METHODIST UNIVERSITY

OFFICE OF ENVIRONMENTAL SAFETY AND HEALTH

Chemical Hygiene Plan (CHP)

29 CFR 1910.1450

METHODIST UNIVERSITY
Environmental Health and Safety Office

Chemical Hygiene Plan (CHP)

29 CFR 1910.1450 OSHA Exposure to Hazardous Chemicals in Laboratories

Revision 10
May 2018

Estimated time to review: 60 – 90 minutes

Review of this document needs to be completed prior to working with hazardous chemicals or materials in a laboratory setting

DOCUMENT REVIEW LOG

May 7, 2018……Annual Update by Dempster

August 19, 2016…….…….…….. Annual Update by Blackley

August 5, 2015…….…….…….. Annual Update by Blackley

January 16, 2014…….……..…. Annual Update by Blackley

September 13, 2013…….. CHP Updated for GHS Hazcom

January 16, 2012…….…….…….. Annual Update by Blackley

January 31, 2012…….…….…….. Annual Update by Blackley

January 31, 2011……..…. Annual Update by Raineri-Padilla

January 11, 2010…….Annual Update by Raineri-Padilla

March 03, 2009…….…….. ….Approved by University President

January 14, 2009……..……Original Document Created

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Policy Statement

This document is in compliance with 29 CFR 1910.1450, —Occupational Exposure to Hazardous Chemicals in Laboratories‖ and is in compliance with 29 USC 654, the —OSHA (Occupational Safety and Health Administration) General Duty Clause‖ which states:

Each employer—

- shall furnish to each of his employees employment and a place of employment which is free from recognized hazards that are causing or likely to cause death of serious physical harm to his employees
- shall comply with occupational safety and health standards promulgated under this Act.

Each employee—
shall comply with occupational safety and health standards and all rules, regulations and orders issued pursuant to this Act which are applicable to his own actions and conduct.

It is the policy of Methodist University to provide as safe a workplace as is possible and practicable for all of its employees. This Chemical Hygiene Plan covers a broad range of aspects regarding the use of chemicals in the workplace, from initial receipt to ultimate disposal, including but not limited to: proper storage, ventilation, usage, Safety data sheets (SDS), use of Personal Protective Equipment (PPE's), hazard information, precautions, special precautions, inspections, employee training, labeling and environmental controls. All employees who handle any chemicals as part of their employment at Methodist University are to be in compliance with this plan.

If there is a release of hazardous chemicals from any MU property or into the MU environment then the Emergency Action Plan (EAP) (Appendix K) will be implemented.

1.0 Standard Operating Procedures for Laboratory Chemicals

The decision to procure a chemical shall be a commitment to handle and use the chemical properly from the initial receipt to the ultimate disposal.

1.1 New Chemical Procurement

Requests for procurement of new chemicals shall be submitted
to the respective supervisor from where the request arises for approval; when unsure of who to contact for approval contact the Chemical Hygiene Officer. The form entitled —New Chemical Purchasing Request‖, form that can be found online www.methodist.edu/ehs shall be used for this purpose.

All involved personnel, prior to the procurement of the chemical, shall know information on the proper handling, storage and disposal. Chemicals utilized in the laboratory shall be those which are appropriate for the ventilation system

1.2 Chemical Receipt

All chemicals shall be received by the Methodist University Post Office. Personnel who receive chemical shipments shall be knowledgeable in the proper procedures for receipt and must sign (internally) for their receipt.

1.2.1 Rules for Receipt of Chemicals

All employees receiving any chemicals on any Methodist University property will follow all of the following rules.

• Chemical containers shall not be accepted without accompanying labels, Safety data sheets (SDS's) and packaging in accordance with all appropriate regulations.

• All chemical shall be dated when received and when opened.

• SDS's must be forwarded or requested for the EHS Office. These will be added into the Electronic SDS system and will be printed bi-annually.

2.0 Chemical Storage

All chemicals received on any Methodist University property will be stored in compliance with all applicable federal, state and local
regulations and laws. See Appendix I

2.1 General Regulations for Chemical Storage

The regulations/rules for chemical storage are as follows:

- Received chemicals shall be immediately moved to the designated storage area. Large glass containers shall be placed in secondary containment or shipping containers during transportation.
- The storage area shall be well illuminated. All shelves that are used to house chemicals will have retaining lips. Large bottles will be stored no more than two feet from ground level.
- Chemicals shall be segregated by hazard classification and compatibility, in a well-identified area, with local exhaust ventilation.
- All chemicals not in immediate use will be stored in a Chemical Storage room as appropriate to the chemical.
- The storage area shall be accessible during normal working areas.
- In the storage area Mineral Acids will be separated from flammable and combustible materials. Separation is defined by NFPA49, as storage within

the same fire area but separated by as much space as practicable or by intervening storage from incompatible materials.

- Acid-resistant type trays shall be placed under bottles of mineral acids.
- Acid-sensitive materials such as cyanides and sulfides shall be separated from acids.
- Highly toxic chemicals or those whose containers have been opened shall be stored in unbreakable secondary containers.
- The chemical storage area shall not be used as a preparation or repackaging area.

2.1.1 Regulations for the Storage of Flammable and Combustible Materials

All flammable or combustible materials will be handled stored according to all applicable federal, state and local regulations.

Flammable materials are defined in Section 1.7 of NFPA (National Fire Prevention Association) 30. A flammable liquid is defined as a liquid whose flash point does not exceed 100°F, when tested by closed-cup test methods, while a combustible liquid is one whose flash point is 100°F or higher, also when tested by closed-cup methods. These broad groups are further classified as follows:

- Class IA - Flash Point less than 73°F; Boiling Point less than 100°F
- Class IB - Flash Point less than 73°F; Boiling Point equal to or greater than 100°F
- Class IC - Flash Point equal to or greater than 73°F, but less than 100°F
- Class II - Flash Point equal to or greater than 100°F, but less than 140°F
- Class IIIA - Flash Point equal to or greater than 140°F, but less than 200°F
- Class IIIB - Flash Point equal to or greater than 200°F

See Appendix H for a list of common Class I flammable/combustible chemicals.

