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Section 1: Introduction

Nova Southeastern University is committed to establishing and maintaining safe and healthy working conditions and to promote safe practices by all staff, faculty and students. The University is also committed to working in ways that reflect its deep concern for its neighbors and for the quality of the surrounding environment.

The goals of implementing the Formaldehyde Exposure Control Plan (FECP) include:

1. Minimizing the risk of formaldehyde exposure;
2. Minimizing the risk of work-related injury and illness;
3. Minimizing the risk to the environment;
4. Compliance with applicable regulations and standards;
5. Achievement of goals with a minimum burden on research and clinical activities.

Formaldehyde is common to the chemical industry. International production was over 46 billion pounds in 2004, according to the International Agency for Research on Cancer (IARC). It is well known as a preservative in medical laboratories, as an embalming fluid, and as a sterilizer. Its primary use is in the production of resins and as a chemical intermediate. Urea-formaldehyde (UF) and phenol formaldehyde (PF) resins are used in foam insulations, as adhesives in the production of particle board and plywood, and in the treating of textiles.

An effective chemical hygiene plan necessitates that mechanisms be in place and functioning to ensure that safety policies and procedures are being adhered to, personnel are meeting their safety responsibilities, and an effective form of monitoring and documentation is in place for confirmation purposes.

1.1 Purpose & Applicability

The University utilizes formaldehyde in a number of laboratories and classrooms. It is most often used as a preservative for biologic specimens including anatomical subjects used for dissection and training in gross anatomy classrooms.

The development of a detailed written chemical hygiene plan specific to formaldehyde and the implementation of this plan within employee and student training programs should result in a safer working environment and contribute to a reduction in work place accidents and injuries.

It is the policy of the University in coordination with the Office of Environmental Health and Safety (EHS) to provide the University community with a safe and healthful environment. The primary goal of this Formaldehyde Exposure Control Plan (FECP) is to minimize employee and student exposure to formaldehyde. The purpose of the FEPC is to ensure that no employee or student is exposed to an airborne concentration of formaldehyde in excess of the Occupational Health and Safety Administration (OSHA) Formaldehyde Standard levels of 0.75 parts per million (ppm) as an 8-hour time-weighted average (TWA) or 2.00 ppm as a 15-minute short-term

exposure limit (STEL) as well as to limit airborne concentrations of formaldehyde to below the American Conference of Governmental Industrial Hygienist (ACGIH) ceiling limit of 0.3 ppm.

1.2 Definitions

ACGIH Ceiling Limit - an exposure to an airborne concentration of 0.3 parts per million (ppm) as a Threshold Limit Value (TLV) that should not be exceeded during a workday.

Acute - Severe, often dangerous conditions in which relatively rapid changes occur.

Carcinogen - Any substance that causes the development of cancerous growths in living tissue, either those that are known to induce cancer in man or animals or experimental carcinogens that have been found to cause cancer in animals under experimental conditions.

Designated area - An area which may be used for work with "select carcinogens, reproductive toxins, or substances which have a high degree of acute toxicity".

Formaldehyde - The chemical substance HCHO. Formaldehyde is a naturally-occurring organic compound with the formula CH₂O or HCHO. It is the simplest aldehyde and is also known by its systematic name methanol. The common name of this substance comes from its similarity and relation to formic acid. It is assigned Chemical Abstracts Service Registry No. 50-00-0.

Formaldehyde Exposure Assessment - A quantitative determination of employee exposure to formaldehyde. Includes full shift personal samples that are representative of the monitored employee's regular, daily exposure to formaldehyde and fifteen minute short term exposure limit samples during tasks that are believed to result in the highest exposures.

Health Hazard - A substance for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur if exposed. This term includes carcinogens, toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, and neurotoxins, agents which act on the hematopoietic systems and agents which damage the lungs, skin, eyes, or mucous membranes.

MSDS - Material Safety Data Sheets

OSHA - Occupation Safety & Health Administration. The current OSHA regulations covering occupational exposure to formaldehyde are located in 29 CFR 1910.1048.

OSHA Action Level (AL) - an exposure to an airborne concentration of 0.50 parts per million (ppm) formaldehyde as an eight-hour time-weighted average (TWA).

OSHA Permissible Exposure Limit (PEL) - an exposure to an airborne concentration of 0.75 ppm formaldehyde as an eight-hour time-weighted average (TWA).

CHEMICAL HYGIENE PLAN - FORMALDEHYDE

OSHA Short Term Exposure Limit (STEL) - This is the maximum concentration to which personal can be exposed to formaldehyde of 2.0 ppm for a short period of time (15 minutes) for only four times throughout the day with at least one hour between exposures.

PPE / Personal Protective Equipment - Any devices or clothing worn by personal to protect against hazards in the environment. Examples are respirators, gloves, and chemical splash goggles.

Regulated Area – Any area where the concentration of airborne formaldehyde exceeds either the OSHA PEL or the STEL.

Respirator - A device which is designed to protect the wearer from inhaling harmful contaminants.

TLV / Threshold Limit Value - Airborne concentrations of substances devised by the ACGIH that represents conditions under which it is believed that nearly all workers may be exposed day after day with no adverse effect. TLVs are advisory exposure guidelines, not legal standards that are based on evidence from industrial experience, animal studies, or human studies when they exist.

Time Weighted Average - The time weighted average airborne chemical concentration for a normal eight hour work day and a 40 hour work week to which nearly all personal may be repeatedly exposed, day after day, without adverse effect.

Toxic - Substances such as carcinogens, irritants, or poisonous gases, liquids, and solids which are irritating to or affect the health of humans.

Section 2: Hygiene and Chemical Safety

1. Good personal hygiene will help minimize exposure to hazardous chemicals.
2. When working with chemicals, follow these guidelines:
 - a. Wash hands frequently and before leaving the laboratory. Also, wash hands before eating, drinking, smoking, or applying makeup.
 - b. Remove contaminated clothing immediately. Do not use the clothing again until it has been properly decontaminated.
 - c. Follow any special precautions for the chemicals in use.
3. In addition follow these special precautions:
 - a. Do not eat, drink, smoke, or apply makeup around chemicals.
 - b. Do not wear contact lenses near chemicals, especially corrosives or volatile solvents.
 - c. Do not keep food or food containers anywhere near chemicals.
 - d. Do not use laboratory equipment to serve or store food or drinks.
 - e. Do not sniff or taste chemicals.

Section 3: Chemical Hygiene Responsibilities

3.1 The Office of Environmental Health and Safety

Nova Southeastern University and the Environmental Health and Safety office has certain obligations and must:

1. Maintain the University's Formaldehyde Exposure Control Program (FECP).
2. Identify job descriptions and tasks where the exposure to formaldehyde has the potential to exceed the OSHA action level of 0.50 ppm, the OSHA short-term exposure limit (STEL) of 2.00 ppm, or the ACGIH 0.3 ppm ceiling limit.
3. Perform exposure monitoring of personnel within job descriptions and tasks identified as having the potential to exceed the OSHA action level of 0.50 ppm or the OSHA short-term exposure limit (STEL) of 2.00 ppm.
4. Recommend engineering controls/work practices and or personal protective equipment to reduce employee exposure to formaldehyde below the OSHA permissible exposure level of 0.75 ppm over the course of an eight-hour day (TWA), 2.00 ppm over any 15-minute period (STEL), or 0.3 ppm at any time.
5. Define regulated areas where formaldehyde concentrations may exceed the OSHA TWA or STEL and ensuring that appropriate signs are posted.
6. Select appropriate personal protective equipment including dermal and respiratory protection as required based on exposure monitoring results.
7. Perform annual fit testing of workers wearing respirators as part of this program under the University's respiratory protection program.
8. Develop and implement educational programs designed to improve the health and safety of the University community and to foster compliance with governmental regulations and professional standards.
9. Provide annual training (initial and refresher) of workers that have any exposure to formaldehyde.
10. Employee notification of monitoring results. All employees shall be notified of the results of their exposure monitoring within 15 days of the receiving the results from the laboratory.
11. Keep records of staff, faculty and student exposures to formaldehyde:
 - a. Records should include measurements made to monitor exposures, if any, as well as any medical consultations and examinations, including written opinions.

CHEMICAL HYGIENE PLAN - FORMALDEHYDE

12. Conduct regular surveys to the campus departments using formaldehyde and assist in compliance with the FECP.
13. Require that the MSDS for formaldehyde and formaldehyde containing products be on hand prior to receipt of such products whenever possible.
 - a. Maintain an accurate inventory of all formaldehyde containing chemicals in Nova Southeastern University laboratories.
14. Implement and maintain a medical surveillance program that includes:
 - a. An initial medical evaluation of employees who are required to wear respiratory protection
 - b. Perform annual follow-up medical evaluations
 - c. Maintain these records as mandated in 29 CFR 1913.1020, Access to Employee Exposure and Medical Records.

