1. Purpose

This Standard Operating Procedure (SOP) establishes procedures for the safe handling, transportation and storage of Methylene Chloride (MC), which is also known as Dichloromethane (DCM), Methylene dichloride, Methylene bichloride, and Methane dichloride (CAS# 75-09-2).

2. Scope

This SOP addresses only the use of pure Methylene Chloride and its solutions of 0.10% or greater in the laboratory. It applies to all Kennesaw State University (KSU) employees, students and contractors. It assumes that all of the KSU minimum safety requirements, as detailed in the KSU Chemical Hygiene Plan have been implemented.

3. Personnel Qualifications and Responsibilities

- All faculty, staff and students engaged in the use or handling of Methylene Chloride, or working within a laboratory using Methylene Chloride, are responsible for understanding all hazards associated with its use, and for using appropriate personal protective equipment (PPE).
- The Principal Investigator/Laboratory Supervisor (PI/LS) is responsible for ensuring that his/her staff has been trained in the use, storage, and handling of Methylene Chloride, and all associated emergency procedures. Records of this training must be retained by the department, and a copy must be forwarded to the Environmental Health and Safety Department (EHS).
- Methylene Chloride use is restricted to the specific employees or students who have had prior training in proper use, handling and storage, and emergency procedures.

4. EHS Responsibilities

- Provide guidance in assessing hazards, establishing engineering and administrative controls, good work practices and selection of personal protective equipment (PPE).
- Perform and document exposure monitoring to determine employee exposure to hazardous materials and to evaluate the adequacy of controls.

5. Health and Safety Hazards of Methylene Chloride

- Methylene Chloride (CH_2Cl_2) is a volatile, colorless liquid with a “chloroform-like odor.” It is only slightly soluble in water but can dissolve organic compounds. As a result, it is primarily used as a solvent in laboratories.
- Methylene Chloride is an eye and skin irritant, but through repeated or prolonged exposure, can cause damage to the liver, blood, and central nervous system.

- Methylene Chloride is categorized as a probable human carcinogen (Group 2A) by the International Agency For Research on Cancer (IARC)
- Occupational exposure to Methylene Chloride is regulated by OSHA under 29 CFR 1910.1052. The OSHA's Permissible Exposure Limits (PELs) for MC is 25 ppm (8-hour time weighted average (TWA) while the short-term exposure limit (STEL) is 125 ppm for 15 minutes. No employee should be exposed to Methylene Chloride above the permissible limit for the specified period of time. In addition, OSHA has established an Action Level for MC of 12.5 ppm for an 8-hour TWA. For airborne concentrations at or above the action level, EHS will employ exposure monitoring and/or medical surveillance.
- Since this is a highly volatile chemical, the main exposure concern is via inhalation. Acute inhalation exposure can affect the central nervous system by impairing vision, hearing, and movement. These effects can be reversed once the exposure stops. Exposure at extremely high levels can ultimately be fatal.
- Prolonged exposure can cause dizziness, headaches, nausea, and memory loss.
- Exposure to Methylene Chloride can have delayed toxic effects. Once metabolized by the human body, it becomes carbon monoxide, which can interfere with the ability of blood to transport oxygen throughout the body, leading to asphyxiation.

6. Requirement for Working with Methylene Chloride

Methylene Chloride is considered a Particularly Hazardous Substance (PHS) due to its target organ toxicity and its suspected carcinogenicity. For more information, consult the Safety Data Sheet (SDS) as well as other sources of information such as the OSHA Methylene Chloride Standard and the Agency for Toxic Substances Disease Registry (ATSDR).

6.1. Hazard and Risk Assessments

- The PI/LS must be aware of and approve the work performed under their jurisdiction and shall ensure that an appropriate hazard assessment for the use of Methylene Chloride has been conducted. EHS may be consulted to provide assistance in performing hazard assessments.
- Each new operation using Methylene Chloride must be evaluated individually; assessment of the level of risk depends on how the substance will be used.
- The assessment should ensure appropriate protective measures have been put into place and that the proper level of work authorization has been obtained, before commencing the operation.

6.2. Hazard Prevention and Control

The hazards of Methylene Chloride can be mitigated by a variety of means including chemical substitution, engineering controls, administrative controls, personal protective equipment, and work practices. General

control measures are discussed in this section. PIs/LSs must develop control measures specific to the particular operation after conducting the appropriate hazards assessment and develop a separate Standard Operating Procedure (SOP) specific to the operation/project.

6.2.1. Chemical substitution

- Before Methylene Chloride is selected for use in a particular operation/process, the PI/LS should determine if a safer alternative chemical is available and can be used in lieu of Methylene Chloride.

6.2.2. Engineering Controls:

- Because of its high volatility and the possibility of aerosol formation, Methylene Chloride (and Methylene Chloride solutions) must be handled in a chemical fume hood with negative pressure ductwork.
- The fume hood should have been inspected in the last 12 months and must function within the acceptable flow rate range. Work should be performed with the sash lowered as much as possible.