The rules for storage are as follows:
All flammable materials will be stored in an ANSI or NFPA approved flammable storage cabinet that is vented to the outside of the building, and the cabinet must be grounded.
There is no limit to the number of flammable storage cabinets allowed per laboratory area.
The maximum quantity of Class I, II and III, flammables (in any combination) shall not exceed 5 gallons per 100 square feet of laboratory space.

The maximum quantity of Class I flammables shall not exceed 2 gallons per 100 square feet of laboratory space.

2.1.2 Regulations for Acid Storage

All acids will be stored according to all applicable federal, state and local regulations. The rules for acid storage are as follows:

- All acids are to be stored in an ANSI approved Acid Cabinets, except Nitric Acid.
- Nitric acid is to be stored on a bottom shelf in the chemical stockroom, in the organic chemical section, on a shelf labeled —Miscellaneous, Nitric Acid, or in a separate Nitric Only labeled Acid storage cabinet.

2.2 Regulations for the Storage of Chemicals in the Lab/Workstation

The following regulations will be followed whenever chemicals are removed from the chemical storage area and/or are being used at
the lab/workstation.

- When chemicals are taken from the chemical storage room they shall be placed in an outside secondary container for transportation.
- Storage of chemicals at the laboratory table/bench or other work area shall be limited to the amounts needed for that laboratory period or shift.
- The container size shall be the minimum convenient size.
- The amount of chemicals at the laboratory bench/table or other work area shall be as small as practical.
- Chemicals in the workplace shall not be exposed to sunlight or heat.

3.0 Inspections of Chemical Storage Areas

All chemical storage areas will be inspected regularly according to the following:

The Laboratory Manager or Area Supervisor shall conduct periodic, at least annually, inventories of chemicals, outside of the chemical storage room. Unneeded items shall be properly discarded or returned to the storage area.
The Chemical Hygiene Officer and/or Laboratory Manager/Coordinator, shall examine stored chemicals at least annually for replacement, deterioration and container integrity. The inspection should determine whether any corrosion, deterioration, or damage has occurred to the storage area as the result of leaking chemicals. If there are any deficits noted inform the laboratory manager.

4.0 Chemical Handling

Each employee in a laboratory, with the training, education and resources provided by their laboratory supervisors, shall develop and implement work habits consistent with this Chemical Hygiene Plan (CHP) to minimize personal and coworker exposure to chemicals in the laboratory. Work habits will be based on the realization that all chemicals inherently present hazards in certain conditions. Therefore, exposure to all chemicals shall be minimized.

4.1 General Precautions for Handling Chemicals

General precautions which shall be followed for the handling and use of all chemicals are:

- Skin contact with all chemicals shall be avoided.
- Appropriate clothing and closed toed shoes shall be worn when working with chemicals.
- All employees shall wash all areas of exposed skin prior to leaving the laboratory.
- Mouth suction for pipeting or starting a siphon is strictly prohibited.
- Eating, drinking, smoking, gum chewing, tobacco chewing, or application of cosmetics in areas where laboratory chemicals are present is strictly prohibited. These areas have been posted. Hands shall be thoroughly washed, prior to performing any of the above activities.
- Storage, handling and consumption of food or beverages shall not occur in chemical storage or chemical usage areas, nor shall refrigerators, glassware or utensils used for laboratory operations be used for food or beverages.
- The intent and procedures of this Chemical Hygiene Plan shall be continuously adhered to.
- All Risk Determinations shall be conservative in nature.
- Any chemical mixture shall be assumed to be as toxic as its most toxic component.
- Substances of unknown toxicity shall be assumed to be toxic.
- Laboratory employees shall be familiar with the symptoms of exposure to the chemicals with which they work and to the precautions necessary to prevent exposure to workplace chemicals.
- In all cases of chemical exposure, neither the Permissible Exposure Limits (PELs) of the Occupational Safety and Health Administration (OSHA) or the Threshold Limit Values (TLVs) of the American Conference of Governmental Industrial Hygienists (ACGIH) shall be exceeded.
- The engineering controls and safety equipment in the laboratory shall be utilized and inspected regularly.

- Specific precautions based on the toxicological characteristics of individual chemicals shall be implemented as deemed necessary by the Chemical Hygiene Officer these special precautions are listed in *Section 14.0* of this CHP.

4.2 Laboratory Equipment and Glassware

Each employee shall keep the work area clean and uncluttered. All chemicals and equipment shall be properly and labeled properly. At the completion of each laboratory period, or operation or workday, the work area shall be thoroughly cleaned and all equipment properly cleaned and stored.

In addition, the following procedures shall apply to the use of laboratory equipment:

- All laboratory equipment shall be used only for its intended purpose.
- All glassware will be handled and stored with care to minimize breakage.
- All broken glassware will be immediately disposed of in a container labeled "Broken Glass".
- All evacuated glass apparatus shall be properly shielded to contain chemicals and glass fragments in the case that implosion occurs.
- Labels should be attached to all chemical containers, identifying the contents and related hazards.
- Labels must be legible.
- Labels must be in English.
- Waste receptacles shall be identified as such with an appropriate label.
- Contents of the waste receptacle must be written on the container
- Volumes of each waste must be listed on the outside of the waste receptacle.
- All laboratory equipment shall be inspected on a periodic basis as specified in Appendix A of this CHP, and be replaced or repaired as necessary.

4.3 Personal Protective Equipment

All Methodist University personnel will use all appropriate PPE's whenever transporting or handling chemicals. The regulations for usage of PPE's are as follows:

- Safety glasses/goggles meeting ANSI Z87.1 are required for employees and visitors to all laboratories and will be worn at all times when in the laboratory.
- Contact lenses are prohibited in laboratories, except as approved by the laboratory supervisor.
- ANSI approved chemical protective goggles and/or face shields shall be worn during chemical transfer and handling as procedures and the safe handling of individual chemicals dictate.

