OCCUPATIONAL SAFETY PLAN

The Occupational Safety Plan was developed to assure safe and healthful working conditions for all faculty, staff, and students, based on OSHA requirements. This plan covers those aspects of safety not addressed in other UNT safety plans and guidelines.

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1 INTRODUCTION

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

This manual has been prepared by the UNT Risk Management Services (RMS) to prevent injuries, illnesses, and death from work related activities and to protect UNT resources. The goal is to control of all types of hazards encountered in the performance of duties in service to UNT.

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.

This manual brings together information that will assist employees and supervisors in fulfilling their responsibilities to ensure a safe environment at UNT.

All personnel should become familiar with the information contained in this manual.

1.2 SCOPE

The information and procedures listed in this manual are applicable to all areas of UNT and represent only general minimum standards. They do not substitute for special operation manuals used in certain buildings or laboratories to address 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, 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

This document has been created to assist in hazard mitigation at UNT. It has been developed using current industry best practices, as well as state and federal regulations. As regulations and guidelines promulgated by the Occupational Safety and Health Administration (OSHA), the Environmental Protection Agency (EPA), the National Fire Protection Association (NFPA), the National Institute of Occupational Safety and Health (NIOSH), and the Texas Administrative Code (TAC) are updated, the online version of this manual will be updated as needed. This document will be reviewed at least annually.

1.4 RECORD OF CHANGES

Change #	Date of Change	Change Entered by	Description
24-01	**09-12-24**	**Steven Wilson**	**Major revision**

1.5 EH&S Program Contacts

Subject	Office Name	Telephone	Email
Scott Dunkle	Exc. Dir. Risk Mngt.	940-565-4751	Scott.dunkle@unt.edu
Chris Erickson	Director EHS	940-565-2167	Chris.erickson@unt.edu
Steven Wilson	Occ. Sfty. Prog. Mgr	940-369-8146	Steven.wilson2@unt.edu
Tyler Godby	Asb. Mngt. Planner	940-369-8790	Tyler.godby@unt.edu

1.6 Emergency Phone Numbers

Police/Fire Emergency 911 for all emergencies	Police Dispatch	940-565-3000
Emergency Power Outage	Facilities	940-565-2700
Hazardous Material Release/Spill 911 for all emergencies	Police Dispatch	940-565-3000
Hazardous Material Exposure: Skin, Eyes, Ingested, Inhaled, Injected 911 for all emergencies	Occupational Health	940-565-2109

1.7 Other Important Institutional Phone Numbers

Abuse of Children, Elderly, or Disabled Clay Simmons VP & Chief Integrity Officer	940-565-4364
Ethics Abuse Clay Simmons VP & Chief Integrity Officer	940-565-4364

1.8 UNT Relevant Website links

Report an Ethics Compliant	Call 877-606-9187 or Text 940-340-5156
First Report of Injury	

Student complaints	

2 PROGRAM MANAGEMENT

2.7 PROGRAM ELEMENTS

The following program elements are applicable to all university operations and activities.

2.7.1 Prevention

RMS will advocate for strategies that will reduce or prevent negative outcomes for UNT students, faculty, contractors, and visitors as well as people in the neighboring communities.

2.7.2 Surveillance

RMS 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.

2.7.3 Protection and Control

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

2.7.4 Education, Promotion, and Training

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

2.7.5 Notification and Communication

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

2.7.6 Confidentiality

RMS, in compliance with UNT policies, will make every effort to ensure the confidentiality of employee health and exposure records.

2.7.7 Program Evaluation

RMS will conduct an annual evaluation of the program to ensure its alignment with regulatory and standards producing entities. This evaluation will assess the successes and opportunities for program improvement.

2.8 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 are 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 designated representative. Once completed, the work is inspected by Safety to ensure that it is compliant with the applicable standards.

2.9 ASSIGNMENT OF PROGRAM RESPONSIBILITY

2.9.1 Director for Environmental Health and Safety

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

2.9.1.1 Identifying the applicable standards, guidelines, and recommendations necessary for a safe and healthy workplace.

2.9.1.2 Requesting program reviews and audits for methods of continuous improvement.

2.9.1.3 Ensuring prompt and thorough accident/incident investigations and delivering accurate results to the appropriate departments.

2.9.1.4 Development of metrics to track event trends and initiate problem solving.

2.9.1.5 Ensuring UNT personnel take all necessary and appropriate safety precautions.

2.9.1.6 Providing vision and support for EHS managers.

2.9.2 Occupational Safety Program Manager

The Occupational Safety Program Manager is responsible for:

2.9.2.1 Identifying the applicable safety and health standards, rules, and regulations pertaining to the various areas of the UNT campus.

2.9.2.2 Providing an appropriate level of oversight when conditions require corrective actions.

2.9.2.3 Providing training and education opportunities.

2.9.2.4 Investigating and generating incident reports as requested.

2.9.2.5 Conducting regular surveys of UNT campus operations to ensure compliance with safety standards.

2.9.2.6 Initiating corrective actions necessary to remediate identified hazards or immediately dangerous to life and health (IDLH) conditions.

2.9.2.7 Ensuring UNT personnel take all necessary and appropriate safety precautions to protect themselves, others, property, and the environment.