6.2.3. Designated Area:

- Methylene Chloride must be used in an area that is designated for its complete use with signs indicating that purpose. The area should be wiped down with a soap and water solution after completion of Methylene Chloride use.

6.2.4. Personal Protective Equipment (PPE):

- Gloves, lab coat and safety glasses must be worn when working with Methylene Chloride. Wear Polyvinyl Alcohol gloves. Avoid the use of nitrile and latex gloves, as will not provide adequate protection for use of this chemical.
- Change gloves regularly (at least every two hours) and wash your hands when changing.
- If splashes may occur, wear goggles and a face shield instead of safety glasses. Safety glasses do not provide adequate protection from splashes.

6.2.5. Work Practice Controls

- Use a less dangerous product than Methylene Chloride if possible or purchase in dilute solutions.
- Always transfer the chemical from one container to another inside of the fume hood.
- When transferring the chemical from one container to another, only pour the amount that is needed.
- Keep all containers of Methylene Chloride closed as much as possible. This is a highly volatile chemical, and open containers will result in inadvertent release of harmful vapors.
- Once work is complete, wipe down the work area with a soap and water solution.

6.2.6. Handling and Storage

- Methylene Chloride is incompatible with strong oxidizers, caustic substances, chemically active metals such as aluminum and magnesium powders, potassium, sodium, and concentrated nitric acid. Store it away from these chemicals.

6.3. Emergency Procedures

- In the event of an emergency involving Methylene Chloride, contact the KSU Police Department by dialing extension 6666 (470-578-6666).
- Be prepared to communicate what the emergency is, how many people are involved and what the extent of their injuries or illnesses are. Remove the person to fresh air. Evacuate adjoining laboratories as necessary. Notify the lab safety coordinator and the PI of the lab.

6.3.1. Accidental Exposure to Methylene Chloride

- If Methylene Chloride vapor has been inhaled, move the victim to fresh air immediately.
- If it has spilled on the skin or clothing, wash the affected area with large amounts of soap and water, using a safety shower or eyewash, as appropriate, for a minimum of 15 minutes. During washing, remove contaminated clothing and footwear. Remove goggles last. Those assisting the victim should wear appropriate protective gloves. A disposable laboratory coat, scrubs, or jumpsuit should be available for the exposed individual to wear after using a safety shower.
- If exposure to the eyes has occurred, immediately flush affected eye(s) for at least 15 minutes without stopping. Hold upper and lower eyelids open and away from the eyes during irrigation. Do not allow victims to rub eyes or keep eyes closed. Remove contact lenses if possible. (Note: contact lenses should not be worn when working with this material). If necessary, continue flushing with personal eyewash or apply ice water compresses during transport to a medical facility or eye specialist. **Seek medical attention immediately.**
- If Methylene Chloride is ingested, do not induce vomiting, but flush mouth immediately. Never give anything by mouth to an unconscious person. **Seek medical attention immediately.**
- Methylene Chloride exposure requires immediate first aid and medical treatment. Prompt first aid is essential, even if the victim does not exhibit any signs or symptoms or feel any pain.

6.3.2. Spill Clean-up

- Spill clean-up must be performed by properly trained hazardous material specialists. Do not attempt to clean up a spill of pure Methylene Chloride or a solution of greater than 5% unless you have had special training.

Emergency Contact

6666

- Wipe up solutions with chemical absorbent pads. Once the spill has been completely absorbed, wipe the area down at least twice using a soap and water solution.
- Waste generated from a spill must be handled as hazardous waste.

6.4. Waste Management

- Methylene chloride is a toxic waste. If it is disposed of as a pure chemical, it carries a waste code of U080. As a spent solvent, it carries a waste code of F001 or F002. As a small quantity generator, KSU is allowed to generate up to 1000 kg of this type of waste per month. Any amount that will change the generator status to a large quantity generator will all of the regulations thereof.

6.5. Training Requirements

- All faculty/staff/students who work with Methylene Chloride are required to complete the OwlTrain online training course “Laboratory Safety” and the course “Globally Harmonized System of Classification and Labeling of Chemicals (GHS)”.
- They are also required to read and fully comply with this SOP for Methylene Chloride. Use EOSMS-Form 0001 Training Attendance Sign-in Form or the form in Appendix A below to record training for this SOP.

Appendix A: SOP Review Record Form

To be completed by the employee/student

Methylene Chloride is considered a Particularly Hazardous Substance (PHS) due to its target organ toxicity and suspected carcinogenicity. To manage risks associated with use of Methylene Chloride and to ensure the safety of KSU employees and students, the University has established a Standard Operating Procedure (SOP) for the safe handling of Methylene Chloride.

The procedure requires that all faculty/staff/students who work with Methylene Chloride complete the appropriate safety training and read and comply with the SOP for Methylene Chloride. This form, therefore, should be completed and signed by each KSU employee or student who works, or plans to work with Methylene Chloride, as documentation that he/she has read and understood the requirements of the SOP.

Name		☐ Faculty ☐ Staff ☐ Student	
Job Title		Department	
Supervisor's Name			

By signing this form, I certify that I have read, understood and will comply with the requirements of this SOP

Signature		Date	

Note: