

Occupational Safety Plan



THE UNIVERSITY *of* NORTH TEXAS
HEALTH SCIENCE CENTER *at* FORT WORTH

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1. Introduction

It is the policy of the University of North Texas Health Science Center (HSC) to provide a safe and healthy working and learning environment for all faculty, students, staffs, visitors and contract employees.

This manual has been prepared by the Office of Environmental Health & Safety (EHS) in an effort to prevent injuries, illnesses and death from work related causes and to minimize losses of resources and interruptions from accidental occurrences. It is directed toward the control of all types of hazards encountered in the performance of official duties.

1.1 Purpose

The purpose of this manual is to provide employees with general guidelines for implementing a high quality safety program. It is not an exhaustive source document but rather an approach to safety.

The manual brings together information that will assist employees and supervisors to carry out their responsibility in ensuring a safe environment at HSC.

All personnel should become familiar with the information contained in this manual and should conduct their operations accordingly.

1.2 Scope

The information and requirements given in this manual are applicable to all areas of HSC and represent only general minimum standards. They do not substitute for special operation manuals used in certain buildings or laboratories to meet specific situations. This manual will serve as a basis to which supervisors shall add safety measures relevant to their laboratory or work areas.

It must be emphasized that this is primarily an in-house manual. The procedures and requirements are established based on the facilities and resources available. They represent, nonetheless, a code of standard safe work practices.

This manual contains the objectives, policies, standards, and procedures that pertain to all employees. Specific responsibilities, administrative procedures, and operational requirements are described that are relevant to institutional work, and the prevention of occupational injuries and illnesses.

1.3 Development, Maintenance and Revision Process

All materials in this manual have been developed and maintained under the supervision of the Office of Environmental Health & Safety (EHS).

As regulations and guidelines promulgated by the Occupational Safety and Health Administration (OSHA), the Environmental Protection Agency (EPA), the National Fire Protection Association (NFPA), and the National Institute of Occupational Safety and Health (NIOSH), the online version of this manual will be updated.

2. Applicability

This institutional occupational safety manual is adopted under policy 4.201, Campus Operations policy, and must be utilized to protect the campus and personnel. These documents must be readily accessible to all campus personnel.

3. Approval and Implementation

This Occupational Safety Manual is hereby approved for the University of North Texas Health Science Center. This plan shall apply to all HSC personnel participating in all scientific and medical research activities at HSC facilities or sanctioned activities. The details of this plan are the institutional policies directing occupational safety. This plan is effective immediately and supersedes all previous editions.

DocuSigned by:
Chris Erickson
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Chris Erickson, MBA, ASP, CHMM
Director Environmental Health & Safety
UNT Health Science Center

4. Record of Changes

Change #	Date of Change	Change entered by	Description
1			
2			

5. Contact Information

5.1 EH&S Program Contacts

Subject	Office Name	Telephone	Email
Fire and Occupational Safety	Program Manager	817-735-2698	William.pingry@unthsc.edu

Hazardous Materials/ Chemical Safety Program	Assistant Director	817-735-2691	Alan.corbitt@unthsc.edu
Biosafety/Rad Safety	Director	817-735-5431	Maya.nair@unthsc.edu
Safety	Director	817-735-2245	Christopher.erickson@unthsc.edu
Occupational Health	Occupational Health	817-735-2273	

5.2 Emergency Phone Numbers

Police/Fire Emergency	Police Dispatch	In-house phone: ext 2600 or 911 Cell phone: 817-735-2600
Emergency Power Outage	Facilities	Ext: 2181 / 817-735-2181
Hazardous Material Release/Spill	Police Dispatch	In-house phone: 2600 Cell phone: 817-735-2600
Hazardous Material Exposure: Skin, Eyes, Ingested, Inhaled, Injected	Occupational Health	EXT. 2273 / 817-735-2273

5.3 Other Important Institutional Phone Numbers

Campus Police/Security Non-Emergency	Ext: 2210 / 817-735-2210
Facilities Non-Emergency	Ext: 2181 / 817-735-2181
Environmental Health and Safety	Ext: 2245 / 817-735-2245
Radiation Safety	Ext: 5431 / 817-735-5431

5.4 HSC Relevant Website Links

Report an Ethics Compliant	https://secure.ethicspoint.com/domain/media/en/gui/54789/index.html
First Report of Injury	https://www.unthsc.edu/administrative/wp-content/uploads/sites/23/WC_Employee_FoEHS.pdf
Student complaints	https://unthsc.qualtrics.com/jfe/form/SV1Mn0IIToxxTH3QF?Q_JFE=qdg

6. Program Management

6.1 Program Elements

The following program elements are applicable to all university operations and activities. These elements are directed toward the prevention of accidents and health hazards present in the performance of official duties.

6.1.1 Prevention

The EHS will emphasize strategies that preclude or prevent any occurrence that would have an adverse effect on HSC faculty, students, employees, contractors, patients and visitors, and people in the neighboring community.

6.1.2 Surveillance

The EHS will provide for the systematic inspection of facilities; the collection, analysis, interpretation, and evaluation of safety and health data essential to the planning and implementation of the Occupational Safety program.

6.1.3 Protection and Control

A system for the control of hazards will be maintained and will include, engineering controls, the use of alternatives that are less hazardous, administrative procedures, and the use of personal protective equipment.

6.1.4 Education, Promotion, and Training

Health and safety awareness will be promoted among managers, supervisors, employees and contractors through orientation programs and regularly scheduled safety education and training sessions, as appropriate.

6.1.5 Notification and Communication

Employees and others (visitors, contractors) will be notified of their exposure, or potential exposure, to hazardous substances or conditions by EHS and will be informed of risks that result, or may result, from exposure to hazardous substances or conditions.

6.1.6 Confidentiality

The EHS, in conjunction with HSC, will make every effort to ensure the confidentiality of employee health and exposure records.

6.1.7 Program Evaluation

An annual evaluation of the overall program will be conducted by EHS to determine if the program and its policies and procedures are relevant and appropriate, and if they continue to meet or exceed health and safety standards.

6.2 Campus Wide Occupational Safety Assessments

This manual outlines the building assessment program conducted by Occupational Safety for all on and off campus buildings to ensure they maintained in accordance with applicable standards. All deficiencies identified during the building assessments are categorized as Priority High, Medium, or Low; and then reported to the responsible group. Once completed, the work is reviewed by Safety to ensure that it is consistent with the applicable standards.

6.3 Assignment of Program Responsibility

6.3.1 Director for Environmental Health and Safety

The Director for Environmental Health and Safety (EHS) is responsible for:

- Identifying the applicable standards, guidelines, and recommendations necessary for a safe and healthy workplace.
- Establishing and reviewing the procedure manual.
- Requesting program reviews and audits for methods of continuous improvement.
- Ensuring prompt and thorough accident/incident investigations and delivering accurate results to the appropriate departments.
- Development of metrics to track event trends and initiate problem solving.
- Ensuring HSC personnel take all necessary and appropriate safety precautions.

6.3.2 Occupational Safety Program Manager

The Occupational Safety Program Manager is responsible for:

- Identifying the applicable safety and health standards, rules, and regulations pertaining to the various areas of the HSC campus.
- Providing an appropriate level of management when conditions require corrective actions.
- Providing training and education opportunities.
- Investigating and generating incident reports.
- Conducting regular surveys of HSC campus operations to ensure compliance with safety standards.
- Initiating corrective actions necessary to remediate identified hazards or immediately dangerous to life and health (IDLH) conditions.
- Ensuring HSC personnel take all necessary and appropriate safety precautions in order to protect themselves, others, property, and the environment.
- Ensuring safe operations through facility and site inspections.
- Maintaining comprehensive records of hazards at the operational level and providing the information to program management.
- Providing training and education opportunities.
- Investigating and generating incident reports.
- Conducting regular surveys of HSC campus operations to ensure compliance with safety standards.
- Initiating corrective actions necessary to remediate identified hazards or immediately dangerous to life and

health (IDLH) conditions.

- Ensuring HSC personnel take all necessary and appropriate safety precautions in order to protect themselves, others, property, and the environment.

6.3.3 Supervisors and Managers

Supervisors at all levels throughout the university are responsible for maintaining a safe and healthy workplace. Each member of the management team is required to comply with all applicable safety and health standards, rules and regulations pertaining to the activities immediately under their authority. Supervisors shall ensure that all personnel who report to them are instructed and/or trained in safety and health precautions for their work and work areas. In carrying out this responsibility, EHS shall be called upon for assistance as required.

6.3.4 Employees

Employees at all levels throughout the university are responsible for complying with all health and safety standards, rules, regulations and suggestions provided by EHS pertaining to activities in their work area. Employees have the responsibility to ensure that all applicable workplace training are completed in a timely manner. Each individual must take all necessary and appropriate safety precautions to protect themselves, other personnel and the environment

7. General Health and Safety

7.1 General

It is the goal of HSC to comply with all applicable regulations and guidelines from OSHA, EPA, NFPA, NIOSH to provide faculty, students, employees and visitors with a safe and healthful working and learning environment. This section will provide basic information on the recognition, evaluation, and control of occupational health hazards to which employees may be exposed.

7.2 Prevention and Control of Workplace Hazards

To help meet the university goals, the Occupational Safety Program was created to maintain safe and healthy working conditions for all HSC faculty, staff, students, and visitors. All recognized safety and health hazards shall be eliminated or controlled as quickly as possible, based upon the degree of risk posed by the hazards.

7.2.1 Principles of Hazard Control

- Engineering Controls
 - Substitution - The risk of injury or illness may be reduced by replacement of an existing process, material, or equipment with a similar item having more limited hazard potential. Care must be exercised in any substitution to ensure that the substitute materials are technically acceptable and to avoid introducing new or unforeseen hazards.
 - Isolation - Hazards are controlled by isolation whenever an appropriate barrier is placed between the

- hazard and an individual who may be affected by the hazard. This isolation can be in the form of physical barriers, time separation, or distance. Examples include machine guards, electrical insulation, glove boxes, acoustical containment, and remote controlled equipment.
- Ventilation - The control of a potentially hazardous airborne substance by ventilation can be accomplished by one or two methods: using local exhaust by capturing and removing the substance at its source, or if that is not feasible, diluting the concentration of the substance by mixing with uncontaminated.
 - Administrative Control
 - This method of hazard mitigation depends on effective operating practices that reduce the exposure of individuals to chemical or physical hazards. These practices may be in the form of preventive maintenance programs to reduce the potential for leakage of hazardous substances, or adjusted work schedules, which involve control of work in high hazard and low hazard areas or limited access to high hazard areas.
 - Personal Protective Equipment. (PPE)
 - This method of hazard control is least preferred because personal protective devices may reduce a worker's productivity, while affording less effective protection against the recognized hazard than other methods of control. Nevertheless, there are instances where adequate levels of risk reduction cannot be achieved through other methods, and personal protective devices must be used, either alone or in conjunction with other protective measures.
 - It is the responsibility of each Department to provide appropriate PPE for its employees once deemed necessary. PPE shall be provided, used, and maintained when it has been determined that its use is required and that such use will lessen the likelihood of occupational injuries and/or illnesses.

7.2.2 Application of Hazard Control Principles

Hazardous conditions in the workplace may be prevented through appropriate actions when facilities are designed, when operating procedures are developed, and when equipment is purchased.

Design Reviews - Occupational health and safety issues shall be considered, designed, and engineered into all facilities, which are acquired or constructed. To ensure that appropriate hazard control techniques are applied, EHS shall participate in the review of plans and specifications for construction and renovation projects.

- Operating Procedures - Standard operating procedures, safety policies, or similar directives are to be developed as a collaborative effort between EHS and the effected department(s) to ensure a comprehensive and functional policy or procedure is developed. All university employees and/ or (sub) contractors shall adhere to the appropriate safety policies for the work being performed.
- Purchasing Procedures - Many hazards can be avoided by incorporating appropriate specifications for purchased equipment/material and contracted efforts that involve work at HSC facilities. HSC organizations responsible for developing specifications for such purchases should coordinate with EHS personnel to ensure that health and safety requirements are considered.

- Permanent Hazard Abatement - Engineering control methods are the preferred method of hazard control, followed by administrative control and personal protective equipment.

7.3 Hazard Reporting

Identification and reporting of potentially unsafe or unhealthful working conditions is the responsibility of all HSC employees. All employees are encouraged to report unsafe or unhealthful working conditions to EHS or to their immediate supervisor who will promptly investigate the situation and take appropriate corrective actions.

Any physical hazard or unsafe act by an employee or contractor should be reported immediately by contacting EHS at [817-735-2245](tel:817-735-2245) or safety@unthsc.edu. A safety representative will respond to the location to investigate the concern and work directly with a responsible individual to mitigate the hazard.

7.4 Hazard Communication

EHS and laboratory personnel perform a wide range of operations and provide services that commonly require the use of chemicals that have inherent chemical and physical hazards. The Texas Hazard Communication Standard requires employers to provide information to their employees concerning the hazardous chemicals in the workplace through a written program, training sessions, safety data sheets (SDS), labels and warnings, and other pertinent information. For more information, see the HSC's Chemical Safety Manual.

7.5 Hearing Conservation

Noise is one of the most pervasive occupational health problems. Exposure to high levels of noise causes temporary or permanent hearing loss and may cause other harmful health effects as well. The extent of damage depends primarily on the intensity of the noise and the duration of the exposure. Noise induced hearing loss is an irreversible condition that progresses with increased exposure and is aggravated by the normal aging process. Susceptibility to hearing impairment due to noise varies greatly among individuals.

To help meet the OSHA standard 1910.95 (Occupational Noise Exposure) EHS will conduct noise level monitoring and assist in the selection of appropriate hearing protective devices or engineering control.

7.6 Mold Management Program

Any visible mold contamination, regardless of the species of mold, must be removed in a timely manner to prevent further growth. Mold growth can be potentially damaging to cellulose-based products such as drywall, ceiling tiles, and paper. Complete removal of visible mold and mold contaminated porous building materials, removal of water source, and maintenance of proper indoor air quality (IAQ) parameters is essential to help ensure that mold growth does not reoccur.

Mold assessment and remediation activities are regulated within the state by the Texas Mold Assessment and Remediation Rules (25 TAC §295.301 – 295.338). There are currently no federal regulations governing mold. Please contact EHS if any mold is found within the HSC buildings. EHS will survey the area to determine the extent of contamination and recommend the course of action.

7.7 Asbestos Management Program

Federal, state, and local regulations govern activities involving asbestos-containing materials (ACM). These regulations set out permissible exposure limits, exposure monitoring specifications, respirator requirements, hygiene facilities and practices, communication standards, medical surveillance, employee training, recordkeeping and waste disposal requirements.

It is only when ACM is damaged that asbestos fibers can become airborne. Materials that commonly contain asbestos include fireproofing, floor tiles, pipe insulation, sprayed-on acoustical ceilings, as well as numerous other insulating materials.

Prior to any renovation or dismantling within the HSC buildings, a licensed inspector must survey the area for asbestos and EHS shall be contacted to ensure all regulations are followed. If asbestos is found Facilities Services or EHS will oversee the operations for all asbestos related projects.

7.8 Housekeeping

All places of employment including outside areas should be kept as clean as the nature of the work allows but must be kept free and clear of pallets debris, trash, scrap, spills or other extraneous materials which could create a health or fire hazard and cause an accident. Mechanical and electrical rooms will not be utilized for storage.

8. Employee Health Services

8.1 Health Services

8.1.1 Emergency Treatment of Illness/Injury on the Job

For a life-threatening emergency, call 9-1-1 or seek medical treatment at the nearest Emergency Room. Transportation by emergency services will only be to a hospital emergency room. If a worker does not wish to be transported by emergency services after they have arrived and made an assessment of the illness/injury, the individual will be required to sign a release form stating that treatment/transport is not desired.