2.9.2.8 Providing guidance and oversight for Occupational Specialists.

2.9.3 Occupational Safety Specialist

The Occupational Safety Program Specialist is responsible for:

2.9.3.1 Ensuring safe operations through facility and site inspections.

2.9.3.2 Maintaining comprehensive records of hazards at the operational level and providing information to program management.

2.9.3.3 Providing training and education opportunities.

2.9.3.4 Investigating and generating incident reports.

2.9.3.5 Conducting regular surveys of UNT campus operations to ensure compliance with safety standards.

2.9.3.6 Initiating corrective actions necessary to remediate identified hazards or immediately dangerous to life and health (IDLH) conditions.

2.9.3.7 Ensuring UNT personnel take all necessary and appropriate safety precautions to protect themselves and others.

2.9.4 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 shall ensure compliance 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 complete required training in safety and health precautions for their work. In fulfilling this responsibility, EHS shall be called upon for assistance as needed.

2.9.5 Employees

Employees at all levels throughout the university are responsible for complying with all health and safety standards and rules regarding activities in their work area. Employees have the responsibility to ensure that they complete all assigned workplace training courses in a timely manner. Everyone must take all necessary and appropriate safety precautions to protect themselves, other personnel, and the environment.

3 GENERAL HEALTH AND SAFETY

3.7 GENERAL

It is the goal of UNT to comply with all applicable regulations and guidelines from OSHA, EPA, NFPA, NIOSH and TAC. This section will provide basic information on the recognition, evaluation, and control of occupational health hazards to which employees may be exposed.

3.8 PREVENTION AND CONTROL OF WORKPLACE HAZARDS

To help meet university goals, the Occupational Safety Program was developed to provide a safe place to work and learn. All recognized safety and health hazards shall be mitigated using the hierarchy of controls, prioritizing hazards with the greatest risk.

3.8.1 Principles of Hazard Control

A. Elimination

- Does this task or activity need to be performed?
- Can we obtain the results in another manner or from another source?
- Can we perform this task from the ground rather than at elevation?
- Can we eliminate this blind spot?

B. Substitution / Replacement

- 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 substitutions are technically acceptable and to avoid introducing new or unforeseen hazards.

- Can we use a less toxic chemical? i.e., low-VOC paint?
- Can we use a different piece of equipment? i.e., a larger or newer forklift?

C. Engineering Controls

- 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, or remote-controlled equipment. Increasing distance from the hazard and reducing the amount of exposure time also work well.
- 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 substance.
- Speed limiters on golf carts.

D. 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 include training, establishing safe work procedures, preventive maintenance programs, adjusted work schedules or job rotation among those who work in high hazard and low hazard areas and limiting access to high hazard areas.
- Train and certify forklift operators.
- Training on warning devices like backup alarms.
- Train pedestrians where blind spots on forklifts are located.
- Train machine operators on the importance of not wearing jewelry or loose-fitting clothing.
- Electricians and other affected employees must follow LOTO procedures.

E. Personal Protective Equipment. (PPE)

This method of hazard control is least preferred because personal protective equipment may reduce a worker's productivity and is less effective than other methods of control. This control requires a worker to wear something and wear it properly. 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 and ensure it is used, stored, maintained and disposed of properly.

- High visibility vests, hard hats, safety glasses, welding helmets etc.
- Respiratory protection

3.8.2 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.

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

B. 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, RMS shall participate in the review of plans and specifications for construction and renovation projects.

C. Operating Procedures - Standard operating procedures, safety policies, or similar directives are to be developed as a collaborative effort between RMS and the effected department(s) to ensure comprehensive and functional policies and procedures are developed. All university employees and/ or (sub) contractors shall adhere to the appropriate safety policies for the work being performed.

D. Purchasing Procedures - Many hazards can be avoided by incorporating appropriate specifications for purchased equipment/material and contracted efforts that involve work at UNT facilities. UNT organizations responsible for developing specifications for such purchases should coordinate with RMS personnel to ensure that health and safety requirements are considered.

3.9 HAZARD REPORTING

Identification and reporting of potentially unsafe or unhealthful working conditions is the responsibility of all UNT employees. All employees are encouraged to report unsafe or unhealthy working conditions to RMS 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 Risk Management Service at 940-565-2109 or *AskRMS@unt.edu*. A safety representative will respond to the location to investigate the concern and collaborate directly with a responsible individual to mitigate the hazard.

3.10 HAZARD COMMUNICATION

UNT Facilities Services 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 UNT's Chemical Hygiene Plan and the Hazard Communication Program.

3.11 HEARING CONSERVATION

Noise is one of the most pervasive occupational health problems. Exposure to elevated levels of noise can cause 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 among individuals.

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

3.12 Mold Management program

Any visible mold contamination, regardless of the species, 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 RMS if any mold is found within the UNT buildings. Risk Management Services will survey the area to determine the extent of contamination and recommend a course of action.

3.13 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 UNT buildings, a licensed inspector must survey the area for asbestos and RMS shall be contacted to ensure all regulations are followed. If asbestos is found, Facilities Services or RMS will oversee the operation for all asbestos related projects.

3.14 Housekeeping

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

4 EMPLOYEE HEALTH SERVICES

4.7 HEALTH SERVICES

4.7.1 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 assessed 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 and driver from the individual's work center.

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

4.7.2 Reporting of Injuries and incidents

All on the job injuries must be reported as soon as possible through the *Insurance and Claims* program on the Risk Management Services website.