- Close toed shoes must be worn when handling chemicals.
- Sandals, perforated shoes (including crocs), and bare feet are strictly prohibited in laboratories.
- Safety shoes as specified per ANSI 47, are required when employees routinely lift heavy objects.
- In appropriate laboratories, laboratory coats and/or laboratory aprons are provided and must be worn in the laboratory. Laboratory coats will be laundered on a periodic basis, at least monthly. Laboratory coats shall be removed and appropriately discarded immediately upon discovery of significant contamination.
- Appropriate chemical resistant gloves, based on the table in Appendix B of this CHP, shall be worn at all times when there may be skin contact with chemicals.
- Disposable gloves will be properly discarded after use.
- Reusable gloves, will be inspected and cleaned prior to re- use. Damaged or deteriorated reusable gloves will be immediately replaced. Reusable gloves shall be washed prior to removal from hands.
- Thermal-resistant gloves shall be worn for the operations involving the handling of heated materials and exothermic reaction vessels.
- Thermal-resistant gloves shall be non-asbestos and shall be replaced when damaged or deteriorated.
- Respirators shall comply with the OSHA Respiratory Protection Standard, 29 CFR 1910.134. *(no respirators are currently in use in a Methodist University lab)*

4.4 Personal Work Practices

All Methodist University personnel will employ the safest work practices practicable whenever transporting or handling chemicals. These work practices include the following:

- Laboratory supervisors, managers and/or coordinators must ensure that each employee knows and follows the procedures established in this CHP.
- All employees shall remain vigilant to unsafe practices and conditions in the laboratory and shall immediately report such practices and/or conditions to the laboratory supervisor.
- The laboratory supervisor must promptly correct the unsafe practices and/or conditions.
- Long hair and loose-fitting clothing shall be confined close to the body, to avoid being caught in moving machine/equipment parts.
- Use only the equipment that is appropriate to the ventilation system.

- Avoid unnecessary exposure to all chemicals by any route. The routes are, inhalation, skin absorption, ingestion, and inoculation.
- Do not smell or taste any chemicals.
- Encourage safe work practices in coworkers by setting the proper example.
- Horseplay is strictly prohibited.
- Seek information and advice from knowledgeable persons, standards, codes, CHP and SDS's about the hazards present in the laboratory, plan operations, equipment and protective measures accordingly.
- Use engineering controls in accordance with Section 8.0 of this CHP.
- Inspect personal protective equipment, prior to use and wear appropriate personal protective equipment as procedures dictate and when necessary to avoid exposure to chemicals or other hazards present in the laboratory.
- Never mouth pipette. Mouth suction must not be used to start a siphon. A pipette bulb or other aspirating device must be used to start a siphon.
- Wash hands thoroughly prior to leaving the work area, using an approved hand soap. Never wash using an organic solvent.
- Safety data sheets (SDS's) for chemicals used in the laboratory are readily available to all employees that may be exposed to such chemicals. Per OSHA 29 CFR 1910.1450(h)
- The Chemical Hygiene Officer will maintain the SDS's.
- The SDS's will be available during work hours.
- Know the safety precautions for the work being done.
- Know the potential hazards from the SDS's, reference materials, laboratory supervisors and Chemical Hygiene Officer.
- Appropriate Eye Protection must be worn when using chemicals.
- Do not eat, drink, use tobacco, chew gum or apply cosmetics in the laboratory.
- Food, drink, consumption of tobacco products, chewing gum and application of cosmetics are all potential routes for exposure to hazardous chemicals.
- Food and drink are absolutely prohibited from being stored, handled or consumed in laboratories using hazardous chemicals.
- Laboratory refrigerators, ice chests, freezers and ice machines are never to be used to store food or drink that is intended for human consumption.
- Never work in the laboratory alone when working with hazardous chemicals.
- Know the location of and how to operate the emergency equipment your area.
- Know how to obtain help in an emergency situation and be familiar with emergency procedures.
- Equipment should be used only for its designated purpose.
- Handle and store glassware with care. Do not use damaged glassware. Use extra care with evacuation apparatuses to prevent implosion.

5.0 Labeling of Chemicals and Chemical Containers

All containers in the laboratory shall be labeled. This includes chemical containers and waste containers. The label shall be informative and durable, and at minimum, will identify the contents, source, date of acquisition, storage location and indication of hazard. The rules for labeling are as follows:

- All labels will be in English.
- All labels will be legible.
- When chemicals are placed in a secondary container, the container will be labeled as to exact chemical content, dated with the date of transfer and initialed by the person doing the transfer.
- All labels will be durable.
- The laboratory manager/coordinator will replace deteriorating labels.
- In the case of portable containers, the individual using the container shall label portable containers.
- Exemptions to the labeling requirements shall be made for chemical transfers from a labeled container into a container that is intended for the immediate use of the employee that performed the transfer.
  - The labeling shall be periodically inspected by the Laboratory Supervisor to ensure that the labels have not been removed, defaced or fallen off. The form entitled —Chemical Hazard Audit Checklist, found on our website, www.methodist.edu/ehs.

6.0 Criteria for the implementation of Control Measures

The control of occupational exposure to chemicals is paramount to worker safety in laboratories. The following control measures will be implemented in accordance with this policy:

6.1 Air Sampling

- Air sampling for evaluating employee exposure to chemical substances shall be conducted periodically or as specified by specific codes or regulations.
- If at any time air sampling discloses employee exposure over the Action Level (or in the absence of an Action Level, the Permissible Exposure Limit, PEL), Methodist University shall immediately comply with the periodic monitoring required in the specific standard covering that chemical.
- Periodic monitoring will be terminated in accordance to the relevant standard of the chemical or substance that is being monitored.
- Upon the addition of new chemicals or changes in the control procedures, additional air sampling will be considered to determine employee exposure.

Air sampling is to be conducted if there is reason to believe that exposure levels for regulated substances that require air sampling, routinely exceed the action level for that chemical, or in the absence of an "action level" the designate level for that chemical.