It is the individual's responsibility to arrange for appropriate transportation if medical treatment is desired or needed, if they wave transport by emergency services. It must be kept in mind that injuries to limbs or an altered level of consciousness/awareness which would impair the proper operation and control of a motor vehicle will prohibit the individual from driving themselves to obtain emergency care. Transportation should then be provided by a state vehicle, if possible and driver from the individual's work center.

Care of minor injuries (first aid) may be obtained at the point of incident.

8.1.2 Reporting of Injuries and Incidents

All on the job injuries must be reported as soon as possible to a [UNTHSC Workers' Compensation](#).

8.1.3 Medical Treatment

Medical examinations for personnel who have been exposed to health hazardous conditions are an essential part of the occupational health program. These examinations shall be specific for the type of exposure or operation involved. Persons who know they have been exposed or suspect exposure must notify their supervisor and (EHS) immediately. It is imperative that persons who have been exposed to a harmful contaminant which presents the possibility of contaminating other persons and/or the work area remain in an isolated area, if at all possible.

If you are injured on the job and need medical treatment, you must be seen by a workers' comp in-network provider. If treatment is received by an out-of-network primary care physician, this will be at the expense of the injured employee and will not be covered by workers' compensation.

For a life-threatening emergency, call 9-1-1 or seek medical treatment at the nearest Emergency Room.

For non-emergency injuries, your direct supervisor for assistance in obtaining authorization for medical care.

If you are unable to speak your direct supervisor, during regular business hours, treatment should be obtained at the closest Care Now facility.

An injured employee is not required to seek medical treatment if they do not wish to do so. The supervisor must complete the Workers' Comp Employee Injury Report Form and if the employee determines they need medical treatment at a later date, contact HR for authorization of treatment.

8.2 Women of Childbearing Age

Employees should notify their supervisors as early as possible should they become pregnant in order to facilitate a work assignment suitability survey regarding health and safety factors. Pregnancies shall be referred to Human Resources so specific job limitations can be recommended if necessary after consultation with the individual's physician.

Female animal workers, especially those known to be pregnant, avoid exposure to certain potential hazards such as pregnant sheep or cat feces (possibility of toxoplasmosis infection). Working with hazardous drugs, agents or toxic chemicals during pregnancy is also strongly discouraged.

Personal protective equipment (PPE) should be worn at all times and additional precautions observed for pregnant women, as outlined by the principal investigator, supervisor or physician prior to the start of work with hazardous materials. Communicate your work conditions to your medical provider.

8.3 Handicapped Employees

Architectural barriers should be eliminated and a "buddy" system developed to assure that employees can be mobile in an emergency. The Uniform Federal Accessibility Standards developed under the Architectural Barriers Act, 42 U.S.C. 4151-4157 and 36 CFR Part 119, Americans with Disabilities Act (ADA), contain all applicable standards

8.4 Immunocompromised Individuals

Individuals with compromised immune systems should discuss their workplace hazards with their personal care physician. These individuals are also encouraged to self-report so that appropriate workplace precautionary measures can be assessed.

8.5 Medical Surveillance and Exposure Control Programs

Certain jobs at HSC have inherent risks requiring more extensive review and medical evaluation or surveillance by the Occupational Health Program. Depending on risk assessments, an individual may be required to enter a specific monitoring or medical surveillance program. The purpose of medical surveillance is to monitor for early detection and prevention of occupational disease and to identify conditions that may increase the risk of occupational disease, and the current programs are described below.

Enrollment in a medical surveillance program, if needed, requires that an individual fills out a medical questionnaire. The information in the questionnaire is confidential and will not be reviewed by anyone at HSC. These forms are sent to the occupational health care physician or licensed health care professional (PLHCP) for review and determination if additional medical evaluation or preventive medical services (e.g. vaccination or serological testing) is needed, such as:

- Review of workplace history and hazard evaluation
- General physical examination
- Blood and urine tests
- Vision and hearing tests
- Pulmonary function test
- Immunization (if needed)
- Allergy testing
- Referral for any special tests if needed, such as chest x-rays or laser eye exams

After evaluation, a written opinion from the PLHCP will be provided to HSC and the employee indicating medical clearance with conditions of approval, PPE and work practice recommendations, as applicable. The nature of medical conditions requiring limitations, restrictions, or modifications of work will not be disclosed to HSC. Recommendations may be made to HSC EHS may be made related to workplace risk or exposure assessments.

Covered Individuals must update medical questionnaires as determined in the medical clearance, or when employee reports changes in health status. Periodic medical reviews only apply to personnel exposed to hazards covered under applicable regulations or guidelines. Surveillance Program enrollment is based on individual workplace risks.

Current Surveillance Programs at this time include:

- Animal Worker Medical Surveillance and Allergy Prevention Program:

- a. Applies to all Covered Individuals in contact with animals or animal tissues to determine their likelihood of occupational-induced or laboratory-acquired animal allergy or illnesses.
- b. The purpose of HSC's Animal Exposure Surveillance Program is to reduce human health risks associated with the care and use of animals in research, teaching, and service.
- c. Any person experiencing allergy symptoms related to work should seek medical evaluation with a HSC Worker's Compensation authorized treating physician.
- d. Mechanisms in place at HSC to prevent the development of occupational illnesses and allergies related to animal use include:
 - i. Annual occupational health risk assessments
 - ii. Training, including information distributed after enrollment in the Occupational Health Program,
 - iii. Personal Hygiene
 - iv. Facilities, procedures, and monitoring
 1. Building ventilation/HVAC system
 2. Caging systems with HEPA filtration, air pressure differentials and directional air flow for enhanced containment.
 3. Work place practices to reduce allergen levels should include transportation of waste and bedding in sealed containers, and use of wet or damp floor cleaning implements instead of dry sweeping.
 - v. Personal Protective Equipment
 1. Protective clothing, gloves, and respiratory protection available for all animal work,
 - vi. Annual Animal Allergy/Exposure Medical Surveillance and preventative medicine as described above

Vaccinations may be recommended or required if the individual works with an infectious agent that has an FDA approved vaccine.

- A) Tetanus Immunizations are recommended every ten years for certain employees and may be required for certain work areas such as the vivarium or animal laboratories. Immunization history will be determined at the time of risk assessment.
- B) Rabies immunization: Pre-exposure immunizations with follow-up antibody titers every two years; and repeat immunizations are provided based on risk assessment for personnel who work directly with the rabies virus, have direct contact with animals quarantined for rabies surveillance, are exposed to animals or animal parts with potential of containing the rabies virus, are responsible for the control of wild animals on campus, have regular contact with potentially rabid animal species, and certain laboratory workers.
- C) Hepatitis B vaccinations are available to employees who could reasonably anticipate exposure to bloodborne pathogens during performance of regular job duties.
- D) Other vaccinations will be available, based on risk assessment and consultation with the HSC occupational health care provider (such as hepatitis).

9. Incident Reporting and Investigation Procedure

9.1 Introduction

An incident report system shall record any incident involving HSC personnel, arising in the course of employment, which has the potential for property damage, personal injury, illness, or death.

9.2 Purpose

- All incidents shall be reported in order to facilitate investigations, establish a written record of factors, and to provide statistical information for incident tracking.
- Track and analyze incidents, as well as serious events or near misses, which represent a hazard or potential hazard to employees, visitors, and other personnel on campus.
- Meet regulatory reporting requirements.

9.3 Applicability and Scope

The incident reporting requirements apply to all incidences involving HSC personnel arising out of or in the course of employment which results in (or might have resulted in) personal injury, illness, and/or property and vehicle damage.

9.3.1 Incident

Incident refers to any unplanned event or event sequence, whether it results in loss, injury, illness, disease, death, or none of these. Incident losses can take many forms. Besides injury, illness, disease, and death, there are damage to property, equipment, materials, and the environment.

Injuries and illnesses that require reporting are those that occur on the job which result in lost time, work restrictions, first aid or other medical attention, permanent physical bodily damages, or death.

Examples include, but are not limited to:

- Heat exhaustion from working in hot environments
- Strained back muscles from moving equipment
- Acid burns on fingers
- Damage to a State vehicle
- Fire/explosion
- Property damage
- Chemical releases requiring evacuation of at least that immediate spill area

9.3.2 Near Misses

Near misses are still classified as incidents even though they may not result in an actual or observable loss, injury, illness, disease, or death are still required to be reported. The information obtained from such reporting can be extremely useful in identifying and mitigating problems before they result in actual personal or property damage.

Examples of near miss incidences required to be reported include the falling of a compressed gas cylinder, overexposures to chemical, biological, or physical agents (not resulting in an immediately observable manifestation of illness or injury), and slipping and falling on a wet surface without injury.

9.4 Responsibilities

9.4.1 EHS

Review and investigate each incident to determine the root cause, which resulted in the injury or event. Provide a brief summary narrative of the event to management along with any recommended corrections and/or preventative actions to prevent a reoccurrence of the incident.

9.4.2 Workers' Compensation and Insurance

Human Resources has the overall responsibility for maintaining employee records upon receiving any workers' compensation or insurance claims. Workers' compensation and insurance provides benefits to eligible employees who sustain an injury while within the course and scope of their job duties

9.4.3 Managers and Supervisors

Managers and Supervisors are primarily responsible for ensuring that the incident report form is completed and that all copies are sent to the appropriate locations.

9.4.4 HSC Personnel

All HSC personnel have the responsibility to initiate the incident reporting sequence by informing their supervisors immediately of an actual or potential injury or illness as soon as possible after an incident has occurred.

9.5 Incident Reporting Procedures and Practices

This section describes the specific procedures that shall be followed by HSC personnel in order to effectively report incidents, occupational injuries and illnesses, and other events.

9.5.1 Incident Scene

The active scene of all incidents shall be secured, and a full investigation of the incident has been completed. Work in the area will be terminated indefinitely until the completion of the investigation and permission to continue is provided by EHS following consultation to executive management.

9.5.2 Record Keeping

HR will maintain the records of all First Report of Injury forms. The injury and illnesses data from reports are used in identifying and mitigating problems. The data is also presented in various safety meetings.

9.6 Incident Investigations

EHS Occupational Safety personnel will review each significant incident forwarded to them through HR Workers' Compensation & Insurance based upon several factors:

- Type or severity of incident

- Number of injuries
- Level of continued risk the hazard poses to people and property

Based upon the initial incident assessment, EHS Occupational Safety will:

- Determine if an investigation is required
- Make recommendations for corrective actions necessary to reduce or eliminate hazardous conditions
- Monitor the remediation process to ensure safety policies are properly enforced

10. Risk Assessment

Risk assessment is the process of evaluating a workplace, processes, and/or methods to identify potential risks that may be involved. After identifying, analyzing and evaluating the severity of the risk, the appropriate safety measures should be applied to effectively eliminate or mitigate the risk.

Risk assessment steps:

- Hazard identification: identifying hazards and risk factors that have the potential to cause harm.
- Risk analysis, and risk evaluation: analyzing and evaluate the risk associated with that hazard.
- Determining appropriate ways to eliminate the hazard or control the risk when the hazard cannot be eliminated.

10.1 Importance of Risk Assessments

Risk assessments are very important as they form an integral part of an occupational health and safety management plan. They help to:

- Create awareness of hazards and risk.
- Identify who may be at risk (e.g., employees, cleaners, visitors, contractors, the public, etc.).
- Determine whether a control program is required for a particular hazard.
- Determine if existing control measures are adequate or if more should be done.
- Prevent injuries or illnesses, especially when done at the design or planning stage.
- Prioritize hazards and control measures.
- Meet legal requirements where applicable.

10.2 Goals of a Risk Assessment

The goal of a risk assessment is to remove or minimize all hazards by adding control measures, as necessary. This helps create a safer and healthier workplace.

10.3 When to Do a Risk Assessment

There are many reasons a risk assessment is needed, including:

- Before new processes or activities are introduced.
- Before changes are introduced to existing processes or activities, including when products, machinery, tools, equipment change or new information concerning harm becomes available.
- When hazards are identified.

10.4 Completing a Risk Assessment

A person or team of individuals who have a good working knowledge of the situation and/or process should conduct the assessments. Supervisors and workers who are familiar with the process under review should be include on the team or as sources of information, as these individuals are most accustomed with the operation. In the laboratory setting, the Principal Investigator is ultimately responsible for the risk assessment.

In general, to do an assessment:

- Identify hazards.
- Determine the likelihood of harm, such as an injury or illness occurring, and its severity.
 - Consider normal operational situations as well as non-standard events such as maintenance, shutdowns, power outages, emergencies, extreme weather, etc.
 - Review all available health and safety information about the hazard such as safety data sheet (SDS), manufacturers literature, information from reputable organizations, results of testing, workplace inspection reports, records of workplace incidents (accidents), including information about the type and frequency of the occurrence, illnesses, injuries, near misses, etc.
 - Understand the minimum legislated requirements for your jurisdiction.
- Identify actions necessary to eliminate the hazard, or control the risk using the hierarchy of risk control methods.
- Evaluate to confirm if the hazard has been eliminated or if the risk is appropriately controlled.
- Monitor to make sure the control continues to be effective.
- Keep any documents or records that may be necessary. Documentation may include detailing the process used to assess the risk, outlining any evaluations, or detailing how conclusions were made.

When doing an assessment, also take into account:

- The methods and procedures used in the processing, use, handling or storage of the substance, etc.
- The actual and the potential exposure of workers (e.g., how many workers may be exposed, what that exposure is/will be, and how often they will be exposed).

- The measures and procedures necessary to control such exposure by means of engineering controls, work practices, and hygiene practices and facilities.
- The duration and frequency of the task (how long and how often a task is done).
- The location where the task is done.
- The machinery, tools, materials, etc. that are used in the operation and how they are used (e.g., the physical state of a chemical, or lifting heavy loads for a distance).
- Any possible interactions with other activities in the area and if the task could affect others (e.g., cleaners, visitors, etc.).
- The lifecycle of the product, process or service (e.g., design, construction, uses, decommissioning).
- The education and training the workers have received.
- How a person would react in a particular situation (e.g., what would be the most common reaction by a person if the machine failed or malfunctioned).

It is important to remember that the assessment must consider not only the current state of the workplace but any potential situations as well.

By determining the level of risk associated with the hazard, the employer, and the health and safety committee (where appropriate), can decide whether a control program is required and to what level.

10.5 Identifying Hazards

The goal is to find and record possible hazards that may be present in the workplace. It may help to work as a team; include both people familiar with the work area, as well as people who are not - this way both the experienced and fresh eye can conduct the inspection. In either case, the person or team carrying out the assessment should have a good knowledge of the hazard being assessed, any situations that might likely occur, and protective measures appropriate to that hazard or risk.

To be sure that all hazards are found:

- Look at all aspects of the work.
- Include non-routine activities such as maintenance, repair, or cleaning.
- Look at accident / incident / near-miss records.
- Include people who work off site either at home, on other job sites, drivers, teleworkers, with clients, etc.
- Look at the way the work is organized or done (include experience of people doing the work, systems being used, etc).
- Look at foreseeable unusual conditions (for example: possible impact on hazard control procedures that may be unavailable in an emergency situation, power outage, etc.).

- Determine whether a product, machine or equipment can be intentionally or unintentionally changed (e.g., a safety guard that could be removed).
- Review all of the phases of the lifecycle.
- Examine risks to visitors or the public.
- Consider the groups of people that may have a different level of risk such as young or inexperienced workers, persons with disabilities, or new or expectant mothers.

10.6 Determining Risk

Each hazard should be studied to determine its' level of risk. To research the hazard, you can look at:

- Product information / manufacturer documentation.
- Past experience (knowledge from workers, etc.).
- Legislated requirements and/or applicable standards.
- Industry codes of practice / best practices.
- Health and safety material about the hazard such as safety data sheets (SDSs), research studies, or other manufacturer information.
- Information from reputable organizations.
- Results of testing (atmospheric or air sampling of workplace, biological swabs, etc.).
- The expertise of an occupational health and safety professional.
- Information about previous injuries, illnesses, near misses, incident reports, etc.
- Observation of the process or task.