All laboratory incidents must be reported to RMS via the online incident report form.

4.7.3 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 to the type of exposure or operation involved. Persons who know they have been exposed or suspect exposure must notify their supervisor and Risk Management Services (RMS) 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 possible, until proper assistance is obtained. If you are injured on the job and need medical treatment, a workers' comp in-network provider must see you. If an out-of-network primary care physician receives treatment, this will be at the expense of the injured employee and will not be covered by workers' compensation.

If you are injured on the job, your supervisor should complete the Employee Injury Report, found on the Forms page under the "Insurance and Claims" heading on the UNT Risk Management website.

For life-threatening emergencies, call 9-1-1 or seek medical treatment at the nearest Emergency Room. Advise the provider that you are employed by UNT, and this is a work-related injury.

For non-life-threatening injuries, the Insurance and Claims section of the RMS department can direct you to your approved providers. Nova Medical Center – Denton is experienced in occupational injuries. They are generally open during the weekdays, during normal business hours. Care Now facilities can also accept workers' compensation claims; however, wait times tend to be longer and web check-in is unavailable. Your supervisor can authorize treatment for your work-related injury, there is no need to wait for RMS personnel to do so.

If you do not wish to seek medical treatment, your supervisor must still complete the Employee Injury Report Form. If you determine you need medical treatment at a later date, RMS will provide guidance.

4.8 HANDICAPPED EMPLOYEES

Architectural barriers should be eliminated, and a 'buddy" system developed to assure that employees can be mobile in an emergency. Employees with disabilities are encouraged to reach out to the Occupational Safety Department for assistance in developing a personalized emergency plan. 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.

4.9 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.

4.10 MEDICAL SURVEILLANCE AND EXPOSURE CONTROL PROGRAMS

Certain jobs at UNT 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 fill out a medical questionnaire. The information in the questionnaire is confidential and will not be reviewed by anyone at UNT. 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 the appropriate UNT division 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 UNT.

Recommendations may be made to UNT RMS 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:

A) 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 UNT'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 UNT Worker's Compensation authorized treating physician.
    d. Mechanisms in place at UNT 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. Workplace 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 at no cost to the Covered Individual.

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 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 UNT occupational health care provider (such as hepatitis).

5 INCIDENT REPORTING AND INVESTIGATION PROCEDURE

5.7 INTRODUCTION

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

Purpose

- All incidents shall be reported 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.

5.8 APPLICABILITY AND SCOPE

The incident reporting requirements apply to all incidences involving UNT 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.

5.8.1 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 bodily injuries, or death.

Examples include, but are not limited to:

5.8.1.1 Heat exhaustion from working in hot environments.
5.8.1.2 Strained back muscles from moving equipment.

5.8.1.3 Acid burns on fingers
5.8.1.4 Damage to a State vehicle
5.8.1.5 Fire/explosion
5.8.1.6 Property damage
5.8.1.7 Chemical releases requiring evacuation of at least that immediate spill area.

5.8.2 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 and 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.

5.9 RESPONSIBILITIES

5.9.1 Risk Management Services

Occupational Safety will review and investigate incidents referred by Insurance and Claims, 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.

5.9.2 Workers' Compensation & Insurance

RMS Insurance and Claims has the overall responsibility for implementing the Incident Reporting System and maintaining employee records upon receiving any workers' compensation or insurance claims.

5.9.3 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.

5.9.4 UNT Personnel

All UNT 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.

5.10 INCIDENT REPORTING PROCEDURES AND PRACTICES

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

5.10.1 Reporting

To officially report any incident an Employee Injury Report (Incident Only) Form must be completed online. The form is located on UNT's Risk Management Services website.

Employees shall report all incidents to their supervisor immediately. If the employee is still in a life-threatening situation contact UNT Police 911. Once the impacted employee is no longer in immediate danger the supervisor will fill out a Worker's Comp Packet with the injured employee for the incident within 24 hours. It is the responsibility of the supervisor to ensure the eForm packet is completed in a timely manner for all incidents.

5.10.2 Incident Scene

The active scene of all serious incidents shall be secured until 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 RMS following consultation with management.

5.10.3 Record Keeping

Insurance & Claims will maintain the records of all Employee Injury Report Forms. The injury and illnesses data from reports are used in identifying and mitigating problems.

5.11 Incident Investigations

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

- Type or severity of incident.
- Number of injuries
- Level of continued risk the hazard poses to people and property.
- Request from Claims department

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

- Determine if a root cause 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.

6 RISK ASSESSMENT

Risk assessment is the process of evaluating a workplace, process, 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:

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

6.7 Importance of Risk Assessments

Risk assessments are especially 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).
- 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.

6.8 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.

6.9 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 that might result in increased hazards.
- When hazards are identified.

6.10 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 included on the team or as sources of information, as these individuals are most familiar with the operation. In the laboratory setting, the Principal Investigator is responsible for the risk assessment.

In general, to do an assessment:

A. Identify hazards.
B. Determine the likelihood of harm, such as an injury or illness occurring, and its severity.
    a. Consider normal operational situations as well as non-standard events such as maintenance, shutdowns, power outages, emergencies, extreme weather, etc.
    b. Review all available health and safety information about the hazards such as safety data sheet (SDS), manufacturers' literature, information from reputable organizations, results of testing, workplace inspection reports, records of workplace incidents, near misses, etc.
    c. Understand the minimum legislated requirements for your jurisdiction.
C. Identify actions necessary to eliminate the hazard or control the risk using the hierarchy of risk control methods.