- Methodist University shall notify all relevant employees of air sampling results in their work areas within 15 days of the receipt of the monitoring results, either individually in writing or by posting the results in an appropriate location per 29 CFR 1910.1450(d)(4).

6.2 Housekeeping

Each laboratory worker is directly responsible for the cleanliness of his/her work area and is jointly responsible with other laboratory workers for common areas in the laboratory. The following procedures apply to the housekeeping standards of the laboratory:

- All spills on laboratory benches, tabletops, stools, chairs, floors and the like, shall be immediately cleaned up and the cleaned-up materials will be properly disposed of. Large spills will necessitate the implementation of the Emergency Action Plan per OSHA 1910.138 and 1910.120.
- Housekeeping personnel are not to be involved in chemical spill clean up.
- Laboratory benches/tables shall be kept clear of equipment and chemicals except those necessary for the work that is currently being performed.
- The work area shall be cleaned at the end of each operation and shift.
- All apparatus shall be thoroughly cleaned and returned to storage upon completion of usage.
- All floors, aisles, exits, fire extinguishing equipment, eyewashes, emergency showers, electrical disconnects, gas disconnects and other emergency equipment shall remain unobstructed.
- All labels shall face front.
- Chemical containers shall be clean, properly labeled and returned to the storage area upon completion of usage.
- All chemical wastes must be disposed of in accordance with the Methodist University Hazardous Waste Disposal Plan.
- The numbers of chemicals in a laboratory are to be kept to a minimum.
- Discard or recycle chemicals that are not being used.
- Do not use stairs, hallways or mechanical spaces as storage areas.
- Waste should be disposed of promptly by using the appropriate containers.

6.3 Safety and Emergency Equipment

The following rules regarding Safety and Emergency Equipment will be followed by all Methodist University personnel:

- Emergency contact numbers will be posted in every laboratory.
- All laboratory personnel will be trained in the proper use of the fire extinguishers when hired.
- Prior to the procurement of new chemicals, the Campus Fire Marshall or Police & Public Safety Office representative shall determine that existing extinguishers and other emergency equipment are appropriate for such chemicals.
- All employees who might be exposed to chemical splashes shall be instructed in the location and proper usage of emergency showers and eye washes.
- The eyewashes will be inspected weekly, by the primary laboratory instructor/manager/coordinator for each laboratory to ensure that they are free from obstruction and all parts and signs are in place. These inspections shall be in accordance with ANSI Z358.1 and the manufactures specifications. And recorded on the eye wash/safety shower tag affixed to each shower or eye wash.
- For Safety Showers, the Campus Safety Officer and Chemical Hygiene Officer will conduct a flow test at least annually. Records shall be maintained on the eye wash/safety shower tag.
- Locations signs for safety and emergency equipment have been posted.

7.0 Engineering Controls

According to OSHA's Hierarchy of Controls, the initial method of controlling occupational exposure to chemicals is through engineering controls. In accordance with this the following regulations have been established:

7.1 Intent

The engineering controls installed in the laboratory are intended to minimize employee exposure to chemical and physical hazards in the workplace. These controls must be maintained in proper working order for this goal to be realized.

7.2 Modification

No modification of engineering controls will occur unless testing indicates that worker protection will continue to be adequate.

7.3 Improper Function

Improper function of engineering controls must be reported to the Chemical Hygiene Officer immediately. The system shall be taken out of service, until proper repairs have been executed.

7.4 Usage

All employees shall follow proper work practices when using the engineering controls:

7.4.1 Local Exhaust Ventilation

The following procedures shall apply to the use of local exhaust ventilation:

Openings of hoods shall be placed as close as possible to sources of the air contaminants. If there is a screen on the face of the hood, clear it prior to usage.

- Hood fans shall operate the entire time that the hood is in usage. If there are waste receptacles or chemicals in the hood the hood fan must stay on.
- After using the hoods, operate the fan for an additional time, typically a minimum of 15 minutes, to clear the residual contaminants from the ductwork.
- The ventilation system shall be inspected, at least once a semester or twince a year by the Laboratory Manager/Coordinator. The duct velocity must be maintained at 3500 feet per minute as a minimum velocity. The Laboratory Manager will maintain a record of each inspection and a copy will be forwarded to the Campus Safety Officer.
- Prior to a change in chemicals or procedures, the Laboratory Supervisor will determine the adequacy of the ventilation system for the chemical or the procedure.

7.4.2 Laboratory Hoods

The laboratory hoods shall be utilized for all chemical procedures, which might result in release of hazardous vapors or dust. As a general rule, the hood shall be used for all chemical procedures involving substances are appreciably volatile and have a Permissible Exposure Limit (PEL) —designated‖ less than 50 ppm.
The following work practices shall apply to the use of hoods:

- Confirm adequate hood ventilation performance prior to opening chemical containers inside the hood. An inward flow of air can be confirmed by holding a piece of paper at the face of the hood and observing the movement of the paper.
- Keep the sash of the hood closed at all times, except when adjustments within the hood are being made. At these times, maintain the sash height as low as possible.
- Storage of chemicals and equipment inside the hood shall be kept to a minimum.

- Minimize interference with the inward flow of air into the hood.
- Leave the hood operating when it is not in active use if hazardous chemicals are contained inside the hood or it is uncertain whether adequate general laboratory ventilation will be maintained when the hood is non-operational.
- The Laboratory Manager shall inspect the ventilation system semi -annually. The hood face velocity shall be maintained between 75 and 125 feet per minute. The Laboratory Manager will maintain a record of the inspection and a copy will be sent to the Campus Safety Officer.
- The hood shall not be used for the disposal of volatile chemicals.
- Prior to the introduction of new chemicals, the Chemical Hygiene Officer shall determine the adequacy of hood ventilation systems.

7.4.3 Glove Boxes & Isolation Rooms

The exhaust air from a glove box or isolation room will pass through scrubbers or other treatment before release in the regular exhaust system. (NOTE: There are currently no glove boxes or isolation rooms, in operation at Methodist University.)