3.2 Laboratory Supervisors

Laboratory Supervisors have certain obligations and must:

1. Notify EHS of unusual conditions or changes in work practices that would render EHRS initial determination monitoring as being unrepresentative of typical formaldehyde exposures.
2. Enforce the use of personal protective equipment, engineering controls and administrative work practices designed to minimize employee exposures to formaldehyde.
3. Ensure employees are provided with required personal protective equipment without cost to the employee.
4. Enroll employees exposed to formaldehyde above the 0.50 ppm OSHA action level or the 2.00 ppm OSHA short-term exposure limit into a medical surveillance program with HUP Occupational Medicine.
5. Ensure employee attendance at initial and annual EHS Laboratory Safety Training.

3.3 Employees

Employees have certain obligations and must:

1. Use personal protective equipment, engineering controls and adhere to administrative work practices as instructed.
2. If air purifying respirators are used, replacing respirator cartridges after every three hours of use or at the end of the shift, whichever is shorter, unless the cartridges contain a NIOSH-approved end-of-service indicator to show when formaldehyde breakthrough occurs.
3. Notify supervisors of unusual conditions or changes in work practices that would render EHS Initial monitoring as being unrepresentative for formaldehyde exposures.
4. Participate in annual EHS Laboratory Safety Training and medical surveillance including initial and follow-up medical evaluations if required.

Section 4: Procedures for Compliance

1. Initial Determination of Employee Formaldehyde Exposure – the EHS will perform formaldehyde exposure assessments on all tasks suspected of having the potential to expose employees to levels of formaldehyde above the OSHA AL of 0.50 ppm as a TWA or the 2.00 ppm STEL. The assessments shall include air monitoring and observation of work practices and engineering controls used for each task. Air monitoring shall include personal breathing zone (pbz) samples in addition to area samples. Only pbz samples can be used for comparison with the OSHA AL, PEL, STEL, and the ACGIH's TLVs.
2. Design of Engineering Controls and Work Practices – the EHS will observe and evaluate all job tasks involving the use of formaldehyde and make recommendations to minimize exposures to a level as low as reasonably attainable. Where engineering controls and work practices are not sufficient to reduce exposures below the PEL or STEL, the EHS shall recommend the use of the appropriate respiratory protection.
3. Safety Equipment – Quick drench showers must be provided when an employee's skin may be splashed with solutions containing 1 percent or greater formaldehyde. If eyes may be splashed with solutions containing 0.1 percent or greater formaldehyde, eyewash facilities must be available for emergency use.
4. Follow-Up Sampling - Any employee whose formaldehyde exposure exceeds the OSHA action level of 0.50 ppm shall be monitored semi-annually. Any employee whose formaldehyde exposure exceeds the OSHA STEL of 2.00 ppm shall be monitored annually.

5. Designation of Regulated Area - Regulated areas shall be established in any area where the concentration of formaldehyde exceeds either the TWA or the STEL. All entrances and access ways to the regulated area shall be posted with signs bearing the following information:

**DANGER
FORMALDEHYDE
MAY CAUSE CANCER
CAUSES SKIN, EYE, AND RESPIRATORY IRRITATION
AUTHORIZED PERSONNEL ONLY**

6. Labeling - Formaldehyde gas, and all mixtures or solutions composed of greater than 0.1 percent formaldehyde and materials capable of releasing formaldehyde into the air, under reasonably foreseeable conditions of use, at concentrations reaching or exceeding 0.1 ppm must be labeled with hazard warning labels. The original manufacturer labels are sufficient and should not be removed. Where the original manufacturer labels are not present, new labels must be applied to the containers indicating that the product contains formaldehyde and include the words "Sensitizer" and "May Cause Cancer" on the label. List the name and address of the responsible party, and state that physical and health hazard information and safety data sheets are available from EHRS. Chemicals that produce formaldehyde gas must be stored in an area within the laboratory that is conspicuously labeled as a "Designated Area". The laboratory room sign must have a "Designated Area" sticker affixed to the sign. Designated area room sign stickers are available from EHS.
7. Storage- Storage of formaldehyde-contaminated equipment and clothing shall have signs with the following information:

**DANGER
FORMALDEHYDE-CONTAMINATED [CLOTHING] EQUIPMENT MAY CAUSE CANCER
CAUSES SKIN, EYE AND RESPIRATORY IRRITATION
DO NOT BREATHE VAPOR
DO NOT GET ON SKIN**

8. Laundering - The university will inform any person who launders, cleans, or repairs such clothing or equipment of formaldehyde's potentially harmful effects and of procedures to safely handle the clothing and equipment.