D. Evaluate to confirm if the hazard has been eliminated or if the risk is appropriately controlled.
E. Monitor to make sure the control continues to be effective.
F. 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, consideration should also be given to:

A. The methods and procedures used in the processing, use, handling, or storage of the substance, etc.
B. 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).
C. The measures and procedures necessary to control such exposure by means of engineering controls, work practices, and hygiene practices and facilities.
D. The duration and frequency of the task (how long and how often a task is done).
E. The location where the task is done.
F. 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).
G. Any possible interactions with other activities in the area and if the task could affect others (e.g., cleaners, visitors, etc.).
H. The lifecycle of the product, process, or service (e.g., design, construction, uses, decommissioning).
I. The education and training the workers have received.
J. 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, RMS can decide whether a control program is required.

6.11 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. The person or team conducting the assessment should have a working 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:

A. Look at all aspects of the work.
B. Include non-routine activities such as maintenance, repair, or cleaning.

C. Look at accident / incident / near-miss records.
D. Include people who work off site either at home, on other job sites, drivers, teleworkers, with clients, etc.
E. Look at the way the work is organized or done (include experience of people doing the work, systems being used, etc.).
F. Look at foreseeable unusual conditions, i.e., power outage.
G. Determine whether a product, machine or equipment can be intentionally or unintentionally altered (e.g., a safety guard that could be removed).
H. Review all the phases of the lifecycle.
I. Examine risks to visitors or the public.
J. 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.

6.12 Determining Risk

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

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

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

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

6.13 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 must 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.

	Severity				
Probability	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.

6.14 Methods of Mitigation

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

A. Elimination (including substitution).
B. Engineering controls.
C. Administrative controls.
D. Personal protective equipment.

6.15 Documentation for Risk Assessment

Keeping records of your assessment and any control actions taken is especially 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:

A. Level of risk involved.
B. Legislated requirements.
C. Requirements of any management systems that may be in place. Your records should show that you:
    1. Conducted a good hazard review.
    2. Determined the risks of those hazards.
    3. Implemented control measures suitable for the risk.
    4. Reviewed and monitored hazards in the workplace.

7 PERSONAL PROTECTIVE EQUIPMENT PROGRAM

7.7 INTRODUCTION

The goal 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 engineering controls, 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, foot, and hand protection.

7.8 RESPONSIBILITIES

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

7.8.1 Managers and Supervisors

7.8.1.1 Shall be responsible for providing PPE required and making it available to employees.

7.8.1.2 Ensure their personnel are trained in the use, inspection, and care of PPE required for their unique work situations.

7.8.1.3 Maintaining records of such training.

7.8.1.4 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.

7.8.1.5 Ensuring defective or damaged equipment is immediately replaced.

7.8.1.6 Notifying RMS when new hazards are introduced or when processes are added/changed to re-evaluate PPE needs.

7.8.2 Employee

7.8.2.1 Follow the requirements of the PPE Program.

7.8.2.2 Wearing PPE as required

7.8.2.3 Attending required training sessions

7.8.2.4 Caring for, cleaning, and maintaining PPE as required

7.8.2.5 Informing the supervisor of any need to repair or replace PPE.

7.8.3 Environment Health and Safety (EHS)

7.8.3.1 Development, implementation, and administration of the PPE Program.

7.8.3.2 Conducting workplace hazard assessments to determine the presence of hazards, which necessitate the use of PPE.

7.8.3.3 Conducting periodic workplace reassessments as requested by supervisors and/or as determined by EHS.

7.8.3.4 Providing guidance for the selection and purchase of approved PPE.

7.8.3.5 EHS is also responsible for providing training and technical assistance to supervisors on the proper use, care, and cleaning of approved PPE.

7.8.3.6 Reviewing, updating, and evaluating the overall

effectiveness of the PPE Program.

7.9 PROGRAM COMPONENTS

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

7.9.1 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 identifies new or additional equipment are needed to meet requirements, it shall be the departments/programs responsibility to purchase or make changes in a timely manner.

7.9.2 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 protective clothing and equipment that meet criteria developed by a Nationally Recognized Testing Laboratory (NRTL), when required, shall be used. Careful consideration will be given to comfort and fit of PPE to ensure that it will be used. In addition, care should be taken to ensure that the right size is selected.

7.9.3 Eye and Face Protection

Preventing eye injuries requires that all persons who may be in eye hazard areas wear protective eyewear. The recognized standard is ANSI Z87. 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.

7.9.3.1 Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment.
7.9.3.2 Goggles and face shields shall be used when there is a hazard from chemical splash.
7.9.3.3 Face shields shall only be worn over primary eye protection (safety glasses or goggles).
7.9.3.4 For employees who wear prescription lenses, eye protectors shall either incorporate the prescription in the design or fit properly over the prescription lenses.
7.9.3.5 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

7.9.3.6 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

1. 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.
2. 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.
3. Face Shields: These normally consist of 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.
4. 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.

7.9.4 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

7.9.4.1 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

7.9.4.2 Class G - General service, limited voltage. Protection against impact hazards.
7.9.4.3 Class E - Utility service, high voltage. Used by electrical workers.
7.9.4.4 Class C - Special service, no voltage protection.