Remember to include factors that contribute to the level of risk such as:

- The work environment (layout, condition, etc.).
- The systems of work being used.
- The range of foreseeable conditions.
- The way the source may cause harm (e.g., inhalation, ingestion, etc.).
- How often and how much a person will be exposed.
- The interaction, capability, skill, experience of workers who do the work.

10.7 Ranking and Prioritizing Risks

Ranking or prioritizing hazards is one way to help determine which risk is the most serious and thus which to control

first. Priority is usually established by taking into account the employee exposure and the potential for incident, injury or illness. By assigning a priority to the risks, a ranking or an action list is created.

There is no one simple or single way to determine the level of risk. Nor will a single technique apply in all situations. The group has to determine which technique will work best for each situation. Ranking hazards requires the knowledge of the workplace activities, urgency of situations, and most importantly, objective judgement.

For simple or less complex situations, an assessment can literally be a discussion or brainstorming session based on knowledge and experience. In some cases, checklists or a probability matrix can be helpful. For more complex situations, a team of knowledgeable personnel who are familiar with the work is usually necessary. Figure. 3.A shows an example of the relationship between probability and severity.

Probability	Severity				
	Negligible	Minor	Serious	Critical	Catastrophic
Frequent	Low	Moderate	High	High	High
Probable	Low	Moderate	High	High	High
Occasional	Low	Moderate	Moderate	High	High
Remote	Low	Low	Moderate	Moderate	High
Improbable	Low	Low	Low	Moderate	Moderate

Figure 3.A Risk Matrix: “Probability” is the likelihood that an event will happen. “Severity” is how bad it will be.

10.8 Methods of Mitigation

Once priorities are established, the group can decide on ways to control each specific hazard. Hazard control methods are often grouped into the following categories:

- Elimination (including substitution).
- Engineering controls.
- Administrative controls.
- Personal protective equipment.

10.9 Documentation for Risk Assessment

Keeping records of your assessment and any control actions taken is very important. You may be required to store assessments for a specific number of years. Check for local requirements in your jurisdiction.

The level of documentation or record keeping will depend on:

- Level of risk involved.
- Legislated requirements.

- Requirements of any management systems that may be in place.

Your records should show that you:

- Conducted a good hazard review.
- Determined the risks of those hazards.
- Implemented control measures suitable for the risk.
- Reviewed and monitored all hazards in the workplace.

11. Personal Protective Equipment Program

11.1 Introduction

The objective of the Personal Protective Equipment (PPE) Program is to protect employees from the risk of injury by creating a barrier against workplace hazards. Personal protective equipment is not a substitute for good engineering, administrative controls, or good work practices but should be used in conjunction with these controls to ensure the safety and health of employees.

Appropriate personal protective equipment will be provided by each department, used, and maintained when it has been determined that its use is required and that such use will lessen the likelihood of occupational injury and/or illness. This program addresses eye, face, head, and hand protection. Separate programs exist for respiratory and hearing protection.

11.2 Responsibilities

Each department/program shall be responsible for the procurement and implementation of the PPE Program in their work area.

11.2.1 Managers and Supervisors

- Shall be responsible for providing PPE required and making it available to employees.
- Responsible for training their personnel in the selection, use, inspection, and care of PPE required for their unique work situations.
- Maintaining records of such training.
- Proper equipment storage must be provided to protect against environmental conditions, which might degrade the effectiveness of the equipment or result in contamination during storage.
- Ensuring defective or damaged equipment is immediately replaced.
- Notifying EHS when new hazards are introduced or when processes are added/changed to re-evaluate PPE needs.

11.2.2 Employee

- Follow the requirements of the PPE Program.
- Wearing PPE as required
- Attending required training sessions
- Caring for, cleaning, and maintaining PPE as required
- Informing the supervisor of any need to repair or replace PPE.

11.2.3 Environment Health and Safety (EHS)

- Development, implementation, and administration of the PPE Program.
- Conducting workplace hazard assessments to determine the presence of hazards, which necessitate the use of PPE.
- Conducting periodic workplace reassessments as requested by supervisors and/or as determined by EHS.
- Providing guidance for the selection and purchase of approved PPE.
- EHS is also responsible for providing training and technical assistance to supervisors on the proper use, care, and cleaning of approved PPE.
- Reviewing, updating, and evaluating the overall effectiveness of the PPE Program.

11.3 Program Components

- Hazard Assessment and Equipment Selection
- Types of Protective Devices
- Eye and Face Protection
- Head Protection
- Foot Protection
- Hand Protection
- Respiratory Protection Plan
- Cleaning and Maintenance
- Training and Recordkeeping.

11.3.1 Hazard Assessment and Equipment Selection

Departments and Programs are responsible for ensuring their employees are provided with the appropriate safety equipment. PPE being used will ensure a level of protection equal to or greater than the minimum required to protect the employees from the hazards. EHS will provide consultative services to help determine the suitability

of the PPE presently available. If EHS recommends new or additional equipment to meet requirements, it shall be the departments/programs responsibility to purchase or make changes as recommended in a timely manner.

11.3.2 Standards for Protective Devices

All personal protective clothing and equipment will be of safe design and construction for the work to be performed and shall be maintained in a sanitary and reliable condition. Only those protective clothing and equipment that meet NIOSH or ANSI (American National Standards Institute) standards will be procured or accepted for use. Careful consideration will be given to comfort and fit of PPE in order to ensure that it will be used. In addition, care should be taken to ensure that the right size is selected.

11.3.3 Eye and Face Protection

Preventing eye injuries requires that all persons who may be in eye hazard areas wear protective eyewear. This includes employees, visitors, researchers, contractors, or others passing through an identified eye hazard area. Suitable protectors shall be used when employees are exposed to hazards from flying particles, molten metal, acids or caustic liquids, chemical liquids, gases, or vapors, bio-aerosols, or potentially injurious light radiation.

- Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment.
- Goggles and face shields shall be used when there is a hazard from chemical splash.
- Face shields shall only be worn over primary eye protection (safety glasses or goggles).
- For employees who wear prescription lenses, eye protectors shall either incorporate the prescription in the design or fit properly over the prescription lenses.
- Equipment fitted with appropriate filter lenses shall be used to protect against light radiation. Tinted and shaded lenses are not filter lenses unless they are marked or identified as such.

- Prescription Safety Eyewear

OSHA regulations require that each employee who wears prescription lenses while engaged in operations that involve eye hazards shall wear eye protection that incorporates the prescription in its design, or shall wear eye protection that can be worn over the prescription lenses (goggles, face shields) without disturbing the proper position of the prescription lenses or the protective lenses.

- Types of Eye/Face Protection

- Safety Glasses: Protective eyeglasses are made with safety frames, tempered glass or plastic lenses, temples and side shields which provide eye protection from moderate impact and particles. Safety glasses are also available in prescription form for those persons who need corrective lenses.
- Single Lens Goggles: Vinyl framed goggles of soft pliable body design provide adequate eye protection from many hazards. Single lens goggles provide similar protection to spectacles and may be worn in combination with spectacles or corrective lenses to insure protection along with proper vision.
- Face Shields: These normally consist of an adjustable headgear and face shield of tinted/transparent

acetate or polycarbonate materials, or wire screen. Face shields will be used in operations when the entire face needs protection and should be worn to protect eyes and face against flying particles, metal sparks, and chemical/biological splash.

- Welding Shields: These shield assemblies consist of vulcanized fiber or glass fiber body, a ratchet/button type adjustable headgear or cap attachment and a filter and cover plate holder. These shields will be provided to protect workers' eyes and face from infrared or radiant light burns, flying sparks, metal spatter and slag chips encountered during welding, brazing, soldering, resistance welding, bare or shielded electric arc welding and oxyacetylene welding and cutting operations.

11.3.4 Head Protection

Head protection shall be furnished to and used by all personnel working where there is danger of head injury from impact, falling or flying objects, or electrical shock and burns. This includes operators of materials handling equipment, personnel engaged in construction work, warehousing, personnel working in excavations, and all personnel using pickaxes, sledgehammers, or chains.

- ANSI Standard Z89.1-1969
 - This standard establishes specifications for industrial protective helmets for the protection of heads of occupational workers from impact and penetration from falling and flying objects and from limited electric shock and burn.
- Head Protection Classes
 - Class A - General service, limited voltage. Protection against impact hazards.
 - Class B - Utility service, high voltage. Used by electrical workers.
 - Class C - Special service, no voltage protection.

11.3.5 Foot Protection

Safety shoes shall be worn in the shops, warehouses, maintenance, cage wash, glassware, and other areas as determined by EHS. The requirements for the hazards is necessary, ASTM F2413 shall be referenced for the required protection for the work being performed by the employee. ASTM F2413 – Standard Specific for Performance Requirements for Footwear replaced ANSI Z41-99 as the standard for footwear requirements.

- Construction Site Footwear Requirements:
 - HSC personnel accessing construction sites only for specific non-construction purposes such as meetings, inspections, or testing/commissioning of building systems must wear footwear which meets or exceeds ASTM F2413, Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear. Ankle protection is not required by the ASTM standard, nor does it prohibit athletic style safety footwear.
 - If HSC personnel are engaged in actual construction activities, they must comply with the construction specification for safety footwear, including protection of the ankle. It is not anticipated VIPs (donors

and executive leadership) will utilize protective footwear when they visit a construction site. In this case, the contractor should clear and make safe areas for the VIPs to walk and view areas of interest or concern, as well as limit work in the area to be toured. VIPs will be escorted at all times by Senior General Contractor staff to ensure the avoidance of hazards.

- For purpose of definition of the term “Very Important Person (VIP)” as it is related to this policy, the following categories of people shall be considered:
- Donors (of any type) or esteemed guests of HSC
- President of HSC
- Executive Vice Presidents/ Senior Executive Leadership of HSC
- Faculty Chairpersons, Deans, and/or Provosts of various departments with specific interests in the project.

11.3.6 Hand Protection

Suitable gloves shall be worn when hazards from chemicals, cuts, lacerations, abrasions, punctures, burns, biological agents, and harmful temperature extremes are present. Glove selection shall be based on performance characteristics of the gloves, conditions, duration of use, and hazards present. One type of glove will not work in all situations.

11.3.7 Respiratory Protection Plan

Refer to Appendix D

11.3.8 Cleaning and Maintenance

It is important that all PPE be kept clean and properly maintained. Personal protective equipment shall not be shared between employees until it has been properly cleaned and sanitized. PPE will be distributed for individual use whenever possible. It is also important to ensure that contaminated PPE, which cannot be decontaminated, is disposed of in a manner that protects employees from exposure to hazards.

11.3.9 Training

Any worker required to wear PPE shall receive training in the proper use and care of PPE. EHS shall offer retraining to both the employees and the supervisors upon request. The training shall include, but not necessarily be limited to, the following subjects:

- When PPE is necessary to be worn.
- What PPE is necessary
- How to properly don, doff, adjust, and wear PPE.
- The limitations of the PPE.

- The proper care, maintenance, useful life and disposal of the PPE.

After the training, the employees shall demonstrate that they understand the components of the PPE program and how to use PPE properly, or they shall be re-trained.

11.3.10 Recordkeeping

Records shall be kept of the names of persons trained, the type of training provided, and the dates when training occurred.

12. Occupational Safety Plans

12.1 Responsibilities

12.1.1 Managers and Supervisors

Managers and Supervisors must recognize those factors in the workplace with accident potential. The supervisor shall provide frequent inspections of job sites, work methods, and materials/equipment used. Any unsafe equipment and/or material shall be tagged and rendered inoperative or physically removed from its place of operation until repaired or replaced.

All Departments are responsible for:

- Ensuring safe working conditions
- Providing necessary protective equipment (PPE)
- Taking immediate action to halt work and correct any observed or reported safety violation
- Ensuring that required guards and protective equipment are provided, used, and properly maintained
- Ensuring that tools and equipment are properly maintained and used
- Ensuring that the employees understand the work to be done, the hazards that may be encountered, and the proper procedure for doing the work safely
- Ensuring workers exposed or potentially exposed to hazardous chemicals/materials have access to appropriate Safety Data Sheets (SDS)

12.1.2 Employee

Employee must recognize those factors in the workplace with accident potential. The employee shall complete trainings in relation job sites, work methods, and materials/equipment used.

12.2 General Shop and Work Areas

12.2.1 Employee Training

Employees shall be thoroughly trained in the use of protective equipment, guards, and safeguards for chemicals and safe operation of equipment, machines, and tools they use or operate. Only employees who have been trained and those undergoing supervised on-the-job training shall be allowed to use shop equipment, machines, and tools.

12.2.2 Food and Beverages

No food or drink shall be brought into or consumed in areas exposed to toxic materials, chemicals, or shop contaminants. Workers shall wash their hands before eating or drinking after exposure to any contaminant. A separate area shall be designated as being safe for food and drink consumption.

12.2.3 Dress Code

Workers shall not wear rings, earrings, bracelets, wristwatches, or necklaces in the vicinity of operating machinery and power tools. Long full beards, unrestrained long hair, and loose clothing shall be restrained so as not to get caught in moving equipment.

12.2.4 Personal Protective Equipment (PPE)

Personal protective equipment (PPE) is not a substitute for engineering controls or feasible work or administrative procedures. While these controls are being implemented, or if it has been determined that control methods are not feasible, personal protective equipment is required whenever there are hazards that can do bodily harm through absorption, inhalation, or physical contact. This equipment includes respiratory and hearing protective devices, special clothing, and protective devices for the eyes, face, head, and extremities. All PPE shall be of a safe design and constructed for the work to be performed and shall be maintained in a sanitary and reliable condition.

12.2.5 Shop Layout

Proper layout, spacing, and arrangement of equipment, machinery, passageways, and aisles are essential to orderly operations and to avoid congestion.

- Equipment and machinery shall be arranged to permit an even flow of materials and to provide sufficient space to handle the material with the least possible interference from or to workers or other work being performed.
- Passageways/aisles shall be provided and marked to permit the free movement of employees bringing and removing material from the shop. These passageways are independent of clear zones and storage spaces. They shall be clearly recognizable.
- Where powered materials handling equipment is used, facility layout shall provide enough clearance in aisles, on loading docks, and through doorways to permit safe turns. Aisles shall be at least 3 feet wider than the widest vehicle used or most common material being transported.

12.2.6 Illumination

Adequate illumination shall be provided to ensure safe working conditions.

- Portable lamps shall have UL approved plugs, handles, sockets, guards, and cords for normal working conditions.
- For work in boilers, condensers, tanks, turbines, or other grounded locations that are wet or may cause excessive perspiration, a low voltage lighting system should be used. In situations where these lighting systems are not available, a ground fault circuit interrupter lighting system shall be used.
- Flashlights for use near energized electrical equipment and circuitry shall have insulated cases.
- At least 50 foot-candles of illumination shall be provided at all workstations. However, fine work may require 100 foot-candles or more. This can be obtained with a combination of general lighting plus supplemental lighting.

12.2.7 Exits and Exit Markings

- Every exit shall have "EXIT" sign in plain legible letters not less than 6 inches high with the strokes of the letters not less than three-quarters of an inch wide. The signs shall be powered by normal and emergency power circuits only.
- Doors, passageways, or stairways which are neither exits nor ways to an exit (but may be mistaken for an exit) shall be clearly marked "NOT AN EXIT" or by a sign indicating their actual use, for example: "STORAGE ROOM" or "BASEMENT."
- When the direction to the nearest exit may not be apparent to an occupant, an exit sign with an arrow indicating direction shall be used.
- Exit access shall be arranged so it is unnecessary to travel toward any area of high hazard potential in order to reach the nearest exit (unless the path is effectively shielded by suitable partitions or other physical barriers).
- Exit signs shall be clearly visible from all directions of egress and shall not be obstructed at any time. If occupancy is permitted at night, or if normal lighting levels are reduced at times during working hours, exit signs shall be suitably illuminated by a reliable light source.
- A door from a room to an exit or to a way of exit access will be the side-hinged swinging type and will swing in the direction of travel if 50 or more persons occupy the room.
- Areas around exit doors and passageways shall be free of obstructions. The exit route shall lead to a public way. No lock fastening device shall be used to prevent escape from inside the building.
- Where occupants may be endangered by the blocking of any single exit due to fire or smoke, there shall be at least two means of exit remote from each other.
- Exits, exterior steps, and ramps shall be adequately lit to prevent mishaps.

12.2.8 Housekeeping

Good housekeeping shall be maintained in all shops, yards, buildings, mechanical rooms, chases and mobile equipment. Supervisors are responsible for good housekeeping in or around the work they are supervising. As a minimum, the following requirements shall be adhered to:

- Material shall not be placed where anyone might stumble over it, where it might fall on someone, or on or against any support unless the support can withstand the additional weight.
- Aisles and passageways shall be kept clear of tripping hazards.
- Nails shall be removed from loose lumber or the points turned down.
- Trash and other waste materials shall not be allowed to accumulate and will be kept in approved receptacles
- Disconnect switches, distribution panels, or alarm supply boxes shall not be blocked by any obstruction which may prevent ready access.
- Machinery and equipment shall be kept clean of excess grease and oil and (operating conditions permitting) free of excessive dust.
- Mechanical and electrical rooms will not be utilized for storage, of spare parts, construction supplies, and other articles. But instead will be kept clean and properly illuminated to allow access for maintenance.

12.2.9 Use of Tools

- Hand Tools
 - Incidents at the job site involving hand tools are usually the result of misuse. Hand tools are precision tools capable of performing many jobs when used properly. Hand tool safety requires that the tools be of good quality and adequate for the job. All tools shall be kept in good repair and shall be stored properly.
 - When personnel use hand tools while they are working on ladders, scaffolds, platforms, or work stands, they shall use carrying bags for tools which are not in use.
 - Supervisors shall frequently inspect all hand tools used in the operation under their supervision. Defective tools shall be immediately removed from service and tagged.
- Portable Power Tools
 - Portable power tools can be more hazardous to use than their stationary counterparts. Personnel who are required to use portable power tools in their work shall be thoroughly trained in safe operating practices. Safe operating procedures shall be set up for each type of tool consistent with the manufacturer's instructions.

12.2.10 Use of Compressed Air Sources

Compressed air has the appearance of a relatively harmless gas. The improper or inadvertent connection of items not designed for shop air pressure, i.e., equipment, storage vessels, or containers, to a shop air supply may cause

serious personal injury and more than likely will damage the item being connected.

The maximum air pressure approved for general use in the shops and laboratories is 30 psi (pounds per square inch).

12.2.11 Barricades

Appropriate barriers shall be erected around excavations, open manholes, open electrical panels, or other such operations that present hazards to personnel working in or near the affected area. Barricades shall delineate the boundaries of work areas. Signs must be posted to warn people of dangers and to identify protective equipment required while in the work zone.

12.3 Lock-Out/Tag-Out

OSHA Standard 29 CFR 1910.147, the Lockout/Tagout Standard, covers situations where injury could be caused by unexpected startup, energization, or release of stored energy while a machine or piece of equipment is being serviced or repaired. The standard requires that each piece of equipment be examined to determine what energy source needs to be locked out and that an energy control program be developed consisting of documented:

- Energy Control Procedures
- Periodic Inspection
- Training

The standard does not apply to work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or startup of the equipment is controlled by unplugging the equipment from the energy source and by the plug remaining under the exclusive control of the person performing the servicing or repair.

The HSC lockout/tagout program along with specific details and forms are in APPENDIX A

12.4 Fall Protection

The procedures in APPENDIX C is to prevent the injury of personnel due to falls or slips any time personnel are working on portable stairs, ladders, or scaffolding, or at elevations of more than four feet above grade. The applicable information in the OSHA standards. 29 CFR 1910.21-.68. shall be use for additional resources.

Employees performing work at elevated surfaces shall utilize protective measures to protect against fall injuries. Guard rails shall be employed for large projects to prevent falls from one level to another when feasible. During maintenance activity, Fall Arrest System shall be utilized to safeguard workers.

Fall Arrest Systems consist of a Body Harness, a Shock Absorbing Lanyard or Retractable Lifeline and a Tie-off Point. These Systems are designed to arrest a free fall should a worker slip from an elevated work site and also function to minimize forces imposed on the worker as the Fall Arrest System activates and checks the fall.

EHS may offer assistance in identifying and evaluating fall protection issues and training in fall protection.

12.5 Electrical

All electrical work shall be performed in accordance with published OSHA standards for Electrical Safety-Related Work Practices. 29 CFR 1910.331 through .335, National Fire Protection Association (NFPA) 70 National Electrical Code, and NFPA 70E Electrical Safety Requirements for Employee Workplaces as amended. It is the responsibility of all electrical/electronic maintenance and repair personnel and their supervisors to become familiar with the procedures in the above publications and to employ the mandated safe work practices.

Working on exposed circuit/parts that are energized will not be permitted unless the workers are qualified and trained to do so. Safety related work practices shall be used to prevent electric shock or other electrically induced injuries. Qualified workers are those who have been trained to work safely on energized circuits and, when appropriate, to use the proper personal protective equipment, insulating and shielding materials, and insulated tools. Two workers shall work together any time work must be performed on high voltage energized circuitry or equipment.

12.6 Machinery and Machine Guarding

For most applications machine guarding is an engineering control method that is the best of several of available options for protecting personnel working around machinery and equipment. The installation of machinery and machine guards is a governing factor in controlling and preventing accidents and injuries. The selection of a guarding method to be used if the machine does not have a manufacturer's installed guard may depend on a number of things such as space limitations; size of stock, and frequency of use. The following general guidelines are provided to assist in that selection. For detailed information consult OSHA Standard 29 CFR 1910.211.

Design and construction characteristics of machine guards include:

- The guard must be considered a permanent part of the machine or equipment.
- The guard must afford positive protection. Personnel should not be able to reach a hazard by reaching into, over, under, or through a properly designed and installed guard.
- The guard must prevent access to the danger zone during operation of the equipment.
- The guard must be as convenient as possible and must not interfere with normal operation of the machine or maintenance functions. This may include hinging guards to allow for access, using drift pins, latches, or minimizing the number of cumbersome attachments
- The guard should be designed for the specific job and specific machine, with provisions for lubricating, inspecting, adjusting, and repairing the machine.
- The guard must be durable and constructed strongly enough to resist normal wear.
- The guard must not present a hazard in itself.
- The guard should not be easily bypassed or defeated. The use of "dead man" controls is the preferred method because if the safety device fails or is bypassed, the machine will not present a hazard to personnel.

Under no circumstance shall any HSC machine guard be removed to simplify operator use. Nor, shall any HSC machine/machinery be operated without the required guard being in place. If required guards are to be serviced or

removed to permit service, lockout/tagout procedures must be followed accordingly.

12.7 Plumbing

Plumbing maintenance normally includes the installation, preventive maintenance, and repair of water supply systems, sewage and water disposal systems, natural liquefied petroleum gas (LPG) or other gas supply systems (to include gas appliances), and oxygen supply systems. Hazards that may be encountered during plumbing maintenance include, but are not limited to, entry into an oxygen deficient atmosphere (confined space), fire or explosion by introducing an ignition or flame source into a hazardous environment, falls, cave-in of excavated area, burns from heat producing equipment, strains and sprains of the back or other muscle group, and cuts and/or bruises.

Personal protective equipment worn during plumbing maintenance operations normally consists of eye and/or face protection, work or chemical resistant gloves, and safety-toe shoes. A bump cap or hard hat may be required under conditions that could result in head injuries. Eye or face protection is required while working plumbing connections, with chemicals, or where an eye hazard could exist while using tools or machines, and while working on pressure systems.

Plumbing workers should be trained and authorized to inspect, maintain, or install compressed air systems. Before opening a compressed air line, workers shall ensure the line has been completely drained of existing air to prevent a sudden release of air which will cause the line to whip. The reverse is also true; when personnel have installed a new compressed air system, all parts of the system shall be secured together before air is put into the system. Workers shall wear eye and face protective equipment while working on compressed air systems.

12.8 Gas System Maintenance

Maintenance of gas systems include natural gas, LPG, nitrogen and oxygen. Shop personnel shall be familiar with the properties of the gases in the systems they maintain. Tools used to repair leaks in, or perform maintenance on, gas lines shall be spark-free and protective clothing shall be static-free

12.9 Carpentry and Structural Maintenance

Personnel performing duties in carpentry and structural maintenance are potentially exposed to a wide variety of hazards in many different environments and locations. Potential hazards include exposures to flammable and combustible adhesives, dusts, hazardous noise, eye hazards, working at heights above ground level, lifting hazards, electric and pneumatic power tools, and working with unfinished material which could expose them to splinters. Potential physical and health hazards can be effectively controlled by proper work procedures and controls, and by using required personal protective equipment.

Personal protective equipment shall be worn when operating machinery, equipment, and saws within the shop and on job sites. The PPE consists of eye protection, safety-toe shoes, dust masks, hard hats, and hearing protection.

Supervisors shall ensure that periodic inspections are accomplished on all shop equipment. Machine guards shall not be removed or made inoperative except for authorized maintenance. When guards are removed during machine repair, power control switches shall be locked in the "OFF" position and properly tagged. The machine shall remain locked

until the guards are replaced.

Machines that develop fine dust or other airborne contaminants should be equipped with effective industrial exhaust ventilation. In shops where small numbers of installed machines are not continuously in operation, portable collection systems may be used.

Exhaust ducts and pipes shall be constructed and sized to minimize clogging. They shall discharge into an enclosed container.

Refuse shall be removed daily in all operations that are not required to have an exhaust system or where the refuse cannot be handled by an exhaust system.

12.10 Refrigeration and Air Conditioning Maintenance

Potential hazards associated with refrigeration and air conditioning maintenance include hazardous noise, electrical hazards, exposure to refrigerants, lifting hazards, and compressed gases and cylinders.

Equipment rooms where air conditioning equipment is installed shall be kept free and clear of all trash and clutter which could present tripping or fire hazards. Refrigerant piping shall be properly insulated, both to improve operating efficiency and to prevent injury to workers who may accidentally come in contact with it. Equipment rooms are not normally designed for, nor intended for, storage of materials.

Workers shall ensure that containers are legibly marked with the type of gas contained and stored with minimum intermingling of types of refrigerant. Cylinders shall be stored separately from flammable gases and oxygen. Where caps have been provided for valve protection, they shall be kept in place at all times until the cylinder is actually in use.

12.11 Heating Systems and Boiler Plant Maintenance

12.12 Painting Operations

Proper preventive measures must be taken for operations involving paints, varnishes, lacquers, cleaners, solvents, plastic coatings, and other finishing materials which readily ignite at relatively low temperatures and which could cause fire and health hazards. Many of the materials used in painting and spraying are volatile and may form vapors which may produce explosive and/or toxic mixtures in the air if not removed by adequate ventilation. Conspicuous "NO SMOKING" signs shall be posted where flammable materials are used or stored. The quantity of flammable or combustible liquid kept in the vicinity of spraying operations shall be kept to the minimum required for daily use. All flammable liquids and similar materials shall be stored in approved safety containers and/or storage cabinets.

12.13 Forklift Operation

12.14 Confined Space Entry

Confined spaces are among the more dangerous work environments. A "confined space" may be generally defined as any area which has limited means of egress, is subject to an oxygen deficient or enriched atmosphere or to the accumulation of flammable or toxic gases or vapors, and is configured so as to make rescue difficult. OSHA Standard

29 CFR 1910.146 provides definitive guidelines relative to entering/working in a confined space in addition to specific mandates dealing with the required training and emergency equipment required to support this type of work.

Examples of confined space working areas at HSC include sewers, pits/sumps, chemical/septic waste tanks, vessel voids/bilges, trenches over 4 feet deep, elevator shafts, ventilation ducts, neutralization pits, and man holes.

The HSC detailed confined space entry program will be found in APPENDIX B.

12.15 Ladder Safety

Ladders will be inspected by the worker prior to each use. Ladders with broken or missing rungs, broken or split side rails, or with other faulty parts shall be removed from use and disposed of immediately. Do not place a ladder in front of a door which opens toward the ladder unless the door is locked or otherwise blocked, barricaded, or guarded. No one shall go up or down a ladder without the free use of both hands. Individuals using ladders must maintain three points of contact at all times. If handling material, a rope shall be used to raise or lower the material.

Portable ladders placed against a wall or other fixed object shall be securely fastened or held by a co-worker to prevent slippage. The ladder's base should be placed at a distance from the vertical wall equal to one-fourth the working length of the ladder in order to assure the proper angle (4:1 ratio). No ladder shall be used to gain access to a roof unless the top of the ladder extends at least three feet above the point of support, at eave, gutter, or roof line. Ladders shall not be placed on boxes, barrels, or similar unstable bases to obtain additional height. When using portable ladders on smooth floors or sloping surfaces they shall be equipped with nonslip bases.

13. General Safety Requirements

13.1 Introduction

Personnel safety shall be paramount in all operating procedures to assure maximum practical protection for personnel and to prevent unnecessary exposure to injury and health hazards. It is the responsibility of all individuals to comply with established safety rules and regulations. Management and supervisory personnel at all levels are responsible for assuring that safety precautions are understood and carried out in respective work areas.

This section is limited to basic guidance in some of the essential areas of safety and health, which are generally applicable to all areas of HSC. It is emphasized that these are basic requirements to good safety and health performance and do not represent a comprehensive safety and health program for every area.

13.2 Compliance with Safety Regulations

All HSC personnel shall observe all safety and health rules and regulations. All personnel will be responsible for warning others when it is believed that they are endangered by known hazards or by failure to comply with applicable safety and health precautions. Safety and health precautions must not be disregarded or subordinated due to the urgency of a particular job.

Safe work practices and administrative controls are measures aimed at reducing exposures to hazards, which include

written procedures, safety policies, rules, and practices.

Safe work practices and administrative controls exist at all organizational levels, and include:

- Use and adherence to written protocols and Standard Operating Procedures (SOPs) that detail procedures and safety protocols
- Safety Audits and Oversight: In order to provide ongoing hazard and risk assessment, as well as assessing the adequacy of control measures, routine health and safety audits are performed by various entities and include Biosafety, Radiation Safety, IBC, IACUC and EHS. Medical professionals contribute by providing medical evaluation and risk assessment.
- General safety guidelines and manuals to be followed by all employees, students, and volunteers
 - Biosafety
 - Chemical Hygiene
 - Radiation Safety
 - Electrical Safety
 - Mechanical Safety

13.3 Safety Training

Supervisors shall ensure that all new or reassigned personnel are instructed in safe methods of performing particular tasks prior to starting and during the early stages of each new job. A general safety briefing shall be held in conjunction with the Hazard Communication Standard training and all applicable training for every new and reassigned personnel.

13.4 Two-Person Rule

The two-person rule shall apply whenever dangerous experiments or other potentially life-threatening operations are being performed. No one shall work alone if there is any reason to believe that a situation may develop where the person could not summon assistance within a reasonable time or where assistance from another person would not be available in case of an accident.

When the distance or physical arrangement separating employees is great enough to prevent visual observation or voice communication for long periods, the activities shall be restricted to those with a low probability of an incapacitating accident of such magnitude that help cannot be summoned in a reasonable period.

13.5 Refrigerators and Freezers

Flammable liquids or chemicals capable of giving off flammable or explosive vapors, which require refrigeration, should not be placed in domestic-type refrigerators. Such material shall be stored in explosion-proof refrigerators. In such confined spaces, a very small quantity of flammable liquid can develop into an explosive atmosphere, which could be ignited by the interior light switch or thermostat switch of the refrigerator. Standard refrigerators and freezers shall have a "NO FLAMMABLES" sign/label posted on the door.

At no time will food products for human consumption be stored in any refrigerator or freezer, which is being used for storage of chemicals or biological samples. Laboratory refrigerators and freezers shall have a “Not for Food Use” sign/label posted on the door.