7.4.4 Cold & Warm Rooms

In the event of an electrical failure, the following provisions will apply.(Note: There are currently no cold or warm rooms in operation at Methodist University):

- All open gas valves will be shut off.
- All electrical appliances and circuits will be turned off and unplugged (if possible).
- All fume hoods will be fully shut.
- If open chemicals are in the laboratory all windows will be opened.

7.4.5 Storage Cabinets.

Storage cabinets for Hazardous Chemicals, Acids and Flammables will be set-up per manufactures specifications. Chemical Storage Cabinets will be vented to the outside.

8.0 Employee Information and Training

OSHA requires that all employees working with hazardous chemicals be informed of the hazards and appropriately trained, OSHA —Employee Right to Know/Understand (RTK/U). In compliance with this the following policies/procedures have been implemented:

8.1 Hazard Information

All employees will be apprised of the hazards presented by the chemicals in use in each of the laboratories. Each employee shall receive training at the time of the

initial assignment in the laboratory, prior to assignments involving new exposure situations, by the supervisor/instructor of that laboratory.
All laboratory employees and any other employee who may be exposed to a chemical hazard will undergo initial and annual training on Right to Know/Understand Labeling, Location and Operation of Safety Equipment, What to do in the case of a spill or exposure to a hazardous chemicals, by the Chemical Hygiene Officer. The Chemical Hygiene Officer will maintain records.

8.2 Training Records

All Training records are kept on file in the EHS office. All certificates for successful training completion will be created and given to the area supervisors for all employees and copies will be sent to and retained by Human Resources in each employee's folder.

8.3 Training

Employee training shall include methods of detecting the presence of hazardous chemicals, potential physical and health hazards posed by chemicals in the workplace, and measures that can allow employees to protect themselves.

The training shall present the details of the Chemical Hygiene Plan, and shall include:

- The appropriate contents of the OSHA standard for General Industry and needed appendices;
- The location and availability of the Chemical Hygiene Plan, CHP;
- The location and availability of Safety data sheets, SDS's;
- The Permissible Exposure Limits, PEL's, for OSHA regulated substances or recommended exposure values for other hazardous chemicals not regulated by OSHA, which are present in the workplace;
- Signs and symptoms associated with exposure to chemicals present in the workplace; and Location and availability of reference materials on chemical and laboratory hygiene.
- The Methodist University Chemical Hygiene Officer shall conduct training
- The following materials are training aids that may be used (new materials may be substituted for old as deemed appropriate).

    - Audiovisual Programs: PowerPoint Presentations and Videos where needed.
    - Written Materials: Sample SDS,
    - Right to Know/Understand Overview
    - Quiz on RTK

- List of common Acronyms and Abbreviations used in laboratories,
- Others included in Appendix G of this CHP
- Other materials: Hands on demonstration of use and location of Safety Equipment, including, but not restricted to Fire Fighting Equipment, eyewashes, safety showers, fire blankets, and First Aid Kits.

9.0 Hazardous Chemicals Created in the Laboratory

If the composition of the chemical substance which is produced exclusively for the laboratory's use is known, the employer shall determine if it is a hazardous chemical. If the chemical is determined to be hazardous then the laboratory supervisor shall provide appropriate training as to its safe handling, any special precautions and proper disposal.

10.0 Prior Approval for Laboratory Activities

All activities done in a laboratory will be done under the permission of that laboratory's direct supervisor. All laboratory activities will be done at standard operating times, unless special permission is granted by that laboratory's immediate supervisor. In the case of irregular work hours in the laboratory special provisions will come into play as listed below:

10.1 Permit System

A permit system shall be used for laboratory activities, which present specific, foreseeable hazards to employees. These activities include off-hours work, sole occupancy of a building, hazardous operations and unattended operations. The permit entitled —Chemical Hygiene Permitll is included in *Appendix E* of this CHP and shall be executed prior to the commencement of any of the above-mentioned activities. As per 29 CFR 1910.1450(e)(3)(v).

10.1.1 Unattended Operations & Off-Hours Work Practices

When laboratory operations are performed by students, which will be unattended by the laboratory personnel (any work including: continuous operations, overnight reactions and etc.), the following procedures will be employed:

- The permit system shall be utilized, and a signed and approved Laboratory Access Form must be present with the student at all times.
- Security will be notified upon arrival to the lab and when the student leaves the lab.
- The overhead lights in the laboratory will be left powered on

10.1.2 Sole Occupancy

At no time shall work be performed in any laboratory when the only person in the building is the one in the laboratory performing the work. A second person is defined as someone else in the same laboratory room who is capable and knowledgeable enough in the emergency procedures for the university to contact help if needed. This also does not cover any children under the age of 16.

10.1.3 Hazardous Work

All hazardous operations are to be performed during a time when at least two personnel are present in the laboratory. At no time shall a laboratory person, while working in the laboratory alone in the laboratory, perform work which is considered hazardous. The determination of hazardous operations shall be made by the laboratory supervisor and done only when permitted.

11.0 Medical Consultations and Examinations

The employer shall provide all employees who work with hazardous chemicals an opportunity to receive medical attention, including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances: (OSHA 29 CFR 1910.1450 (g)(1)):

- Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory, the employee shall be provided an opportunity to receive an appropriate medical examination. (OSHA 29 CFR 1910.1450 (g)(1)(i))
- Where exposure monitoring reveals an exposure level routinely above the action level (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements, medical surveillance shall be established for the affected employee as prescribed by the particular standard. (OSHA 29 CFR 1910.1450 (g)(1)(ii))
- Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure, the affected employee shall be provided an opportunity for a medical consultation. Such consultation shall be for the purpose of determining the need for a medical examination. (OSHA 29 CFR 1910.1450 (g)(1)(iii))

11.1 When and Why (of Medical Consults/Exams)

An opportunity to receive medical attention is available to all employees who work with hazardous chemicals, whenever:

- An employee develops signs or symptoms associated with a hazardous chemical to which the employee may have become exposed to in the workplace;(and/or)
- Exposure monitoring reveals an exposure level routinely above the Action Level, or Permissible Exposure Level for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements;(and/or)
- Whenever an event takes place in the work area, such as a spill, leak or explosion or other occurrence resulting in the likelihood of a hazardous exposure

11.2 No Cost to the Employee

All medical consultations and examinations required under this standard, shall be performed by or under the direct supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay and at a reasonable time and place. (OSHA 29 CFR 1910.1450(g)(2))

11.3 Information Provided to the Physician

Methodist University shall provide the following information to the physician: (OSHA 29 CFR 1910.1450(g)(3)):

- The identity of the hazardous chemical(s) to which the employee may have been exposed;
- A description of the conditions under which the exposure occurred, to include quantitative data, if available, and;
- A description of the signs and symptoms the employee is experiencing, if any.