Section 5: Medical Monitoring

1. Notification - Upon identification of employees whose 8-hour TWA equals or exceeds the 0.50 ppm OSHA action level or the 2.00 ppm STEL, the EHS will inform the employee, and the employees' supervisor, in writing, of the need to enroll the employee in a medical surveillance program for formaldehyde exposure. Information supplied will include the employee's name, supervisor's name, telephone number, and air sampling data indicating the employee's exposure. It will be the responsibility of the supervisor to enroll the employees in the medical surveillance program.
2. Implementation - the University shall implement the formaldehyde medical surveillance program in accordance with 29 CFR 1910.1048 Occupational Exposure to Formaldehyde - Final Rule.

Section 6: Selection of PPE

1. The EHS shall selected Personal Protective Equipment (PPE) that specifically protects against exposure to formaldehyde.
 - a. Respiratory Protection - Half face respirators with Formaldehyde/Organic Vapor cartridges provide a protection factor of 10. However, at concentrations above the PEL, severe eye irritation can occur. Therefore, full face respirators with Formaldehyde/Organic Vapor cartridges will be used in environments where the airborne formaldehyde concentration exceeds the PEL.
 - b. Dermal Protection (Gloves) - Gloves must be worn whenever tissues preserved in or fixed with formaldehyde are handled. While latex gloves provide some protection against formaldehyde, butyl or nitrile gloves are recommended and should be used when contact is anticipated.
 - c. Eye Protection - Formaldehyde splashed in the eye can cause irreversible damage to the cornea. Safety glasses with side shields, face shields or splash goggles must always be worn when working with formaldehyde.

Section 7: Special Safety Precautions

1. If formaldehyde contacts the skin, flush with water for at least 15 minutes and report to the EHS Department
2. All solutions of formaldehyde and tissues preserved in formalin must be stored in tightly sealed, properly labeled, containers to prevent leakage, spills and evaporation.

3. Do not pour formaldehyde or formalin waste into sinks or drains. Formalin waste solutions must be placed in tightly sealed, labeled containers and segregated for disposal via the EHS Chemical Waste Program.
4. All spills of formalin solutions must be cleaned up immediately.
 - a. Wear nitrile or butyl gloves and eye protection.
 - b. Cover spill with paper towel or other suitable absorbent material. Do not mop up a spill with reusable mops. If dry absorbents are used, scoop the absorbed formaldehyde solution with a dustpan into a plastic bag.
 - c. Double bag, seal, and label the material. Call the EHS Department at _____ for assistance.
 - d. Dispose of all formalin containing material via the EH&S Chemical Waste Program.
 - e. If the spilled formaldehyde causes severe eye, nose, or throat irritation, immediately evacuate the area. Close all doors to contain vapors.

Section 8: Training

1. All employees exposed to levels of formaldehyde greater than 0.1 parts per million (ppm) are required to have annual training according to OSHA's Formaldehyde Standard 29CFR 1910.1048
2. The EHS shall provide formaldehyde awareness training to all employees and students who are exposed to greater than 0.1 ppm formaldehyde. This training shall consist of the following:
 - a. A discussion of the contents of this regulation and the contents of the Material Safety Data Sheet.
 - b. The purpose for and a description of the medical surveillance program required by the OSHA Formaldehyde standard, including:
 1. A description of the potential health hazards associated with exposure to formaldehyde and a description of the signs and symptoms of exposure to formaldehyde.
 2. Instructions to immediately report to the employer the development of any adverse signs or symptoms that the employee suspect is attributable to formaldehyde exposure.
 3. Description of operations in the work area where formaldehyde is present and an explanation of the safe work practices appropriate for limiting exposure to formaldehyde in each job.
 4. The purpose for, proper use of, and limitations of personal protective clothing and equipment.
 5. Instructions for the handling of spills, emergencies, and clean-up procedures

6. An explanation of the importance of engineering and work practice controls for employee protection and any necessary instruction in the use of these controls.
 7. A review of emergency procedures including the specific duties or assignments of each employee in the event of an emergency.
3. The EHS shall provide formaldehyde awareness training to all employees and students whose 8-hour TWA equals or exceeds the 0.50 ppm OSHA action level or the 2.00 ppm STEL and are required to wear respiratory protection. This training shall consist of the preceding in item # 2 in addition to the following:
- a. Elements of the University's respiratory protection program relevant The OSHA and ACGIH exposure limits.
 - b. A detailed description of personal protective equipment used to reduce exposure to formaldehyde and how it is used.

Section 9: Material Safety Data Sheets - MSDS

The Occupational Safety and Health Administration (OSHA) require that all chemical manufacturers, wholesalers and distributors provide Material Safety data Sheets (MSDS) for the products which they produce and sell. OSHA also requires that employers maintain in the workplace, copies of the MSDS for each hazardous chemical. These are required to be accessible at all times work is being conducted.