13.6 Smoking

The Surgeon General of the United States has determined that using tobacco products is a leading cause of illness and death. Texas recognizes the right of individuals working or visiting in state buildings to an environment free of contaminants.

The HSC policy is to ensure a healthy working environment for all workers. Smoking is forbidden in all areas of campus, including all buildings, individual offices, and enclosed spaces (automobiles, trucks, vessel cabins, aircraft, etc.) under the management control of HSC

Valid, documented, legitimate complaints by non-smoking and smoking employees are of equal concern and will be dealt with on an individual basis. EHS will serve as the functional point of contact and provide assistance or recommendations to the Dean and Director for any employee complaints or concerns about this policy.

13.7 Housekeeping

High standards of housekeeping must be maintained in all shops, offices, laboratories, buildings, work areas, and surrounding grounds.

- All work areas such as workshops and laboratory which might contain potentially grave danger and hazardous materials, must be kept clean and neat at all time.
- Floors shall be kept free from holes and obstructions, especially where the floors form part of the aisles or walking spaces. It is essential that floors are not littered with small objects, such as scraps of metal, nails, and tools.
- Aisles, passageways, stairways, and exits shall be kept clear at all times. All exit signs shall be suitably illuminated by a by a reliable light source.
- Restrooms will be kept in a clean and sanitary condition at all times.
- All HSC provided and personal microwave ovens and refrigerators used for the cooking and storage of food shall be kept clean at all times. Failure to maintain an acceptable degree of sanitation shall be grounds for removal of these appliances.
- Broken glass shall not be placed in wastebaskets. It should be kept in a separate puncture-resistant container that is marked "Broken Glass Handle Carefully" for the cleaning crew to remove or taken directly to a dumpster for disposal.
- Other sharp objects, such as scalpel blades, needles, and razor blades, shall be disposed of in appropriate and labeled containers. When the container is filled, the containers shall be disposed of as required per the HSC Biosafety Manual.

13.8 Slippery Surfaces

Surfaces, which cause hazardous footing to personnel due to the presence of oil or other slippery substances, will be cleaned or treated to provide good footing. Linoleum and other polished floor surfaces shall be treated with a slip resistant preparation.

13.9 Compressed Gas Cylinders

Compressed gas cylinders shall always be stored in an upright position and secured to prevent toppling. The protective caps shall be installed on all cylinders not in use. Cylinders shall not be handled, shipped, or stored without valve protection caps. Compressed gas cylinders must be kept away from excessive heat (125°F, 51.5°C) and shall not be placed where they can be exposed to an electrical circuit. Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet or by a noncombustible barrier at least 5 feet high having a fire-resistance rating of at least one-half hour.

13.10 Compressed Air

Compressed air shall not be used for cleaning purposes when vacuum cleaners or an alternative will do the job. If not practicable or possible to use other means, compressed air may be used for cleaning when reduced to less than 30 psi with eye protection and safeguarding of other personnel in the area. The use of compressed air for cleaning clothing or any part of the body at any pressure is prohibited.

13.11 Working Over, Near, or On the Water

Employees working over or near water, where the danger of drowning exists, shall be provided with U.S. Coast Guard approved personal flotation devices (PFDs). Prior to and after each use, the PFDs shall be inspected for defects which would alter their strength or buoyancy.

At least one lifesaving skiff should be immediately available at locations where employees are working over or adjacent to water.

13.12 Work Clothing

Clothing worn around moving machinery shall be close fitting. Neckties and other loose items shall not be worn. Long sleeves will be worn in operations involving welding or burning and in tasks where the exposure to chemicals or ultraviolet and infrared rays is likely. Long sleeves are recommended for brush cutting.

In industrial operations where there is no hazard to the upper arms, short sleeve shirts and blouses may be worn provided they cover the upper torso. All personnel working in industrial operations shall wear trousers, slacks, or coveralls, which cover the lower extremities.

Safety shoes are required for all personnel involved in work which has the potential for crushing or lacerating foot injuries. This includes personnel in shops, outside maintenance/grounds and others as determined. This requirement is more fully addressed in the section on personal protective clothing.

Persons working in laboratories shall wear appropriate clothing. Lab coats or aprons should be worn for the majority of operations, especially when there is a possibility of splash or spill. Similarly, footwear that provides protection from splash and spill should be worn at all times in laboratories. Going "bare foot" in any laboratory is forbidden. As open-toed shoes, sandals, and "flip-flops" provide no protection from splash or spill, they also are forbidden. Routine cleaning of lab coats and aprons is the responsibility of the individual laboratory. Lab coats and aprons must not be laundered at home.

Persons working in the water should wear appropriate clothing or equipment. Footwear is especially important for person wading where there is any potential for material on the bottom that might lacerate unprotected feet.

14. Plan Review

Review of this plan will be conducted by EHS, as required.

15. Appendix A: Lockout/Tagout SOP

15.1 Purpose

The purpose of this Control of Hazardous Energy (Lockout/Tagout) SOG is to reduce the risk of fatalities/injuries. It covers the servicing, maintenance of machines and equipment in which a release of energy or the unexpected energization or start-up of the machines/equipment could cause injury to employees. This procedure establishes the minimum requirements for the control of such hazardous energy.

15.2 Scope

This procedure is to be used before, during and after any work, servicing, or maintenance activities are performed on any machine or equipment to ensure that the machine or equipment is isolated from all potentially hazardous energy sources where the unexpected energization, start up or release of stored energy could cause injury.

This procedure does not apply to:

- Work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or start-up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing or maintenance.
- Hot tap operations involving transmission and distribution systems for substances such as gas, steam, water or petroleum products when performed on pressurized pipelines, provided that (1) continuity of service is essential; (2) shut down of the service is impractical; and (3) documented procedures are followed, and special equipment is used which will provide proven effective protection for employees.
- Minor tool changes and adjustments, and other minor servicing activities, which take place during normal production operations if they are repetitive, and integral to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection.

No work will be permitted on energized machinery and equipment when any of the safety devices or controls of that machine or piece of equipment are bypassed, unless it is absolutely essential and can only be achieved with the machine or equipment energized. Individuals will not place themselves or any of their body parts in the path of hazardous moving parts of energized machinery or equipment.

A separate energy control procedure is required for a particular piece of machinery or equipment when any of the following elements exist:

- The machine or equipment has the potential for stored or residual energy or reaccumulation of stored energy after shut down which could endanger employees.
- The machine or equipment does not have a single energy source which can be readily identified and isolated.
- The isolation and locking out of that energy source will not completely de-energize and deactivate the machine or equipment. The machine or equipment is not isolated from that energy source and locked out during servicing

or maintenance.

- A single lockout device will not achieve a locked out condition.
- The lockout device is not under the exclusive control of the authorized employee performing the servicing or maintenance.
- The servicing or maintenance creates hazards for other employees.
- There have been accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance.

15.3 Definitions

Affected Employee: An employee whose job requires operation or use of a machine or piece of equipment on which servicing is being performed under lockout or tagout, or whose job requires work in an area in which such servicing or maintenance is being performed.

Authorized employee: A person who locks or implements a tagout system procedure on machines or equipment to perform the servicing or maintenance on that machine or equipment. An authorized employee and an affected employee may be the same person when the affected employee's duties also include performing maintenance or service on a machine or piece of equipment which must be locked, or a tagout system implemented.

Energy Source: Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy, including lasers and radiation producing machines.

Lockout: The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

Lockout Device: A device that utilizes a positive means, such as a lock, to hold an energy isolating device in the safe position and prevent the energizing of a machine or piece of equipment.

Normal Production Operations: The utilization of a machine or piece of equipment to perform its intended production function.

Servicing and/or Maintenance: Workplace activities such as construction, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include liberation, cleaning, or unjamming of machines or equipment, and making adjustments or tool changes where the employee may be exposed to the unexpected energization or start up of the equipment or release of hazardous energy.

Tagout: The placement of a tagout device on an energy isolating device, in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

15.4 Procedure

Specialized lockout/tagout devices shall be obtained and kept within the department for its use. Locks will be standard padlocks, marked and/or tagged to identify the authorized employee who placed the lock. All other lockout devices will be red. Tags will bear the standard red, black, and white “DANGER” design, and will include the words “DO NOT OPERATE”. Tags will also bear the name of the authorized person who placed the tag. Tags will be attached with a nylon cable tie with a locking strength of 50 pounds. When it is impossible to use a cable tie, tags will be attached with the sturdiest means available.

The Heads of departments or their designated representatives and unit managers are required to provide training to ensure that the purpose and function of the energy control procedures are understood by employees. Training must be tracked and recorded for file. Through training, employees will be required to possess the knowledge and skills required for safe application, usage, and removal of energy controls. Contact EHS for assistance in training employees in proper lockout/tagout procedures. Training shall include the following:

- Each authorized employee shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.
- Each affected employee shall be instructed in the purpose and use of the energy control procedures.
- All other employees whose work operations are or may be in the area where energy control procedures may be utilized, shall be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.

When tagout systems are used, employees shall also be trained in the following limitations of tags:

- Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by lockout.
- When a tag is attached to an energy isolating means, it is not to be removed without authorization of the (authorized) person responsible for it, and it is never to be bypassed, ignored or otherwise defeated.
- To be effective, tags must be legible and understandable by all authorized employees, and all other employees whose work operations are or may be in the area.
- Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.
- Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.
- Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment or process that presents a new hazard, or when there is a change in energy control procedures. Retraining shall establish employee proficiency and introduce new or revised control

methods and procedures as necessary. The heads of departments or their designated representatives and unit managers shall certify that employee training has been accomplished and is being kept up to date. The certification shall contain each employee's name and dates of training.

15.5 Techniques

Implementation of the lockout or tagout system shall be performed only by authorized employees. Affected employees shall be notified by heads of departments, or their designated representatives, and unit managers of the application and removal of lockout or tagout devices. Notification shall be given before the controls are applied, and after they are removed from the machine or equipment.

Before shutting down a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy, and assure the necessary lockout/tagout devices are readily available.

Sequence of Lockout or Tagout Procedure:

- If the machine or equipment is operating, shut it down using the normal procedures (depress stop button, open toggle switch, etc.)
- Isolate the machine or equipment from its energy source. Stored energy (such as that in springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, capacitors, steam or water pressure, etc.) must be dissipated or restrained by methods such as repositioning, blocking, bleeding down, etc.
- Lockout and/or Tagout the energy isolating devices with assigned individual locks and/or tags.
- Test the lockout system. After ensuring that no personnel are exposed, and as a check that energy sources have been disconnected, attempt to activate the machine or equipment using the normal operating controls to make certain the equipment will not operate. Caution: Return Operating Controls To "NEUTRAL"
- The equipment is now Locked out or Tagged out.

Transfer of Lockout/Tagout: In order to minimize exposure to hazards from unexpected energization, start up of the machine or equipment, or release of stored energy during shift or personnel changes, the authorized employee (or supervisor) who initially issued the Lockout/Tagout designation shall personally brief and transfer responsibility to another authorized employee or to the incoming shift supervisor who in turn will notify personnel under his/her area of supervision. This procedure shall apply during each shift change or whenever personnel are changed.

An authorized employee may transfer lockout/tagout protection to a second authorized employee. The second authorized employee would place his or her lock on the lockout device or affix his or her own tag before the first authorized employee removed his or her lock or tag.

Group Lockout/Tagout: When more than one crew, craft, department, etc. is involved, assignment of overall job associated with lockout or tagout responsibility should be made to one primary authorized employee designated to

coordinate affected work forces and ensure continuity of protection; and each authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or compatible mechanism when he or she begins work, and shall remove those devices when he or she stops working on the machine or equipment being serviced or maintained.

Each individual performing work on locked/tagged out equipment must install his or her own lock or tag. The one primary authorized employee will be responsible for:

- Ensuring that all members of the group are afforded the full protection of the lockout or tag out;
- Determining the hazard energy exposure status of the group members throughout the servicing and maintenance; and
- Ensuring that the provisions of release from lockout/tagout are followed.

Temporary removal from Lockout/Tagout: In situations in which lockout/tagout devices must be temporarily removed and the machinery energized for testing or repositioning, the following procedures shall be followed:

- Clear the machine or equipment of tools and materials;
- Check to ensure that all individuals are safely positioned away from hazardous moving parts or energized components;
- Remove the lockout/tagout devices;
- Energize and proceed with testing or positioning;
- De-energize all systems and reapply energy control measures;
- Continue the servicing and/or maintenance.

Restoring machines or equipment to normal operation:

- After the servicing and/or maintenance is complete and equipment is ready for normal operations, check the area around the machines or equipment to ensure that no one is exposed.
- After all tools have been removed from the machine or equipment, guards have been reinstalled, employees are in the clear, and the affected employees or departments notified, remove all lockout or tagout devices. Operate the energy isolating devices to restore energy to the machines or equipment.

15.6 Lockout/tagout on electrical utilization systems

This standard applies to work on exposed deenergized parts or near enough to expose the employee to any electrical hazard they present. While any employee is exposed to contact with parts of fixed electrical equipment or circuits which have been deenergized, the circuits energizing the parts shall be locked out or tagged out or both.

Deenergizing Equipment

- Safe procedures for deenergizing circuits and equipment shall be determined before circuits or equipment are deenergized.
- The circuits and equipment to be worked on shall be disconnected from all electric energy sources. Control circuit devices, such as push buttons, selector switches, and interlocks, may not be used as the sole means for deenergizing circuits or equipment. Interlocks for electric equipment may not be used as a substitute for lockout and tagging procedures.
- Stored electric energy which might endanger personnel shall be released. Capacitors shall be discharged and high capacitance elements shall be short circuited and grounded, if the stored electric energy might endanger personnel.
- Stored non-electrical energy in devices that could reenergize electric parts shall be blocked or relieved to the extent that the circuit parts could not be accidentally energized by the device.

Application of Locks and Tags

- A lock and a tag shall be placed on each disconnecting means used to deenergize circuits and equipment on which work is to be performed. The lock shall be attached so as to prevent persons from operating the disconnecting device.
- Each tag shall contain a statement prohibiting unauthorized operation of the disconnecting device and removal of the tag.
- If a lock cannot be applied, or if the employee can demonstrate that tagging procedures will provide a level of safety equivalent to that obtained by the use of a lock, a tag may be used without a lock.
- A tag used without a lock, shall be supplemented by at least one additional safety measure that provides a level of safety equivalent to that obtained by use of a lock. Examples of additional safety measures include the removal of an isolating circuit element, blocking of a controlling switch or opening of an extra disconnecting device.
- A lock may be placed without a tag only under the following conditions:
 - Only one circuit or piece of equipment is deenergized, and
 - The lockout period does not extend beyond the work shift, and
 - Employees exposed to the hazards associated with reenergizing the circuit or equipment are familiar with this procedure.

Verification of Deenergized Condition

- A qualified person shall operate the equipment controls or otherwise verify that the equipment cannot be restarted.
- A qualified person shall use test equipment to test the circuit elements and electrical parts of the equipment to which employees will be exposed and shall verify that the circuit elements and equipment parts are deenergized. The test shall also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage back feed even though specific parts of the circuit have been deenergized and presumed to be

safe.

Reenergizing Equipment

- A qualified person shall conduct tests and visual inspections, as necessary, to verify that all tools, electrical jumpers, shorts, grounds, and other such devices have been removed, so that the circuits and equipment can be safely energized.
- Employees exposed to the hazards associated with reenergizing the circuit or equipment shall be warned to stay clear of circuits and equipment.
- Each lock and tag shall be removed by the employee who applied it or under his direct supervision.
- There shall be a visual determination that all employees are clear of the circuits and equipment.

EXCEPTION: When the authorized employee who applied or installed the lockout or tagout device is not available to remove it, that device may be removed under the direction of the installer's immediate supervisor. Specific training and procedures for such removal shall be provided by each department involved in lockout or tagout operations. The procedures and training shall be documented. The documentation shall demonstrate that safety equivalent to the original process of having only the installer remove the device is maintained. The specific procedure shall include at least the following elements:

- Verification by the immediate supervisor that the employee who applied the device is not at the facility,
- Making all reasonable efforts to inform the authorized employee that his/her lockout or tagout device has been removed, and
- Ensuring that the authorized employee has this knowledge before resuming work at the facility.