11.4 Physician's Written Opinion

For examination or consultation required under this standard, the employer shall obtain a written opinion from the examining physician, which shall include the following: (OSHA 29 CFR 1910.1450(g)(4)).

- Any recommendation for further medical follow-up;
- The results of the medical examination and any associated tests;
- Any medical condition which may be revealed in the course of the examination which may place the employee at an increased risk as the result of the exposure to a hazardous workplace; and
- A statement that the employee has been informed by the physician of the results of the consultation or medical examination and any medical condition that may require further examination or treatment

- The written opinion shall not reveal specific diagnoses unrelated to occupational exposure. (OSHA 29 CFR 1910.1450(g)(4)(ii))

11.5 Seeking Medical Attention

- In any Emergency Situation, immediately employ any needed safety equipment (eyewashes, showers, firefighting equipment and etc.). Call 911 and request Immediate Emergency Attention, then immediately contact Campus Police and Public Safety at x7577 to let them know emergency services will be coming onto campus and the location in which to send them.
- Employees seeking the opportunity of medical consultation in a non-emergency situation, should request the listing from the Methodist University Personnel Office or the Campus Safety Officer or from the Chemical Hygiene Officer.

12.0 Chemical Hygiene Responsibilities

Methodist University as an institution takes its responsibility for providing as safe a work and learning environment as practicable. In accordance with this policy there is a top-down policy of responsibilities:

12.1 College President

Dr. Ben Hancock, has the ultimate responsibility for chemical hygiene throughout the laboratory and with the assistance of other program administrators, will provide continued support for proper chemical hygiene at Methodist University.

12.2 Chemical Hygiene Officer

The Chemical Hygiene Officer shall:

- Work with administrators and other employees to develop and implement appropriate chemical hygiene policies and practices;
- Monitor the procurement and use of chemicals in Methodist University laboratories, including the determination that the facilities and training levels are adequate for the chemicals in use;
- Perform regular, formal chemical hygiene and housekeeping inspections and the inspection of emergency equipment. The inspection of emergency equipment will be done in concert with the campus Safety Officer;
- Help project directors develop precautions and adequate facilities for chemical operations;
- Maintain current knowledge concerning the legal requirements of regulated substances in the laboratory;
- Review and improve the Chemical Hygiene Plan on an annual basis;

- Maintain overall responsibility for laboratory operations, in concert with the Laboratory Manager;
- Ensure that workers know and follow the chemical hygiene rules;
- Determine the proper level of personal protective equipment, ensure that such protective equipment is available and in proper working order;
- Ensure that appropriate training has been provided for employees working with hazardous chemicals; and
- Monitor the waste disposal program of hazardous wastes.

12.3 Laboratory Workers and Other Workers involved in the Usage of Hazardous Substances

All employees involved in the use of hazardous chemicals or who could potentially become exposed to hazardous chemicals in the workplace are individually responsible for:

- Planning and conducting each operation involving the usage of potentially hazardous chemicals, in accordance with the Chemical Hygiene Plan.
- Developing and implementing good chemical hygiene habits.

13.0 Special Precautions

When laboratory procedures change and require the use of additional classifications of chemicals (allergens, sensitizers, acids, corrosives, toxins, acute toxins, embryotoxins, teratogens, mutagens, carcinogens, water reactive and etc.), additional special precautions shall be implemented as deemed necessary by the Chair of the Department of Chemistry or the Chemical Hygiene Officer. The permit system shall be employed for all special activities. All questions regarding the use of the permit system should be addressed to the Chemical Hygiene Officer.

13.1 Working with Allergens and Embryotoxins

When laboratory procedures change and require the use of additional classifications of chemicals (allergens, sensitizers, acids, corrosives, toxins, acute toxins, embryotoxins, teratogens, mutagens, carcinogens, water reactive and etc.), additional special precautions shall be implemented as deemed necessary by the Chair of the Department of Chemistry or the Chemical Hygiene Officer. The permit system shall be employed for all special activities. All questions regarding the use of the permit system should be addressed to the Chemical Hygiene Officer.

- Suitable gloves will be worn at all times when working with allergens or substances of unknown allergenic activity, to prevent hand contact.
- Women of childbearing age will handle embryotoxins only in a hood with confirmed satisfactory performance and will use all other protective

equipment as prescribed by the laboratory supervisor and the Chemical Hygiene Officer.

- Women who are pregnant or that suspect that they may be pregnant are prohibited from using known embryotoxins, and their grade will not be adversely effected due to their inability to complete the lab.
- Embryotoxins will be stored in adequately ventilated areas in unbreakable secondary containers.
- In the event of a spill of an allergen or an embryotoxin the laboratory supervisor and the Chemical Hygiene Officer will be notified. The laboratory supervisor must be immediately notified. A physician will be consulted when appropriate.

13.2 Working with Chemicals of Moderate Chronic or High Acute Toxicity

- Areas where these chemicals are used and stored are restricted access areas and have special warning signs posted.
- A special hood with a minimum of 60 linear feet per minute, face velocity, or other appropriate containment device will be used. Released vapors will not be released with the hood vent. Released vapors will be trapped and properly disposed of.
- Gloves and long sleeves will be used. Hands and arms will be washed immediately after handling/using these materials.
- Two personnel will always be present whenever any of these chemicals are used.

13.3 Working with Chemicals of Moderate Toxic or High Chronic Toxicity

- All transfer of these substances should be done in a designated area: a restricted access area hood, glove box or designated area of the laboratory.
- Approval of the laboratory supervisor will be obtained before any of these chemicals are used in the laboratory.
- Vacuum pumps used for operations with these chemicals must have scrubbers or High Efficiency Particulate Absolute, HEPA, filters.
- Any contaminated equipment or glassware will be decontaminated in the hood before they are removed from the designated area.
- For powders a wet mop or vacuum with HEPA filters will be used for the clean up.
- The designated area will be labeled with warning and restricted access signs.
- Containers of chemicals will be stored in a ventilated, limited access area, in labeled, unbreakable, chemically resistant secondary containers.

13.4 Working with Animals and Chemicals of High Chronic Toxicity

- For large-scale studies, special facilities with restricted access will be provided.
- The substances will be administered by inoculation or gavage, when possible, rather than by diet. When diet is used, a caging system under negative pressure or laminar airflow directed toward HEPA filters will be used.
- Procedures will be used to minimize contaminated aerosol from food, urine and feces. HEPA filtered equipment will be used for cleaning. Contaminated bedding will be moistened before removal. Diets will be mixed in closed containers in hoods.
- Plastic or rubber gloves and fully buttoned laboratory coats will be worn at all times when handling experimental animals.

13.5 Working with Selected Carcinogens

- Selected carcinogens will be worked with only in a designated area.
- Carcinogens will only be used in a hood with proven ventilation.
- All equipment and glassware will be decontaminated after use inside of the hood before removal to other areas.
- All waste containing carcinogens will be considered hazardous and will be properly disposed of.

14.0 Record Keeping

Records of all accidents involving chemicals and Methodist University personnel will be maintained and the following regulations will be followed:

- Police and Public Safety will conduct an accident investigation report.
- Accident reports will be retained for a period of 30 years (OSHA 29 CFR 1910.20).
- Exposure records for hazardous chemicals and harmful physical agents will be maintained for 30 years (OSHA 29 CFR 1910.20).
- Medical records for employees exposed to hazardous chemicals will be maintained for a minimum period of the duration of their employment at Methodist University plus 30 years (OSHA 29 CFR 1910.20).
- Records of inspections will be maintained for 10 years (OSHA 29 CFR 1910.20).
- Records of employee training will be maintained indefinitely (OSHA 29 CFR 1910.20).

15.0 Chemical Spills, Releases and Accidents

In the event of a chemical spill, release or other accident, Methodist University will adhere to the procedures outlined in its Emergency Response Plan (OSHA standard 29 CR 1910.38 and 29 CFR 1910.120).

16.0 Annual Chemical Hygiene Audit

The Chemical Hygiene Officer will conduct an audit of all phases of the Chemical Hygiene Plan, each year. Results will be provided to the Dean of Business Affairs, the Dean of Academic Affairs and to the Chair of the Department of Chemistry. Supervisors of the laboratories/work areas are responsible for taking corrective actions deemed necessary. Appendix F, entitled —OSHA Hazardous Chemicals in Laboratories Standard Compliance Checklist of this CHP.

Appendix A

Resistance of Chemicals to Common Glove Material

Chemical	Natural Rubber	Neoprine	Nitrile	Vinyl
Acetaldehyde	G	G	E	G
Acetic Acid	E	E	E	E
Acetone	G	G	G	F
Acrylnitrile	F	G	-	F
Amm o n ium hydroxide (sat)	G	E	E	E
Aniline	F	G	E	G
Benzaldehyde	F	F	E	G
Benzene	P	F	G	F
Benzyl Chloride	F	P	G	P
Bromine	G	G	-	G
Butyraldehyde	P	G	- -	G
Calcium hypo ch lo rite	P	G	G	G
Carbon disulfide	P	P	G	F
Carbon tetra ch lo ride	P	F	G	F
Chlorine	G	G	-	G
Chloroacetone	F	E	-	P
Chloroform	P	F	G	P
Chromic Acid	P	F	F	E
Cyclohexane	P	F	F	E
Dibenzyl ether	F	G	-	P
Diethanolamine	F	E	-	E
Diethyl ether	F	G	E	P

Dimethyl sulfoxide	-	-	-	-
Ethyl acetate	F	G	G	F
Ethylene	P	F	G	P
Ethylene glycol	G	G	E	E
Ethylene	P	P	-	P
Fluorine	G	G	-	G
Formaldehyde	G	G	-	G
Formic Acid	G	E	E	E
Glycerol	G	G	E	E
Hexane	P	E	-	P
Hydrobromic acid	G	E	-	E
Hydrochloric acid	G	G	G	E
Hydrofluoric acid	G	G	G	E
Hydrogen peroxide	G	G	G	E
Iodine	G	G	-	G
Methylamine	G	G	E	E
Methyl cellosolve	F	E	-	P
Methyl chloride	P	E	-	P
Methyl ethyl	F	G	G	P
Methylene chloride	P	E	-	P
Monoethanolamine	F	E	-	E
Morpholine	F	E	-	P
Napthalene	G	G	E	G
Nitric acid conc.	P	P	P	G
Perchloric acid	F	G	F	E
Phenol	G	E	-	E
Phosphoric acid	G	E	-	E
Potassium	G	G	G	E

Propylene	P	F	-	P
Sodium hydroxide	G	F	G	E
Sodium	G	P	F	G
Sulfuric acid, conc.	G	G	F	F
Toluene	P	F	G	F
Trichloroethylene	P	F	G	F
Tricresyl	P	F	-	F
Triethanolamine	F	E	E	E
Trinitrotoluene	P	E	-	P

Appendix B

Shelf Pattern for Chemical Stockrooms

The following shelf pattern segregates chemicals into organic and inorganic categories. Organization then follows compatibility within the major, organic/inorganic categories. NOTE: Shelves must be set up in this order. Do not change the ordering or an adverse chemical reaction may occur.

