces

Any work surface may be lined with a removable liner of absorbent material. Surfaces can be protected from contamination with chemically resistant trays or plastic backed disposable paper. All work surfaces must be cleaned using the appropriate cleaning solution immediately after use.

11.0 LABORATORY ENGINEERING SAFETY EQUIPMENT

Engineering safety equipment is provided by the university in the design of Achatz Hall of Science. It is maintained according to specifications by the Operations Department.

11.1 Ventilation and Fume Hoods

- i. Air exchange in a laboratory is to measure between 6 and 12 exchanges per hour.
- ii. Annual testing of face velocity and smoke visualization will be done. The face velocity test measures the speed of air-flow into the hood through open sash. It should be 80-120 feet per minute. The smoke test is qualitative but allows one to observe the air-flow.
- iii. If air-flow is insufficient, tag the hood “not in service” and submit an operations work order.

11.2 Eyewashes and Safety Showers

All laboratories in which hazardous and corrosive chemicals are used have direct access to eyewash stations and safety showers. American National Standards Institute (ANSI Z358.1 2004) provides detailed information regarding the installation and operation of emergency eyewash and shower equipment. A record of inspection is maintained by the DSS.

- i. Showers and eye washes are checked routinely and records of checking are maintained by the DSS.
- ii. Safety showers and eye wash should be accessible within 50 feet of the lab work space with no obstruction to access.

11.3 Fire Safety Equipment

Fire requires three things to thrive and spread: fuel, air (more specifically oxygen) and heat (or ignition). Prevention of fires is done by eliminating specific hazards and taking appropriate actions when needed.

- i. Fire safety equipment must be easily assessable, within 50 feet of laboratory workspace. Such equipment should include a fire extinguisher (type ABC) and may include a fire blanket. Water removes the heat, but it should not be used on certain types of fire, such as oil or magnesium.
- ii. Fire blanket is available in the organic lab and anatomy and physiology lab.
- iii. Fire extinguishers are inspected monthly by the DSS and the building alarm system is checked at least annually by a third party provider.
- iv. Flammable chemicals with a low flash point should never be used in an area with an open flame. Storage is in a special volatile storage area.
- v. There are sensors that set off the alarm in every laboratory.

12.0 EMPLOYEE INFORMATION AND TRAINING

University of Saint Francis provides ongoing training sessions for our employees. Our training includes:

- i. Content and location of this chemical hygiene plan

- ii. Location and availability of chemical SDSs, understanding of the permissible exposure limits (PELs) and potential hazards involved in using chemicals.
- iii. Signs and symptoms of overexposure to chemicals.
- iv. The proper use and location of all safety equipment.
- v. The proper storage and labeling of laboratory chemicals.
- vi. Emergency contact information
- vii. The use of equipment and the hazards associated with the equipment.
- viii. Training will occur when the process has changed or the implementation of a new process has occurred.
- ix. Training records will be maintained and documented by the department.

13.0 Waste Management¹⁷

University of Saint Francis is classified as a conditionally exempt small quantity generator (CESQG) of hazardous waste. The procedures are consistent with the University's Waste Disposal Policy¹⁸ and the departmental waste disposal SOP. The University of Saint Francis works with DLD, a licensed treatment, storage and disposal company. Waste removal is generally scheduled for twice a year (end of each semester) or more frequent if needed. Bio-hazardous waste is handled by Healthcare Waste Management.

When chemical waste is generated, the user places the waste in designated containers in the fume hood. The label must indicate the nature of the waste, substance (s), amount, and date of initial accumulation. This waste is stored with lids tightly closed in the vented cabinet below the fume hood in the laboratories where waste was generated. When container is full it may be stored in the chemical stockroom with appropriate labeling. Contact the chemistry lab assistant for additional help.

13.1 Common Chemical Waste Streams

Waste generated in the chemistry and biology laboratories are designed by type. The student adds waste to these containers and enters the date and amount on a waste log.

The common waste stream types are:

Organic solvent waste (non-halogen)

Aqueous waste (contains heavy metals)

Organic solvent (contains halogen)

Acetone wash/rinse waste

Acid waste

Hazardous waste (specific chemical named on label)

Solid waste (specific chemical)

Aqueous waste (contaminated with organic substances)



¹⁷ **Laboratory Waste Management: A Guidebook (ACS Professional Reference Books)**

ACS Task Force on Laboratory and Chemical Waste Management (Author)

¹⁸ Link to Waste Disposal Policy <http://riskandsafety.sf.edu/environment/>

13.2 Chemical Waste Disposal Logs

The waste disposal list is recorded in a spreadsheet and stored on the chemistry archive drive. New waste streams must be profiled by filling out the waste profile form.

13.3 Chemical Manifest

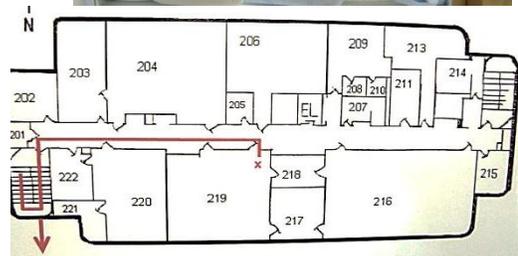
CESQG classification requires manifest copies and records of waste determination. These records are available in the office of Safety and Security.

14.0 Emergency Response, Fire and Chemical Spills

The quick guide to emergency response and chemical spills are found in Sections 4, 5 and 6 of the SDS. Read SDS for chemicals prior to usage.

14.1 Emergency Response

- i. Security (260-399-7888) must be immediately informed if 911 help is needed or has been called. They will guide any emergency vehicle to the correct site. First aid measures may be administered where time is of the essence.
- ii. First Aid kits are available in every lab. These kits are maintained and inspected regularly.
- iii. All incidents and accidents, no matter how small, must be reported.
- iv. Many emergencies call for evacuation of the lab. Evacuation routes are posted and should be known by students, lab assistants and faculty. See example of a posted evacuation route on the right.



14.2 Fire

- i. Small fires are most easily extinguished by covering with a beaker or basin to cut off the air supply. These incidents, though minor, should be reported.
- ii. Immediate response to a fire requires evacuation of the building and pulling the fire alarm located by the door to the stairwell. Elevators should not be used in a fire emergency. Other equipment such as fire extinguishers, fire blanket are located nearby but should be used only by personnel that have been trained in their use.
- iii. In the event of a fire alarm, turn off main gas valve and evacuate the building and meet at the soccer field emergency location.



14.3 Spills

Spills in the academic laboratories are usually less than one liter. Notify the instructor or lab assistant immediately when a spill occurs. Check to see if the spill had hot liquid or

was absorbed on clothing of a worker. For small spills the general protocol is for the instructor or lab assistant to:

- i. Immediately find out what was spilled. If toxic or highly flammable, instruct students to evacuate.
- ii. Contain the spill with absorbent pillows and material. A spill kit is found in each chemistry lab and chemical stockroom.
- iii. If chemical spill is flammable or combustible, make sure there are no open flames.
- iv. If chemical spill produces noxious fumes, wear a face mask.
- v. If the spill is acid, neutralize with sodium bicarbonate, if basic, use citric acid.
- vi. Bag and properly dispose of all material used in the cleanup.
- vii. If the spill is a mercury spill, use the mercury spill kit and follow the instructions.

15.0 Conclusion

Safety and chemical hygiene is the responsibility of everyone. Knowledge and understanding of the hazards, and care for the welfare of the campus community, prompts an awareness of the plan's safeguards and strategies that must be in place to create a culture of safety. USF's mission and Franciscan values enhance the culture of safety by the deep respect for others and the care of creation.