15.7 External (Contractors, Etc.)

Whenever external servicing personnel are to be engaged in activities covered by the scope and application of this procedure, the designated HSC representative and the external employer shall inform each other of their respective lockout or tagout procedures. The designated HSC representative shall ensure that his/her personnel understand and comply with restrictions and prohibitions of the outside employer's energy control procedures. If the employer has no documented lockout or tagout procedures, they shall ensure that their personnel understand and comply with the procedures established in this procedure.

15.8 Effectiveness Criteria

EHS shall conduct periodic inspection of the energy control procedure at least annually to ensure these procedures and the requirements of 29CFR1910.147 are being followed. The inspection shall include a review, between the inspector and each authorized employee, of employees' responsibilities under the energy control procedure being inspected. Inspection shall be documented. The documentation shall identify the machine or equipment on which the energy

control program was being utilized, the date of the inspection, the employees included in the inspection and the person performing the inspection.

A periodic inspection of energy control devices shall be conducted and deficiencies reported to department heads or their designated representatives and unit managers for correction.

15.9 References

1. UCR Hazardous Energy Control Procedures March 14,1994
 2. Title 8, of the California Code of Regulation Sections 2320.4 and 3314
 3. Title 29 of the Code of Federal Regulations Part 1910.147 The Control of Hazardous Energy (Lockout/Tagout) updated 1-21-01
 4. Oklahoma State University Program For The Control Of Hazardous Energy updated 3-30-2000
 5. Lockout/Tagout The Process of Controlling Hazardous Energy by Edward V. Grund, copyright 1995 by the National Safety Council.
 6. Title 29 of the Code of Federal Regulations Part 1910.333 Subpart S
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15.10 FOEHS/Records

HSC Lockout/Tagout Compliance Audit

HSC Contractor Lockout/Tagout Capability Inquiry

16. Appendix B: Confined Space Entry SOP

16.1 Purpose

Entering and working in confined spaces has been and will continue to be an integral part of daily activity by University of North Texas (HSC) employees. This document has been developed to enhance protection for personnel required to enter and conduct work in confined spaces. The procedure contained herein describes reasonable and necessary measures for all facilities, departments, and individuals associated with confined space entry operations.

16.2 Scope

This procedure shall apply to all confined space entry operations conducted at HSC. A site-specific program may be used, providing it meets or exceeds the requirements set forth in this procedure.

This procedure includes definitions, and some overlapping and redundant information. It is organized into four general sections:

- Responsibilities (and Training Requirements)
 - Identifying Confined Space
 - Identifying Confined Space Hazards
 - Confined Space Entry Program
-

16.3 Definitions

Attendant – A person designated by the Entry Supervisor to remain outside the confined space and to be in constant communication with the personnel working inside the confined space.

Authorized Entrant – A person who is approved or assigned by the supervisor in charge of the entry to perform a specific type of duty or duties or to be at a specific location at the job site.

Bonding – The joining of two or more items with an electrical conductor so that all ends joined have the same electrical charge or potential.

Department Head – Persons in charge of students or employees of The University of North Texas facilities with common interests, jobs, or objectives.

Entry – The action by which a person passes through an opening into a permit required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Entry Permit – The written or printed document that is provided by the employer to allow and control entry into a permit space and contains the information specified in this procedure.

Entry Supervisor – Department head or designated representative (such as the foreman or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this procedure.

NOTE: An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this procedure for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of the entry operation.

Hazardous Atmosphere – An atmosphere that may expose employees to the risk of death, incapacitation, and impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

- Flammable gas, vapor, or mist in excess of 10% of its lower flammable limit (LFL),
- Airborne combustible dust at a concentration that meets or exceeds its LFL

NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less,

- Atmospheric oxygen concentration below 19.5% or above 23.5%.
- Atmospheric concentration of any substance for which a dose or Permissible Exposure
- Limit is published in Subpart G, Occupational Health and Environmental Control, in
- Subpart Z, Toxic and Hazardous Substances, of 29 CFR 1910 and that could result in exposure in excess of its dose Permissible Exposure Limit.

NOTE: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision. Any other atmospheric condition that is immediately dangerous to life or health.

NOTE: For air contaminants for which OSHA has not determined a dose or Permissible Exposure Limit, other sources of information, such as Safety Data Sheets that may comply with the Hazard Communication Standard, section 1910.200, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

Hot Work – Any work involving burning, welding or similar fire producing operations. Also, any work that produces a source of ignition, such as grinding, drilling, or heating.

Hot Work Permit – The employer’s written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

Immediately Dangerous to Life or Health – An atmosphere that poses an immediate threat of loss of life: May result in irreversible or immediate severe health effects; may result in eye damage/irritation; or other condition that could

impair escape from a confined space.

Lower Explosive Limit (LEL) – The minimum concentration of a combustible gas or vapor in air that will ignite if an ignition source is introduced.

Non-Permit Required Confined Space – A confined space that does not contain, nor has the potential to contain, any hazard capable of causing death or serious physical harm (with respect to atmospheric hazards).

Oxygen – Deficient Atmosphere – An atmosphere that contains an oxygen concentration of less than 19.5% by volume.

Oxygen – Enriched Atmosphere – An atmosphere that contains an oxygen concentration greater than 23.5% by volume.

PPE – Personal Protective Equipment – Device(s) or clothing worn by the worker to protect against hazards in the environment. Examples are respirators, gloves, and chemical splash goggles.

PEL – Permissible Exposure Level – Concentration of a substance to which an individual may be exposed repeatedly without adverse effect.

Purging – The removal of gases or vapors from a confined space by the process of displacement.

16.4 Responsibilities

Everyone involved in a confined space entry project has certain responsibilities and requires a certain amount of training. It is very important that every individual is familiar with the responsibilities. This section outlines the responsibilities and training requirements for individuals involved in a project.

EHS - The Director of EHS or his/her designated representative shall:

- Review and update the HSC Confined Space Entry Procedures to comply with current 29CFR1910.146 and other OSHA standards for confined space entry operations.
- Facilitate compliance with standards by periodic inspection of entry sites and canceling permits where unsafe conditions are present.
- Assist Department Heads, Managers and Supervisors with:
 - training as set forth in the program,
 - identification of confined spaces,
 - identification of spaces that require a permit for entrance.
- Label all permit required confined spaces.
- Perform a single annual compliance review covering all entries performed during a 12 month period.

Department Heads (or their designated representatives-Entry Supervisors) Entry Supervisors shall:

- Identify confined spaces within facilities or areas under their control.
- Identify hazards within a confined space under their control.
- Document that all training requirements for a specific confined space entry have been met by signing the pre-entry authorization space on the entry permit.
- Insure that the required atmospheric tests are performed at the confined space and results recorded on the permit prior to entry authorization.
- Obtain and maintain all equipment necessary to complete the confined space entry project.
- Authorize entry by signing the entry authorization space on the entry permit after all conditions for a safe entry have been met.
- Terminate the entry and cancel the permit when:
 - Entry operations covered by the entry permit have been completed.
 - A condition that is not allowed under the entry permit arises in or near the permit space.
 - Determine, whenever responsibility for a permit space entry operation is transferred, and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.
- Return completed entry document to EHS, after the entry has been cancelled.

Authorized Entrants - The person(s) authorized to enter a confined space shall:

- Know the hazards that may be faced during entry, including the mode, signs or symptoms, and consequences of the exposure.
- Use proper equipment, which includes:
 - Atmospheric testing and monitoring equipment,
 - Ventilating equipment needed to obtain acceptable entry conditions,
 - Communication equipment necessary to maintain contact with the attendant,
 - Personal protective equipment as needed,
 - Lighting equipment as needed,
 - Barriers and shields as needed,
 - Equipment, such as ladders, needed for safe ingress and egress,
 - Rescue and emergency equipment as needed, and
 - Any other equipment necessary for safe entry into and rescue from permit spaces.
- Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the

attendant to alert entrants of the need to evacuate the space if required.

- Alert the attendant whenever:
 - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, and
 - The entrant detects a prohibited condition.
- Exit the permit space as quickly as possible whenever:
 - An order to evacuate has been given by the attendant or the entry supervisor,
 - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation,
 - The entrant detects a prohibited condition, or
 - An evacuation alarm is activated.

Attendants - Persons authorized to perform duties as attendants shall:

- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure.
- Be aware of possible behavioral effects of hazard exposure in authorized entrants.
- Continuously maintain an accurate count of authorized entrants in the permit space and ensure that the means used to identify authorized entrants accurately identifies who is in the permit space.
- Remain outside the permit space during entry operations until relieved by another attendant.
- Attempt non-entry rescue if proper equipment is in place and the rescue attempt will not present further hazards to the entrant or attendant.
- Communicate with authorized entrants as necessary to monitor their status and to alert entrants of the need to evacuate the space when conditions warrant.
- Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and order the authorized entrants to evacuate the permit space immediately under any of the following conditions:
 - If the attendant detects a prohibited condition,
 - If the attendant detects the behavioral effects of hazard exposure in an authorized entrant,
 - If the attendant detects a situation outside the space that could endanger the authorized entrants, and
 - If the attendant cannot effectively and safely perform all the duties required.
- Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.
- Take the following actions when unauthorized persons approach or enter a permit space while entry is underway:
 - Warn the unauthorized persons to stay away from the permit space,

- Advise unauthorized persons to exit immediately if they have entered the permit space, and
- Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.
- Perform no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

16.5 Identifying Confined Spaces

The first step toward conducting a safe confined space entry is to identify the space as potentially dangerous. All confined spaces shall be considered permit required until pre-entry procedures demonstrate otherwise. To clarify what constitutes a confined space, the following definition will be used.

A **Confined Space** is any space that has the following characteristics:

- Large enough or so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit. Confined space openings are limited primarily by size and location. Openings may be small in size and may be difficult to move through easily. However, in some cases openings may be very large, for example, open topped spaces such as pits or excavations. Entrance and exit may be required from top, bottom, or side. Size or location may make rescue efforts difficult.
- Is not designed for continuous employee occupancy. Most confined spaces are not designed for employees to enter and work on a routine basis. They may be designed to store a product, enclose materials and process, or transport products or substances. Therefore, occasional employee entry for inspection, maintenance, repair, cleanup, or similar tasks, is often difficult and dangerous. The danger associated with entry may come from chemical or physical hazards within the space.

Non-Permit Confined Space means a confined space that does not contain, nor has the potential to contain, any hazard capable of causing death or serious physical harm.

Permit Required Confined Space means a confined space that has one or more of the following characteristics:

- Contains or has the potential to contain a hazardous atmosphere.
- Contains a material that has the potential for engulfing an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section.

Contains any other recognized serious safety or health hazard.

Based on the definition, many types of spaces may be considered confined and therefore, hazardous. Some examples of confined spaces might be sewers, electrical vaults, steam tunnels, mechanical rooms, or other similar types of enclosures.

It is the responsibility of the department heads to evaluate potentially hazardous spaces within facilities or areas under their control and ensure that the proper precautions are taken for safety. This responsibility may be delegated to a competent person within the department provided he/she is qualified. It may be determined that a space presents no real danger for employees. However, until the space has been evaluated and tested, it shall be assumed to be confined and potentially dangerous. Once a space has been evaluated and it has been determined that confined space characteristics are present, the EHS shall determine if the confined space requires a permit and will apply appropriate labeling.

16.6 Identifying Confined Space Hazards

Once a space has been identified as confined, the hazards that may be present within the confined space must be identified. Confined space hazards can be grouped into the following categories:

- Oxygen deficient atmospheres
- Flammable atmospheres
- Toxic atmospheres
- Mechanical and physical hazards

Every confined space must be evaluated for these four types of hazards. The three types of atmospheric hazards are often the most difficult to identify since they are normally invisible.

Oxygen Deficient Atmospheres

- The normal atmosphere is composed of approximately 21% oxygen and 79% nitrogen. An atmosphere containing less than 19.5% oxygen shall be considered oxygen deficient. The oxygen level inside a confined space may be decreased as the result of either consumption or displacement.
- There are a number of processes which consume oxygen in a confined space. Oxygen is consumed during combustion of flammable materials, as in welding, cutting, or brazing. A more subtle consumption of oxygen occurs during bacterial action, as in fermentation process. Oxygen can also be consumed during chemical reactions such as in the formation of rust on the exposed surfaces of a confined space. The number of people working in a confined space and the amount of physical activity can also influence oxygen consumption. Oxygen levels can also be reduced as the result of oxygen displacement by other gases.

Flammable Atmospheres

- Flammable atmospheres are generally the result of flammable gases, vapors, dust mixed in certain concentrations with air, or an oxygen enriched atmosphere.
- Oxygen enriched atmospheres are those atmospheres which contain an oxygen concentration greater than 23.5%. An oxygen enriched atmosphere will cause flammable materials such as clothing and air to burn violently when ignited.

- Combustible gases or vapors can accumulate within a confined space when there is inadequate ventilation. Gases that are heavier than air will accumulate in the lower levels of a confined space. Therefore, it is especially important that atmospheric tests be conducted near the bottom of all confined spaces.
- The Work being conducted in a confined space can generate a flammable atmosphere. Work such as spray painting, coating, or the use of flammable solvents for cleaning can result in the formation of an explosive atmosphere. Welding or cutting with oxyacetylene equipment can also be the cause of an explosion in a confined space and shall not be allowed without a hot work permit. Oxygen and acetylene hoses may have small leaks in them which could generate an explosive atmosphere, and therefore should be removed when not in use. The atmosphere shall be tested continuously while any hot work is being conducted within the confined space.

Toxic Atmospheres

- Toxic Atmospheres may be present within a confined space as the result of one or more of the following:
 - The product stored in the confined space. When a product is stored in a confined space, the product can be absorbed by the walls and give off toxic vapors when removed or when cleaning the residual materials. The products can also produce toxic vapors which will remain in the atmosphere due to poor ventilation.
 - The work being conducted in the confine space. Toxic atmospheres can be generated as the result of work being conducted inside the confined space. Examples of such work include: welding or brazing with metals capable of producing toxic vapors, painting, scraping, sanding, etc. Many of the solvents used for cleaning and/or degreasing produce highly toxic vapors.
 - Areas adjacent to the confined space. Toxic fumes produced by processes near the confined space may enter and accumulate in the confined space. For example, if the confined space is lower than the adjacent area and the toxic fume is heavier than air, the toxic fume may settle into the confined space.

Mechanical and Physical Hazards

- Problems such as rotating or moving mechanical parts or energy sources can create hazards within a confined space. All rotating or moving equipment such as pumps, process lines, electrical sources, etc., within a confined space must be identified.
- Physical factors such as heat, cold, noise, vibration, and fatigue can contribute to accidents. These factors must be evaluated for all confined spaces.
- Excavations could present the possibility of engulfment. Employees shall be protected from cave ins by sloping, benching, or shoring systems when the depth of the excavation is more than four feet, in accordance with 29 CFR 1926.652.

16.7 Confined Space Entry Program

- Identifying all confined spaces
- Preventing unauthorized entry
- The permit system
- Planning the entry
- Conducting pre-entry training
- Preparing the confined space for entry
- Utilizing safety equipment
- Atmospheric testing procedures
- Confined space cleaning procedures
- Rescue procedures

Identifying all confined spaces

All confined spaces located within a facility or under the facility's control should be identified. Once the space has been identified as confined, EHS shall determine if a permit is required.

All employees shall be made aware of these confined spaces through training or instructions provided by department heads or their designated representatives. Assistance with this training shall be provided by the EHS.

Preventing Unauthorized Entry

All employees shall be instructed by department heads or their designated representatives that entry into a confined space is prohibited without an authorized permit.

Department heads or their designated representatives shall instruct all employees to list their names on the authorized permit before they will be allowed to enter a confined space.