7.9.5 Foot Protection

Safety shoes shall be worn in the shops, warehouses, maintenance, cage wash, glassware, and other areas as determined by RMS. The requirements for the hazards are necessary, ASTM F2413 shall be referenced for the required protection for the work being performed by the employee. ASTM F2413 and ANSI Z41 are the standards for footwear requirements.

7.9.6 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.

7.9.7 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 thoroughly 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.

7.9.8 Training

Any worker required to wear PPE shall receive training in the proper use and care of PPE. RMS shall offer retraining to both employees and the supervisors upon request. The training shall include at least the following topics:

7.9.8.1 When PPE is necessary to be worn.
7.9.8.2 What PPE is necessary
7.9.8.3 How to properly don, doff, adjust, and wear PPE.
7.9.8.4 The limitations of the PPE.
7.9.8.5 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.

8 FIRE AND LIFE SAFETY

8.7 INTRODUCTION

RMS – Office of Emergency Management and Safety Services is responsible for enforcing fire safety procedures and managing fire safety equipment on campus. This includes reviewing all buildings to ensure compliance with applicable state, local, and national fire and life safety standards.

8.8 RESPONSIBILITIES

RMS – Office of Emergency Management and Safety Services is responsible for implementing programs that enhance the university's ability to mitigate, prepare for, respond to, and recover from fire and life safety incidents that threaten the safety of the campus community and/or the daily operations of the university.

8.9 FLAMMABLE AND COMBUSTIBLE MATERIALS

A. Substitution - relatively safe materials may be substituted in some instances. Any substituted material should be stable and nontoxic and should either be nonflammable or have a high flashpoint.

B. Storage - flammable and combustible liquids require careful handling at all times. The proper storage of flammable liquids within a work area is particularly important in order to protect personnel from fire and other safety and health hazards.

- Cabinets - Not more than 120 gallons of Class I, Class II, and Class IIIA liquids may be stored in a storage cabinet. Of this total, not more than 60 gallons may be Class I and II liquids. No more than three such cabinets (120 gallons each) may be located in a single fire area.
- Maximum Allowable Capacity of Containers and Portable Tanks (NFPA 45)

Container Type	Flammable Liquids			Combustible Liquids	
	IA	IB	IC	II	IIIA
Glass	500ml	1L	4L	4L	20L
Metal (Other than DOT approved)	4L	20L	20L	20L	20L
Safety Cans	10L	20L	20L	20L	20L
Metal Drums (DOT spec.)	Not Allowed	20L	20L	227L	227L
Polyethylene (DOT Spec. 34, UN 1H1)	4L	20L	20L	227L	227L

Conversion 4L = 1.1 gallons, 20 L = 5 gallons, 227 L = 60 gallons

- Storage Inside Buildings
  - Flammable or combustible liquid shall not be stored, even temporarily, in any exit path, stairway or other areas of access egress.
  - Containers of flammable or combustible liquids must remain tightly sealed, except when transferred, poured or utilized. Remove only that portion of liquid in the storage container required to accomplish a particular job.
  - If a flammable and combustible liquid storage building is used, it will be a one-story building devoted principally to the handling and storing of flammable or combustible liquids.
  - Flammable paints, oils, and varnishes in 1- or 5-gallon containers, used for building maintenance purposes, may be stored temporarily in closed containers outside approved storage cabinets or room if kept at the job site for less than 10 calendar days.

C. Ventilation – flammable and hazardous chemical storage rooms shall be provided with a continuous mechanical exhaust ventilation system. To prevent the accumulation of vapors, the exhaust air openings shall be arranged to provide, as far as practical, air movement directly to the exterior of the building and if ducts are used, they will not be used for any other purpose.

D. Elimination of Ignition Sources - all nonessential ignition sources must be eliminated where flammable liquids are used or stored.

The following is a list of some of the more common potential ignition sources:

- Open flames, such as Cutting and Welding Torches, Furnaces, Matches, and Heaters
- Electrical Sources of Ignition such as electrical motors, switches, and circuit breakers
- Mechanical Sparks
- Static sparks

E. Removal of Incompatibles - materials that can contribute to a flammable liquid fire should not be stored with flammable liquids. Examples are oxidizers and organic peroxides, which, on decomposition, can generate large amounts of oxygen.

F. Flammable Gases - generally, flammable gases pose the same type of fire hazards as flammable liquids and their vapors; many of the safeguards for flammable liquids also apply and other properties such as toxicity, reactivity, and corrosively must be taken into account. In addition, flammable gas could produce toxic combustion products.

8.10 FIRE EXTINGUISHERS

Portable fire extinguishers are active fire protection devices used to extinguish or control small fires in emergencies. It is not intended for use on fires larger than an office trash can.

The use of a fire extinguisher that matches the class of fire, by a person who is well trained, can save both lives and property. Portable fire extinguishers must be installed in workplaces in accordance with NFPA 72.