Shelf Heading	Functional Groups
Organic # 2	Alcohols & Glycols
Organic # 3	Hydrocarbons & Esters
Organic # 4	Esters & Ketones
Organic # 5	Epoxy Compounds & Isocyanates
Organic # 7	Sulfides & Polysulfides
Organic # 8	Phenols & Cresols
Organic # 6	Peroxides & Azides
Organic # 1	Acids, Anhydrides, Peracids
Inorganic # 10	Sulfur, Phosphorous, Arsenic, Phosphorous Pentoxide
Inorganic # 2	Halides, Sulfates, Sulfites, Thosulfates, Phosphates
Inorganic # 3	Amides, Nitrates, Nitrites (NO Ammonium Hydroxide!!!)
Inorganic # 1	Metals, Hydrides (NO Water!!!)
Inorganic # 4	Hydroxides, Oxides, Silicates
Inorganic # 7	Arsenates, Cyanides (NEVER BELOW ACIDS!!!)
Inorganic # 5	Sulfides, Selenides, Carbides, Phosphides, Nitrides
Inorganic # 8	Borates, Chromates, Manganates, Permanganates
Inorganic # 6	Chlorates, Perchlorates, Chlorites, Perchloric Acid, Peroxides
Inorganic # 9	Acids (NOT Nitric!!!)

Appendix C

Emergency Action Plan

This EAP is to be activated in case of fire or medical emergency or large/major chemical spill or release.

EMERGENCY REPORTING AND EVACUATION PROCEDURES

Types of emergencies to be reported by site personnel are:

- MEDICAL
- FIRE
- CHEMICAL SPILL
    - o Evaluate the spill before proceeding.
      If the chemical spill is giving off any type of gas immediately evacuate the area and the building.

In the Case of Fire or Medical Emergency immediately dial **911** for emergency assistance.

EMERGENCY PERSONNEL NAMES AND PHONE NUMBERS

DESIGNATED RESPONSIBLE OFFICIAL:

LT. Janet Bird, Campus Safety Officer
910-630-7149
Emergency: 910-630-7577

Appendix D

Emergency Evacuation Routes

Evacuation route maps have been posted in each work area. The following information is marked on evacuation maps:

1. Emergency exits are mapped in hallways and individual laboratories.
2. Fire Extinguishers are located in hallways and labs.
3. Fire alarm pull stations are located at each exit point.

Assembly points

Site personnel should know at least two evacuation routes.
EMERGENCY PHONE NUMBERS: 911
SECURITY (If applicable): 910-630-7577

BUILDING MANAGER (If applicable):

UTILITY COMPANY EMERGENCY CONTACTS

ELECTRIC: PWC
1-877-OUR- PWC1

WATER: PWC
1-877-OUR-PWC1

Appendix E

Fire Emergency

When Fire is Discovered:

- Activate the nearest fire alarm pull station
- Notify the local Fire Department by calling .
- If the fire alarm is not available, notify the site personnel about the fire emergency by the following means.
    - Vocal Communication
    - Phone Paging
    - Radio

- The Fire Department has been notified.
- The fire is small and is not spreading to other areas.
- Escaping the area is possible by backing up to the nearest exit.
- The fire extinguisher is in working condition and personnel are trained to use it.

Upon being notified about the fire emergency, occupants must:

- Leave the building using the designated escape routes.
- Assemble in the designated area.
- Remain outside until the competent authority (Designated Official or designee) announces that it is safe to reenter.

Designated Official, Emergency Coordinator or supervisors must

- Disconnect utilities and equipment unless doing so jeopardizes his/her safety.
- Coordinate an orderly evacuation of personnel.
- Perform an accurate head count of personnel reported to the designated area.
- Determine a rescue method to locate missing personnel.
- Provide the Fire Department personnel with the necessary information about the facility.
- Perform assessment and coordinate weather forecast office emergency closing procedures
- Assist all physically challenged employees in emergency evacuation

Appendix F

Chemical Spill

The following are the locations of

- Spill Containment and Security Equipment
  - Located in each laboratory on campus. Large spill containment equipment is located in the Tin Can Storage Facility by Maintenance.
- Personal Protective Equipment
  - All students are required to provide their own chemical goggles to prevent the spread of eye born illnesses. All Faculty and Staff are provided proper PPE or may charge their PPE in the campus bookstore to their department accounts.
- SDS:
  - All SDS's are on file electronically as well as physical copies are available in each building where a laboratory or chemical use is prevalent.

When a Large Chemical Spill has occurred:

- Immediately notify the designated official and Emergency Coordinator.
- Contain the spill with available equipment (e.g., pads, booms, absorbent powder, etc.).
- Secure the area and alert other site personnel.
- Do not attempt to clean the spill unless trained to do so.
- Attend to injured personnel and call the medical emergency number, if required.
- Call a local spill cleanup company or the Fire Department (if arrangement has been made) to perform a large chemical (e.g., mercury) spill cleanup.

The Universities Contracted Spill Cleanup Company is:

Clean Harbors
Phone Number:1-800-OIL-TANK

When a Small Chemical Spill has occurred:

- Notify the Emergency Coordinator and/or supervisor (select one).
- If toxic fumes are present, secure the area (with caution tapes or cones) to prevent other personnel from entering.
- Deal with the spill in accordance with the instructions described in the SDS.
- Small spills must be handled in a safe manner, while wearing the proper PPE.
- Review the general spill cleanup procedures.

Appendix G

Forms Available Online

Accident Report Form

The Standard Campus Police and Public Safety Accident Report form will be used when filing a accident report on campus. The Office of Police and Public Safety will take the lead on any accident investigations with the assistance of the Environmental Health and Safety Office.

Chemical Hygiene Permit

This permit is required to be completed for any lab where potentially infectious or potentially hazardous materials are present and used in a laboratory setting. These must be renewed for each physical lab annually.

University Annual Inspection Checksheets for Laboratories

These checksheets are used as a guide for the Office of Environmental Health and Safety to complete annual audits of all laboratories on campus to help evaluate and ensure the effectiveness and regulatory compliance of the Chemical Hygiene Program on campus.