The Permit System

When a confined space must be entered, a permit shall be completed and authorized by EHS prior to entry of the confined space. This permit shall serve as certification that the space is safe for entry. The permit shall contain the date, the location of the space, site number of the space, and the signature of the person providing the certification.

A permit shall not be authorized until all conditions of the permit have been met. The permit will be returned to EHS once the permit is cancelled.

Planning the Entry

The first step towards conducting a safe confined space entry is to plan the entry. This will allow for the identification of all hazards, and for the determination of all equipment necessary, to complete the project.

- Gathering general data
- Identifying the hazards
- Ventilation of the confined space
- Isolating the confined space
- Purging/cleaning the confined space
- Placement of warning signs
- Identifying all personnel
- Identifying necessary equipment

Gathering General Data

Identify the confined space. Give the name, location, site number, of the Confined Space.

Give the reason for entering the confined space. Be specific. Also identify if hot work will be done. Identify the contents of the confined space. This refers to any chemicals or other materials and energy that are usually present in the confined space.

Identifying the Hazards

Note: It is recommended that atmospheric tests be conducted by the entry supervisor prior to the opening of any covers.

- The entry supervisor will determine the oxygen content and describe the testing procedures and equipment used.
- The entry supervisor will determine flammable gas content and describe the testing procedures and type analyzer used.

If a toxic substance is determined to be in the confined space during testing by the entry supervisor, EHS shall be contacted to assist in obtaining a Safety Data Sheet (SDS) or other chemical information to determine what type of personal protective equipment is required, the potential health effects, the Permissible Exposure Limits, and any other information needed to

safely conduct the work.

Department heads or their designated representatives will determine mechanical and physical hazards. They should list all items and energy that will require lockout/tagout, blanking and bleeding, disconnecting, or securing. Physical hazards should also be listed.

Ventilation of the Confined Space

Indicate whether mechanical or natural ventilation will be used. Describe the procedures to be used.

NOTE: If mechanical ventilation is to be used, the exhaust must be pointed away from personnel or ignition sources. Also, mechanical ventilators should be of the explosion-proof type and bonded to the confined space.

Isolating the Confined Space

Describe the procedures for disconnecting equipment or lockout and tagout. All mechanical, electrical, or heat producing equipment should be disconnected or locked and tagged out. This would also include any pumps that pull fluid from, or pump fluid into, the confined space.

Purging/Cleaning the Confined Space

Indicate if the confined space will be purged. Purging with inert gas is not recommended. If the space must be purged, describe the procedures.

Indicate the type of cleaning methods to be used. If chemical cleaners are to be used, name the type and describe the procedures. The SDS for the chemicals should be consulted prior to use.

NOTE: When introducing a chemical into a confined space, the compatibility of that chemical with the contents of the confined space must be checked. If in doubt, consult EHS.

NOTE: If steam is to be used, the hose should be bonded to the confined space.

Placement of Warning Signs

Indicate if warning signs or barriers will be needed to prevent unauthorized entry or to protect workers from external hazards. If the confined space will be left open and unattended for any length of time, warning signs and barriers will be required.

All Personnel

List all employees required to prepare the confined space and who will complete the work inside the space.

Identifying Necessary Equipment

List all equipment that will be necessary to complete the project.

Conducting Training

Department heads or their designated representatives must train all employees who will be involved in confined space entry. The training should be conducted before any entry into confined spaces takes place. Contact EHS for assistance in proper training.

The following outline should be used for training:

- Identify the confined space, the reason for entry
- Identify the work detail
- Inform entrants of all known or suspected hazards.
- Identify isolation procedures.
- Identify purging and/or ventilation procedures.
- Identify all equipment needed
- Determine necessary personal protective equipment
- Establish communication
- Protect from external hazards
- Pre-plan rescue procedures

Place the Confined Space Back Into Service

- Identify the confined space and the reason(s) for entry
- Identify the work detail
 - Assign each employee the job(s) he/she is to perform in the entry project (entrant, attendant, etc.)
 - If an employee is required to use a piece of equipment, be sure that he/she is capable of using the equipment properly
 - Inform all personnel that no one is to enter the confined space unless the attendant is present at the work site
- Inform entrants of all known or suspected hazards
- Inform personnel of any access or exit problems
- Inform personnel of all equipment that must be locked out or tagged out
- Inform personnel of the contents of the confined space
- Inform personnel of all atmospheric levels that must be maintained before entering and while working in the confined space

Steps for Toxic Atmosphere or Substance

If a toxic atmosphere or substance is present or could become present, these steps must be completed:

- If respiratory protection is not going to be used, inform personnel of the maximum permissible exposure level (PEL) that can exist within the confined space, and the method used to monitor PEL.
- Inform personnel of the potential health effects of the exposure to the toxic atmosphere or substance.
- Inform personnel of the signs and symptoms of exposure to the toxic fume.
- Inform personnel of the personal protective equipment (PPE) that they will be required to wear.
 - If entrants are unaware of the proper use of the PPE, they must be trained in the proper use of equipment.
 - Persons should not be assigned to tasks requiring use of respirators unless it has been determined that they are physically able to perform the work and use the equipment. A local physician shall determine what health and physical conditions are pertinent. The respirators user's medical status should be reviewed periodically (at least annually). (29CFR1910.134.10)
- Identify isolation procedures.
- Inform the personnel responsible for the lockout/ tagout of all equipment that must be isolated.
- Inform the personnel responsible for performing this function of the methods to be used.
- Identify purging and/or ventilation procedures.
- Inform all personnel responsible for performing this function of the methods to be used.
- Identify all equipment needed.
- Inform personnel involved in the project of all equipment that will be necessary to complete the project.
- Make sure that all employees are capable of using their assigned equipment properly.
- Determine necessary personal protective equipment for each participant.
- Inform personnel of all PPE that must be used.
- Make sure that all personnel required to use PPE are trained in proper use of the equipment.
- Establish communication
 - Inform all entrants that they are required to maintain communication with the attendant.
 - Inform attendant that he/she must maintain constant contact with all entrants
 - Inform personnel of the type of communication they are to use.
- Protect from external hazards. Inform personnel where signs and barriers will be placed to prevent unauthorized entry and protect entrants from external hazards.

- Pre-plan rescue procedures.
 - The designated attendant should be informed of the rescue procedures to be followed.
 - The attendant should be informed that he/she can have no other duty but to maintain contact with personnel inside the confined space.
 - Inform the attendant not to enter the confined space under any circumstances.
- Place the confined space back into service. (Inform personnel of the steps to be taken to place the confined space back into service).

Preparing the confined space for entry

The following steps are to be followed when preparing the confined space for entry:

- If warning signs or barriers are to be used to prevent unauthorized entry or to protect entrants from external hazards, place on or around the confined space as planned and discussed in training.
- Place all tools, safety equipment, monitoring equipment, etc., near the confined space.
- Isolate all mechanical and/or electrical hazards as planned and discussed in training.
- Purge/ventilate the confined space as planned and discussed in training.
- The entry supervisor will test the atmosphere as discussed in training.
 - If oxygen content is less than 19.5% or greater than 23.5% perform additional ventilation. Then shut off ventilation equipment and retest the oxygen content.
 - If oxygen content is between 19.5% and 23.5% continue entry preparation.
- The entry supervisor will test for flammable gas level as planned and discussed in training.
 - If the meter reading is less than 10% of the lower explosive limit (LEL), continue entry preparations.
 - If the meter reading is above 10% of the LEL, continue ventilation of the confined space. Then shut off the ventilation and have the atmosphere retested.
 - If the meter reading is still above 10% of the LEL, the confined space must be cleaned before entry is permitted. If the confined space must be entered for cleaning purposes, the procedures outlined in Confined Space Cleaning Procedures must be followed.
- The entry supervisor will determine the toxicity of the atmosphere as planned and discussed in training. If a toxic atmosphere is present, no person will be permitted to enter the confined space at a level exceeding the Permissible Exposure Limit without proper Personal Protective Equipment. (Environmental Management should be called to assist in identifying proper precautions and the protective measures to be taken).
- Assemble all personnel involved and conduct a simulated rescue drill.
- The entry supervisor will add any needed information, then complete and sign the permit.

Utilizing Safety Equipment

Where practical, all personnel entering a confined space should be equipped with a retrieval line and safety line secured at one end to the entrant by a full body harness with the other ends secured to a tripod lifting hoist, or a secure anchor.

Atmospheric Testing Procedures

- All testing equipment shall be calibrated by EHS per instructions by the manufacturer.
- All the manufacturer's operating instructions must be followed.
- The test equipment should be tested in a known atmosphere to insure its accuracy.
- Ventilation equipment must be shut off before conducting any atmospheric tests.
- The atmosphere must be tested at the bottom, top, and middle of all confined spaces.
- The atmosphere must be continuously monitored while work is being conducted in the confined space.
- If the confined space is left for any reason, the atmosphere must be retested before reentering the space.

Confined Space Cleaning Procedures

If cleaning must be conducted in a confined space to achieve acceptable atmospheric conditions, the following procedures must be followed:

- All entrants must be equipped with designated safety equipment.
- All entrants must be equipped with an SCBA.
- No spark producing tools will be allowed for use.

Rescue Procedures

In the event of an emergency, the attendant should:

- Immediately summon the City of Denton Fire Department by telephone or radio. (Dial 911).
- Attempt to remove the victim by use of the retrieval lines from outside the confined space if this can be accomplished without creating further hazard for the entrant or the attendant.
- If the attendant is able to remove the victim with the retrieval line, he/she should administer aid within the limits of his/her training until emergency medical services (EMS) arrive.
- If the attendant is unable to remove the victim by using the retrieval line, he or she must wait for help to arrive. The attendant is not to enter the confined space for any reason.

- Give EMS personnel any information they request.
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16.8 References

1. Title 29 of the Code of Federal Regulations Part 1910.146 – Permit – Required Confined Spaces. U.S. Government Printing Office.
 2. National Safety Council Data Sheet 1-704-85 – Confined Space Entry Control System for R&D operations, National Safety News.
 3. N.I.O.S.H. Training and Resource Procedures – Safety and Health in Confined Workspaces for the Construction Industry.
 4. N.I.O.S.H. 97-113 A Guide to Safety in Confined Spaces
 5. University of Oklahoma – Confined Space Program, 1995
 6. The University of Texas Health Science Center at Houston
 7. City of Stillwater, Oklahoma – Confined Space Entry Procedures, 1990
 8. Title 29 of the Code of Federal Regulations part 1926.652 – Requirements for Protective Systems.
 9. Title 29 of the Code of Federal Regulations part 1910.147 – The Control of Hazardous Energy.
 10. Title 29 of the Code of Federal Regulations part 1910.134 – Respiratory Protection.
 11. Safety and Health in Confined Spaces by Neil Mcmanus, 1999
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16.9 FOEHS/Records

HSC Confined Space Identification and Hazard Assessment

HSC Hot work Permit

HSC Confined Space Permit

17. Appendix C: Fall Protection Program

17.1 Introduction

OSHA General Industry Standards require that fall protection measures be employed when work is being performed at a height of four feet or greater off the ground or to the next lower level. An exception to this rule would be when work is performed from a properly installed ladder or scaffold. Other exclusions from fall protection include the performance of inspections, investigations, or assessments of existing conditions prior to beginning or after completion of work or a maintenance activity. However, any time work is being performed four feet or greater above the ground or to the next lower level, supervisors and workers should always consider Fall Protection requirements.

17.2 Prevention

To prevent employees from being injured by falls, employers must:

- A) Guard every floor hole into which a worker can accidentally walk, by use of a railing and a toe board or a floor hole cover.
 - B) Provide a guardrail and toe board around every open-sided platform, floor or runway that is 4 feet or higher off the ground or next level.
 - C) Regardless of height, if a worker can fall into or onto dangerous machines, equipment or materials, guardrails and toe boards must be installed to prevent falls and injuries.
 - D) Other means of fall protection that may be required on certain jobs include safety harness and line, safety nets, stair railings and handrails.
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17.3 Fall Protection Systems

The most common types of Fall Protection Systems include the following:

- A) Guardrails and Toe Boards: Consisting of a top rail 42 inches from the floor, a mid-rail at 21 inches height and a toe board (minimum of 4 inches high with no more than 1/2-inch clearance between bottom of board and floor).
- B) Safety Net System: Includes a net system installed as close as possible under the work area.
- C) Control Zone System: Consisting of a cable or rope and stanchions installed parallel to and not less than 6 feet from the unprotected edge to warn personnel of the approaching unprotected edge. High visibility flagging shall be installed on the cable/rope at intervals of not more than 6 feet.
- D) Personal Fall Arrest System: Minimum system consists of a body harness, lanyard, connector and an anchorage point that will support a minimum of 5000 lbs.
- E) Positioning Device System: Consisting of a full body harness with attachment points or a body harness and additional body belt rigged to support an individual on an elevated vertical or inclined surface to allow work with both hands free.
- F) Hole Covers: Covers are designed and built to fit holes in working surfaces (ex. floors) and structurally sufficient to allow walking across without failure.

17.4 Precautions

Body harnesses are required to be worn with all personal Fall Arrest Systems. Body belts may be worn in addition to body harnesses to allow for positioning of the worker. Only locking-type snap-hooks may be used as part of a Fall Arrest System.

17.5 Training

Fall protection training for HSC employees must consist of the following as a minimum:

- A) The nature of fall hazards in the work area and how to recognize and minimize fall hazards.
 - B) The role of the user in Fall Protection Systems.
 - C) Use, operation and limitations of Fall Protection Systems.
 - D) The procedures for erecting, maintaining, inspecting and disassembling Fall Protection Systems being used.
1. Work cooperatively with EHS to identify areas where fall protection is required for jobs and maintenance evolutions consistent with Departmental responsibilities.
 2. Purchase or obtain Fall Protection Systems consistent with typical jobs or maintenance activity.
 3. Ensure workers are trained in the proper inspection, assembly, wearing, use and disassembly of Fall Protection Systems.
 4. Know when fall protection is required for workers and the job function.
 5. Provide workers with proper fall protection.
 6. Ensure workers use fall protection as required and in correct manner.
 7. Supervisors should set the example!
 8. Assist departments in identifying where fall protection is required.
 9. Provide fall protection training.
 10. Attend training and successfully pass written and practical exam.
 11. Know inspection procedures for Fall Protection Systems.
 12. Wear and use fall protection in correct manner and at all time when working above 4 feet and not protected by other acceptable equipment (ex. an inspected and correct ladder).

18. Appendix D: Respiratory Protection Plan

18.1 Objective

The UNT HSC Respiratory Protection Program is designed to protect employees by establishing accepted practices for respirator use, providing guidelines for training and respirator selection, and explaining proper storage, use and care of respirators. This program also serves to help the company and its employees comply with Occupational Safety and Health Administration (OSHA) respiratory protection requirements as found in 29 CFR 1910.134.

18.2 Assignment of Responsibility

18.2.1 Employer

UNT HSC is responsible for providing respirators to employees and students when they are necessary for health protection. UNT HSC will provide respirators that are applicable and suitable for the intended purpose at no charge to affected employees. Any expense associated with training, medical evaluations and respiratory protection equipment will be borne by HSC.

18.2.2 Environmental Health and Safety Office

The EH&S Office is responsible for administering the respiratory protection program. Duties of the EH&S Office include:

- Identifying work areas, process or tasks that require workers to wear respirators.
- Evaluating hazards.
- Selecting respiratory protection options.
- Monitoring respirator use to ensure that respirators are used in accordance with their specifications.
- Conducting training.
- Evaluating the program.
- Updating written program, as needed.
- Conducting fit testing

18.2.3 UNTHSC Student Health

UNTHSC Student Health is responsible for administering the components of the program that involve personal health information and medical recommendations, including:

- Conducting fit testing.
- Administering the medical surveillance program.

- Maintaining records required by the program.