8.10.1 Classification of Fires and Selection of Extinguishers

A. Types of Fires
- Class A - Fires in ordinary combustible materials, such as wood, cloth, paper, rubber, and many plastics. This would be offices, and labs that do not contain flammables.
- Class B - Fires in flammable liquids, combustible liquids, petroleum greases, tars, oils, oil-based paints, solvents, lacquers, alcohols, and flammables gases. This would include rooms or labs with flammable or combustible liquids.
- Class C - Fires that involve electrical equipment where the electrical non- conductivity of the extinguishing media is important. (When electrical equipment is de-energized, fire extinguishers for Class A or Class B fires can be used.
- Class D – Fires in combustible metals such as aluminum, lithium, potassium, magnesium, and titanium.
- Class K – Fires in cooking appliances like commercial vent hoods in restaurants that involve vegetable or animal fats and oils.

B. Selection and Placement of Extinguishers

The selection of fire extinguishers for a given situation shall be determined by the characteristics of the fires anticipated, the construction and occupancy of the property, and the hazard to be protected. Extinguishers should have a label identifying the type of extinguisher and the type of fires for which it should be used.

- Fire extinguishers should be placed so the travel distance is no more than 75 ft.
- Fire extinguishers shall be always kept in their designated places when they are not being used.
- Fire extinguishers shall be conspicuously located where they will be readily

accessible and immediately available in the event of fire. Preferably, they should be located along paths of travel.

- Cabinets housing fire extinguishers shall not be locked.
- Portable fire extinguishers shall be securely installed on the hanger or in the bracket supplied or placed in the cabinets or wall recesses.

8.10.2 Inspections

The UNT Facilities Services personnel will perform a visual inspection of portable fire extinguishers at least once per month to ensure:

8.10.2.1 The extinguisher is still present in its designated location.
8.10.2.2 No damage has occurred to the equipment.
8.10.2.3 No obstructions are blocking the equipment from view or from easy access.
8.10.2.4 The extinguisher is fully charged and operational.

If needed, inspections that are more frequent will be conducted to meet specific accreditation requirements.

8.10.3 Maintenance

CO2 and pressurized water extinguishers will be hydrostatically tested every 5 years. ABC extinguishers will be hydrostatically tested every 6 years. Each fire extinguisher shall have a tag or label securely attached that indicates the month and year the maintenance was performed and that identifies the person performing the test and state license number.

8.11 FIRE SAFETY INSPECTION AND HOUSEKEEPING

RMS – Office of Emergency Management and Safety Services conducts routine facility safety inspections, which include observation of building structure, worksite safety, unobstructed access to fire extinguishers and emergency evacuation routes.

8.12 EMERGENCY EGRESS

Every exit will be clearly visible, or the route to it conspicuously identified in such a manner that every occupant of the building will readily know the direction of escape from any point. At no time will exits be blocked. Any doorway or passageway which is not an exit or access to an exit, but which may be mistaken for an exit, will be identified by a sign reading "Not an Exit" or a sign indicating it actual use (i.e., “Storage room”). A readily visible sign will mark exits and access to exits. Each exit sign (other than internally illuminated signs) will be illuminated by a reliable light source providing not less than 5 foot-candles on the illuminated surface.

8.13 FACILITIES DESIGN REVIEW

Facilities will be designed in such a way that is consistent with health and safety regulations and standards of superior design. UNT Facilities Services and Risk Management will ensure that there is appropriate health and safety review of facility concepts, designs, and plans. A formal design review process should be in place for all new construction and remodeling efforts.

9 OCCUPATIONAL SAFETY PLANS

9.7 RESPONSIBILITIES

9.7.1 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:

9.7.1.1 Ensuring safe working conditions
9.7.1.2 Providing necessary protective equipment (PPE)
9.7.1.3 Taking immediate action to halt work and correct any observed or reported safety hazard.
9.7.1.4 Ensuring that required guards and protective equipment are provided, used, and properly maintained.
9.7.1.5 Ensuring that tools and equipment are properly maintained and used.
9.7.1.6 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.
9.7.1.7 Ensuring workers exposed or potentially exposed to hazardous chemicals/materials have access to appropriate Safety Data Sheets (SDS)

9.7.2 Employees

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

9.8 GENERAL SHOP AND WORK AREAS

9.8.1 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.

9.8.2 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.

9.8.3 Personal Protective Equipment (PPE)

Personal protective equipment (PPE) is not a substitute for engineering controls or administrative procedures. However, when it has been determined that control methods are not providing adequate protection, personal protective equipment is required. 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.

9.8.4 Illumination

Adequate illumination shall be provided to ensure safe working conditions.

A. Portable lamps shall have UL approved plugs, handles, sockets, guards, and cords for normal working conditions.

B. Ground Fault Circuit Interrupter (GFCI) is required for all work in wet or damp locations.

C. Flashlights for use near energized electrical equipment and circuitry shall have insulated cases.

D. 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.

9.8.5 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. At a minimum, the following requirements shall be adhered to:

A. Aisles and passageways shall be kept clear of tripping hazards.

B. Trash and other waste materials shall not be allowed to accumulate and will be kept in approved receptacles.

C. Disconnect switches, distribution panels, or alarm supply boxes shall not be blocked by any obstruction which may prevent ready access.

D. Machinery and equipment shall be kept clean of excess grease and oil.

E. Mechanical and electrical rooms will not be utilized for storage.

9.8.6 Use of Tools

Hand Tools

All tools shall be kept in good repair and shall be stored properly. Defective tools shall be immediately removed from service and tagged.

9.8.7 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. Signs must be posted to warn people of dangers and to identify protective equipment required while in the work zone.

9.9 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:

A. energy control procedures
B. periodic inspection
C. 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.

Please refer to APPENDIX A for the UNT Lockout / Tagout Standard Operation Procedure.

9.10 FALL PROTECTION

UNT requires that any time a worker is performing elevated work such as an unprotected side or edge or working from an aerial lift, and could potentially fall 6' or more, fall protection is required. Any time a worker can fall any distance and come into contact with dangerous machinery, hazardous chemicals or any other potential for serious harm they must be protected from falls. An exception to this rule would be when work is performed from a properly installed ladder or scaffold. In emergency situations, managers should continue to proceed as they think best.

This program is closely aligned with 29 CFR 1926 Subpart M. Absent guardrails, parapet walls or other engineered barriers, an elevated work permit is required. Work performed from aerial lifts, on roofs or any other place where a Personal Fall Arrest System (PFAS) is required must be permitted. Fall Arrest Systems consist of a Body Harness, a Shock Absorbing Lanyard or Retractable Lifeline and an Anchorage point. These Systems are designed to arrest a free fall should a worker slip from an elevated work site and function to minimize forces imposed on the worker as the Fall Arrest System activates and checks the fall. RMS can help in identifying and evaluating fall protection issues and provide training in fall protection. Work done in elevated spaces must be approved and permitted by submitting an Elevated Work Permit. Please refer to APPENDIX C for the UNT Elevated Work Program Standard Operating Procedure.

9.11 ELECTRICAL

All electrical work shall be performed in accordance with published OSHA standards for Electrical Safety-Related Work Practices. 29 CFR 1910.331 - 335, 1926.416 - 417, National Fire Protection Association 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 to use the proper personal protective equipment, insulating and shielding materials, and insulated tools. Two workers, one of whom must be trained in CPR, shall work together any time work must be performed on high voltage energized circuitry or equipment. All electrical/electronic repair personnel shall be trained in CPR and will participate in refresher training every 2 years in accordance with the American Heart Association Standard.

9.12 Machinery and Machine guarding

For most applications machine guarding is an engineering control method that is the best of several 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 several 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:

A. The guard must be considered a permanent part of the machine or equipment.
B. 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.
C. The guard must prevent access to the danger zone during operation of the equipment.
D. The guard must be as convenient as possible and must not interfere with the 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.
E. The guard should be designed for the specific job and specific machine, with provisions for lubricating, inspecting, adjusting, and repairing the machine.
F. The guard must be durable and constructed strongly enough to resist normal wear.
G. The guard must not create a hazard.
H. 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 UNT machine guard be removed to simplify operator use. Nor shall any UNT 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.

9.13 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:

A. Entry into an oxygen deficient atmosphere (Permit Required Confined Space)

B. Fire or explosion by introducing an ignition or flame source into a hazardous environment.

C. Falls

D. Cave-in of excavated area

E. Burns from heat producing equipment.

F. Strains and sprains of the back or other muscle group

G. Cuts and/or bruises**.**

Personal protective equipment worn during plumbing maintenance operations normally consists of:

A. Eye and/or face protection. This 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.

B. Work or chemical resistant gloves

C. Safety-toe shoes

D. A hard hat may be required under conditions that could result in head injuries.

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.

9.14 GAS SYSTEM MAINTENANCE

Maintenance of gas systems includes 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.

9.15 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:

A. Exposures to flammable and combustible adhesives

B. Dusts

C. Hazardous noise

D. Eye hazards

E. Working at heights above ground level

F. Lifting hazards

G. Electric and pneumatic power tools

H. Working with unfinished material which could expose them to splinters, sharp edges, etc.

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:

A. Eye protection

B. Safety- toe shoes

C. Dust masks

D. Hard hats

E. 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.

9.16 REFRIGERATION AND AIR CONDITIONING MAINTENANCE

Potential hazards associated with refrigeration and air conditioning maintenance include:

A. Hazardous noise

B. Electrical hazards

C. Exposure to refrigerants

D. Lifting hazards

E. 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 refrigerants. 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.

9.17 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.

The provisions of the UNT Respiratory Protection Plan shall be complied with at all times during any painting/spraying procedures. The plan is located in Appendix D of this document.

9.18 FORKLIFT AND AERIAL LIFT OPERATIONS

All requirements of CFR 1910.178 and 1926.602 shall apply including the requirement to have a valid forklift certification authorizing the operation of a forklift. Aerial lift operators shall be certified to operate aerial lifts prior to use. These certifications are valid for no more than 3 years and only for work performed during the course of employment at UNT. This certification shall not be valid for work performed on behalf of any other entity.

9.19 PERMIT REQUIRED CONFINED SPACE ENTRY

Permit Required Confined Spaces are among the more dangerous work environments. A "Permit Required Confined Space" may be generally defined as any area which has limited means of egress, is subject to an oxygen deficient or enriched atmosphere, 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 Permit Required Confined Space in addition to specific mandates dealing with the required training and emergency equipment required to support this type of work.

Examples of Permit Required Confined Space working areas at UNT include sewers, pits/sumps, chemical/septic waste tanks, vessel voids/bilges, trenches over 4 feet deep, elevator shafts, ventilation ducts, neutralization pits, and manholes.

Please refer to the UNT detailed Permit Required Confined Space entry procedure, APPENDIX B Permit Required Confined Space Entry Program Standard Operating Procedure.