18.2.4 Individual Departments and Contractors

Each individual department and contractor are responsible for purchasing and maintaining respiratory protection devices for their employees who are required to wear it due to their job. UNTHSC departments will be responsible for notifying UNTHSC Student Health which of its employees are required to be in the respiratory protection program as determined by EH&S or by their department subject matter experts. UNTHSC Student Health does not provide medical clearance for respiratory protection to contractors. Contractors should be referred to their company's own occupational health provider. The department is responsible for any costs incurred due to construction or installation of engineering controls.

18.2.5 Supervisors

Supervisors are responsible for ensuring that the respiratory protection program is implemented in their particular areas. In addition to being knowledgeable about the program requirements for their own protection, supervisors must also ensure that the program is understood and followed by the employees under their charge. Duties of the supervisor include:

- Ensuring that employees under their supervision (including new hires) receive appropriate training, annual fit testing, and annual medical evaluation.
- Ensuring the availability of appropriate respirators and accessories.
- Being aware of tasks requiring the use of respiratory protection.
- Enforcing the proper use of respiratory protection when necessary.
- Ensuring that respirators are properly cleaned, maintained, and stored according to this program.
- Ensuring that respirators fit well and do not cause discomfort.
- Continually monitoring work areas and operations to identify respiratory hazards.
- Coordinating with the EH&S Office on how to address respiratory hazards or other concerns regarding this program.

18.2.6 Employees

Each employee is responsible for wearing his or her respirator when and where required and in the manner in which they are trained. Employees must also:

- Care for and maintain their respirators as instructed, guard them against damage, and store them in a clean, sanitary location.
- Inform their supervisor if their respirator no longer fits well, and request a new one that fits properly.
- Inform their supervisor or the EH&S Office of any respiratory hazards that they feel are not adequately addressed in the workplace and of any other concerns that they have regarding this program.

- Use the respiratory protection in accordance with the manufacturer's instructions and the training received.

18.3 Applicability

This program applies to all employees who are required to wear respirators during normal work operations, as well as during some non-routine or emergency operations, such as a spill of a hazardous substance.

In addition, any employee who voluntarily wears a respirator when one is not required (i.e., in certain maintenance and coating operations) is subject to the medical evaluation, cleaning, maintenance, and storage elements of this program, and will be provided with necessary training. Employees who voluntarily wear filtering face pieces (dust masks) are not subject to the medical evaluation, cleaning, storage, and maintenance provisions of this program.

18.4 Program

18.4.1 Hazard Assessment and Respirator Selection

The EH&S Office will select respirators to be used on site, based on the hazards to which workers are exposed and in accordance with the OSHA Respiratory Protection Standard. The EH&S Office will conduct a hazard evaluation for each operation, process, or work area where airborne contaminants may be present in routine operations or during an emergency. The hazard evaluations shall include:

- Identification and development of a list of hazardous substances used in the workplace by department or work process.
- Review of work processes to determine where potential exposures to hazardous substances may occur. This review shall be conducted by surveying the workplace, reviewing the process records, and talking with employees and supervisors.
- Exposure monitoring to quantify potential hazardous exposures.

The proper type of respirator for the specific hazard involved will be selected in accordance with the manufacturer's instructions.

18.4.2 Updating the Hazard Assessment

The EH&S Office must revise and update the hazard assessment as needed (i.e., any time work process changes may potentially affect exposure). If an employee feels that respiratory protection is needed during a particular activity, he/she is to contact his/her supervisor or the EH&S Office. The EH&S Office will evaluate the potential hazard, and arrange for outside assistance as necessary. The EH&S Office will then communicate the results of that assessment to the employees. If it is determined that respiratory protection is necessary, all other elements of the respiratory protection program will be in effect for those tasks, and the respiratory program will be updated accordingly.

18.4.3 Training

EHS, or departments will provide training on the use, maintenance, and limitations of respiratory protection to all

University employees who are required to wear respiratory protection while performing work for the University. Training is required at a minimum upon entrance into the Respiratory Protection Program.

18.4.4 NIOSH Certification

All respirators must be certified by the National Institute for Occupational Safety and Health (NIOSH) and shall be used in accordance with the terms of that certification. Also, all filters, cartridges, and canisters must be labeled with the appropriate NIOSH approval label. The label must not be removed or defaced while the respirator is in use.

18.4.5 Voluntary Respirator Use

The EH&S Office shall authorize voluntary use of respiratory protective equipment as requested by all other workers on a case-by-case basis, depending on specific workplace conditions and the results of medical evaluations.

Employees who choose to wear a half face piece APR must comply with the procedures for Medical Evaluation, Respirator Use, Cleaning, Maintenance and Storage portions of this program.

Employees who voluntarily wear disposable filtering face piece respiratory protection, i.e. dusk masks or N95 respirators, are not subject to the medical evaluation, fit testing, and formal training.

18.4.6 Medical Evaluation

Employees who are either required to wear respirators, or who choose to wear a half face piece APR voluntarily, must pass a medical exam provided UNTHSC Student Health before being permitted to wear a respirator on the job. Employees are not permitted to wear respirators until a physician has determined that they are medically able to do so. Any employee refusing the medical evaluation will not be allowed to work in an area requiring respirator use.

A licensed physician at the UNTHSC Student Health Clinic will provide the medical evaluations. Medical evaluation procedures are as follows:

- The medical evaluation will be conducted using the questionnaire provided by the UNTHSC Student Health in compliance with the OSHA Respiratory Protection Standard.
- To the extent feasible, the company will provide assistance to employees who are unable to read the questionnaire. When this is not possible, the employee will be sent directly to the physician for medical evaluation.
- All affected employees will be given a copy of the medical questionnaire to complete. Employees will be permitted to complete the questionnaire on company time.
- Follow-up medical exams will be granted to employees as required by the Standard, and/or as deemed necessary by the evaluating physician.

- All employees will be granted the opportunity to speak with the physician about their medical evaluation, if they so request.
- Positive pressure air purifying respirators will be provided to employees as required by medical necessity.
- After an employee has received clearance to wear his or her respirator, additional medical evaluations will be provided under the following circumstances:
 - The employee reports signs and/or symptoms related to their ability to use the respirator, such as shortness of breath, dizziness, chest pains or wheezing.
 - The evaluating physician or supervisor informs the EH&S Office that the employee needs to be reevaluated.
 - Information found during the implementation of this program, including observations made during the fit testing and program evaluation, indicates a need for reevaluation.
 - A change occurs in workplace conditions that may result in an increased physiological burden on the employee.

All examinations and questionnaires are to remain confidential between the employee and the physician. The EH&S Office will only retain the physician's written recommendations regarding each employee's ability to wear a respirator.

18.4.7 Fit Testing

Employees who are required to or who voluntarily wear half-face piece APRs will be fit tested:

- prior to being allowed to wear any respirator with a tight-fitting face piece;
- annually; or
- when there are changes in the employee's physical condition that could affect respiratory fit (e.g., obvious change in body weight, facial scarring, etc.).

Employees will be fit tested with the make, model, and size of respirator that they will actually wear. Employees will be provided with several models and sizes of respirators so that they may find an optimal fit. Fit testing of powered air purifying respirators will be conducted in the negative pressure mode.

18.4.8 General Respirator Use Procedures

- Employees will use their respirators under conditions specified in this program, and in accordance with the training they receive on the use of each particular model. In addition, the respirator shall not be used in a manner for which it is not certified by NIOSH or by its manufacturer.
- All employees shall conduct user seal checks each time they wear their respirators. Employees shall use either the positive or negative pressure check (depending on which test works best for them) as specified in the OSHA Respiratory Protection Standard.

- Positive Pressure Test: This test is performed by closing off the exhalation valve with your hand. Breathe air into the mask. The face fit is satisfactory if some pressure can be built up inside the mask without any air leaking out between the mask and the face of the wearer.
- Negative Pressure Test: This test is performed by closing of the inlet openings of the cartridge with the palm of you hand. Some masks may require that the filter holder be removed to seal off the intake valve. Inhale gently so that a vacuum occurs within the face piece. Hold your breath for ten (10) seconds. If the vacuum remains, and no inward leakage is detected, the respirator is fit properly.
- All employees shall be permitted to leave the work area to maintain their respirator for the following reasons:
 - to clean their respirator if it is impeding their ability to work;
 - to change filters or cartridges;
 - to replace parts; or
 - to inspect respirator if it stops functioning as intended.

Employees should notify their supervisor before leaving the area.

- Employees are not permitted to wear tight-fitting respirators if they have any condition, such as facial scars, facial hair, or missing dentures, that would prevent a proper seal. Employees are not permitted to wear headphones, jewelry, or other items that may interfere with the seal between the face and the face piece.
- Before and after each use of a respirator, an employee or immediate supervisor must make an inspection of tightness or connections and the condition of the face piece, headbands, valves, filter holders and filters. Questionable items must be addressed immediately by the supervisor and/or EH&S Office.

18.4.9 Air Quality

For supplied-air respirators, only Grade D breathing air shall be used in the cylinders. The EH&S Office will coordinate deliveries of compressed air with the company's vendor and will require the vendor to certify that the air in the cylinders meets the specifications of Grade D breathing air.

18.4.10 Change Schedules

Respirator cartridges shall be replaced as determined by the EH&S Office, supervisor(s), and manufacturers' recommendations.

18.4.11 Cleaning

Respirators issued for the exclusive use of an employee shall be cleaned as often as necessary. Atmosphere-supplying and emergency use respirators are to be cleaned and disinfected after each use.

The following procedure is to be used when cleaning and disinfecting reusable respirators:

- Disassemble respirator, removing any filters, canisters, or cartridges.

- Wash the face piece and all associated parts (except cartridges and elastic headbands) in an approved cleaner-disinfectant solution in warm water (about 120 degrees Fahrenheit). Do not use organic solvents. Use a hand brush to remove dirt.
- Rinse completely in clean, warm water.
- Disinfect all facial contact areas by spraying the respirator with an approved disinfectant.
- Air dry in a clean area.
- Reassemble the respirator and replace any defective parts. Insert new filters or cartridges and make sure the seal is tight.
- Place respirator in a clean, dry plastic bag or other airtight container.

18.4.12 Maintenance

Respirators are to be properly maintained at all times in order to ensure that they function properly and protect employees adequately. Maintenance involves a thorough visual inspection for cleanliness and defects. Worn or deteriorated parts will be replaced prior to use. No components will be replaced or repairs made beyond those recommended by the manufacturer. Repairs to regulators or alarms of atmosphere-supplying respirators will be conducted by the manufacturer.

- All respirators shall be inspected routinely before and after each use.
- The Respirator Inspection Checklist (Attachment D) will be used when inspecting respirators.

18.4.13 Storage

After inspection, cleaning, and necessary repairs, respirators shall be stored appropriately to protect against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals.

- Respirators must be stored in a clean, dry area, and in accordance with the manufacturer's recommendations. Each employee will clean and inspect their own air-purifying respirator in accordance with the provisions of this program, and will store their respirator in a plastic bag in the designated area.
- Respirators shall be packed or stored so that the face piece and exhalation valve will rest in a near normal position.
- Respirators shall not be placed in places such as lockers or toolboxes unless they are in carrying cartons.

18.4.14 Respirator Malfunctions and Defects

- For any malfunction of an ASR (atmosphere-supplying respirator), such as breakthrough, face piece leakage, or improperly working valve, the respirator wearer should inform his/her supervisor that the respirator no longer functions as intended, and go to the designated safe area to maintain the respirator. The supervisor must ensure that the employee either receives the needed parts to repair the respirator or is provided with a new respirator.

All workers wearing atmosphere-supplying respirators will work with a buddy. The EH&S Office shall develop and inform employees of the procedures to be used when a buddy is required to assist a coworker who experiences an ASR malfunction.

- Respirators that are defective or have defective parts shall be taken out of service immediately. If, during an inspection, an employee discovers a defect in a respirator, he/she is to bring the defect to the attention of his/her supervisor. Supervisors will give all defective respirators to the EH&S Office. The EH&S Office will decide whether to:
 - temporarily take the respirator out of service until it can be repaired;
 - perform a simple fix on the spot, such as replacing a head strap; or
 - dispose of the respirator due to an irreparable problem or defect.

18.4.15 Emergency Procedures

In emergency situations where an atmosphere exists in which the wearer of the respirator could be overcome by a toxic or oxygen-deficient atmosphere, the following procedure should be followed.

- When the alarm sounds, employees in the affected area must immediately don their emergency escape respirator, shut down their process equipment, and exit the work area.
- All other employees must immediately evacuate the building. UNTHSC's Emergency Management Plan describes these procedures (including proper evacuation routes and rally points) in greater detail.
- Employees who must remain in a dangerous atmosphere must take the following precautions:
 - Employees must never enter a dangerous atmosphere without first obtaining the proper protective equipment and permission to enter from the EH&S Office or supervisor.
 - Employees must never enter a dangerous atmosphere without at least one additional person present. The additional person must remain in the safe atmosphere.
 - Communications (voice, visual or signal line) must be maintained between both individuals or all present.
 - Respiratory protection in these instances is for escape purposes only. UNTHSC employees are not trained as emergency responders, and are not authorized to act in such a manner.

18.4.16 Program Evaluation

The EH&S Office will conduct periodic evaluations of the workplace to ensure that the provisions of this program are being implemented. The evaluations will include regular consultations with employees who use respirators and their supervisors, site inspections, air monitoring and a review of records. Items to be considered will include:

- comfort;
- ability to breathe without objectionable effort;

- adequate visibility under all conditions
- provisions for wearing prescription glasses;
- ability to perform all tasks without undue interference; and
- confidence in the face piece fit.

Identified problems will be noted in an inspection log and addressed by the EH&S Office. These findings will be reported to the UNTHSC administration and the report will list plans to correct deficiencies in the respirator program and target dates for the implementation of those corrections.

18.4.17 Documentation and Recordkeeping

- A written copy of this program and the OSHA Respiratory Protection Standard shall be kept in the EH&S Office's office and made available to all employees who wish to review it.
- Copies of training will be kept by the respective departments and fit test records shall be maintained by the UNHSC Student Health Clinic. These records will be updated as new employees are trained, as existing employees receive refresher training, and as new fit tests are conducted
- For employees covered under the Respiratory Protection Program, the UNHSC Student Health Clinic shall maintain copies of the physician's written recommendation regarding each employee's ability to wear a respirator. The completed medical questionnaires and evaluating physician's documented findings will remain confidential in the employee's medical records in UNHSC Student Health Clinic.



ATTACHEMENT B

Hazard Evaluation

Process Hazard Evaluation for UNT HSC	
Process	Noted Hazards

(Include documentation of the sampling data that hazard evaluation is based on.)



ATTACHMENT C
Record of Respirator Issuance

UNT HSC Personnel in Respiratory Protection Program				
Respiratory protection is required for and has been issued to the following personnel:				
Name	Department	Job Description/ Work Procedure	Type of Respirator	Date Issued

• **ATTACHMENT D**
Respirator Inspection Checklist

Type of Respirator:	Location:
Respirator Issued to:	Type of Hazard:
Face piece	<input type="checkbox"/> Cracks, tears, or holes <input type="checkbox"/> Face mask distortion <input type="checkbox"/> Cracked or loose lenses/face shield
Head straps	<input type="checkbox"/> Breaks or tears <input type="checkbox"/> Broken buckles
Valves:	<input type="checkbox"/> Residue or dirt <input type="checkbox"/> Cracks or tears in valve material
Filters/Cartridges:	<input type="checkbox"/> Approval designation <input type="checkbox"/> Gaskets <input type="checkbox"/> Cracks or dents in housing <input type="checkbox"/> Proper cartridge for hazard
Air Supply Systems	<input type="checkbox"/> Breathing air quality/grade <input type="checkbox"/> Condition of supply hoses <input type="checkbox"/> Hose connections <input type="checkbox"/> Settings on regulators and valves
Rubber/Elastomer Parts	<input type="checkbox"/> Pliability <input type="checkbox"/> Deterioration

Inspected by:	Date:
Action Taken:	