9.20 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 always maintain three points of contact. 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 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.

10 GENERAL SAFETY REQUIREMENTS

10.7 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 UNT. It is emphasized that these are basic requirements and do not represent a comprehensive safety and health program for every area.

10.8 COMPLIANCE WITH SAFETY REGULATIONS

All UNT personnel shall observe all safety and health rules and regulations. 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:

A. Use and adherence to written protocols and Standard Operating Procedures (SOPs) that detail procedures and safety protocols.
B. 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 RMS. Medical professionals contribute by providing medical evaluation and risk assessment.
C. General safety guidelines and manuals to be followed by all employees, students, and volunteers.

- Biosafety
- Chemical Hygiene
- Radiation and Laser

- Electrical Safety
- Mechanical Safety

10.9 Safety Training

Supervisors shall ensure that all new or reassigned personnel are instructed in safe methods of performing specific tasks prior to starting and during the initial stages of each new job.

10.4 Two-Person Rule

The two-person rule shall apply whenever high potential for injury 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 extended 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.

10.5 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 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.

10.6 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 laboratories must be kept clean and neat at all times.
- Floors shall be kept free of clutter.
- Aisles, passageways, stairways, and exits shall be always kept clear.
- Restrooms will be kept in a clean and sanitary condition.
- All UNT provided and personal microwave ovens and refrigerators used for the cooking and storage of food shall be kept clean.
- 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 janitorial staff 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 appropriately labeled sharps containers.

10.7 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 never be handled, transported, or stored without valve protection caps in place. 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.

10.8 Compressed Air

Compressed air shall not be used for cleaning purposes when vacuum cleaners or an alternative method is available. Compressed air may only be used for cleaning when reduced to less than 30 psi and eye protection is in use by all personnel in the area. The use of compressed air for cleaning clothing or any part of the body at any pressure is prohibited.

10.9 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 damage.

10.10 Work Clothing

Clothing worn around moving machinery shall be close fitting. Neckties and other loose items shall not be worn. Long sleeves are required to be worn in operations involving welding or cutting and tasks where exposure to chemicals or ultraviolet and infrared rays is likely. Long sleeves are required when using a chainsaw or similar activity.

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 with similar exposure. 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 shall be worn when there is a possibility of splash or spill. Similarly, footwear that provides protection from splashes and spill shall be worn at all times in laboratories. Open-toed shoes, sandals, and "flip-flops" provide no protection from splash and spills and are prohibited. Going "bare foot" in any laboratory is 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.

11 PERMITTING PROCESS

The primary goal of the permitting process is to identify and mitigate risks to UNT in general, and our workers specifically. The criteria used in developing and updating the permitting process are as follows.

1. Protect our workers.
2. Protect UNT from risks such as lawsuits and damage to our great reputation and standing in the community.
3. Never delay work except in IDLH conditions
4. Make the permitting process simple and easy for people at all levels of computer literacy.
5. Make the process available to people with any electronic device with internet access.
6. Make the process fast.
7. Provide support 24/7
8. Provide contact information to multiple people within the department should any questions arise.

The permits are housed in UNT Campus Optics. We have implemented this permitting process to provide an additional layer of protection around our people that are performing high risk activities. We issue permits for Elevated Work, Permit Required Confined Spaces and Hot Work. These permits are for a specific time frame, a specific activity and a specific place. Permitting work isn't a method of controlling work, but is meant to provide an experienced colleague and teammate helping protect our people and providing service to our customers.

RMS Safety would only consider delaying work in cases considered Immediately Dangerous to Life or Health (IDLH). Having 2 backups to the permit review process ensures there is always someone with the ability to review and accept a permit request.

One of the hazards of performing repetitive "routine tasks" is that it leads to complacency, which in turn leads to accidents. Requesting a permit is not the same as requesting permission, it is merely a second set of experienced eyes on high-hazard work.

The permitting process is simple and can be completed electronically with the exception of the Attendant Log for Permit Required Confined Spaces (PRCS), which must be printed and signed by all who enter or leave a PRCS. The request can be completed in less than 5 minutes quite easily. These requests can be made from any phone, tablet, or computer with internet. The permits are reviewed by the Occupational Safety Program Manager and approved in a very short time frame. In emergency situations, managers should continue to

- The first step is to navigate to the Occupational Safety and Health website.
- At the bottom of the page are three tabs titled "Asbestos Program", "Indoor Air Quality", and "Permitting". Select the Permitting tab.
- The permitting tab contains links to request PRCS permits, Elevated Work permits, Hot Work permits, and the PRCS attendant log

After selecting the appropriate permit link, a webpage will open that has questions specific to the type of permit being requested. When the questions have been answered, select "Submit" on the

bottom right side of the page.
The Occupational Safety team will receive an email notification that a new permit request was submitted. Safety will review the request and notify the requestor in the response that the permit is "accepted" or "rejected".

If "accepted" a member of the Safety team will inspect the worksite before work begins. Then submit an inspected and approved response in Campus Optics.

Should the initial request be "rejected" the requestor can call Safety or simply correct the deficiency as identified in the response. This typically occurs when a requestor overlooks adding the required contact information necessary.

The requestor can resubmit the original request with corrections and Safety can then approve the request.

If the permit was a PRCS permit, the requestor will send the cancelled permit along with the Attendant Log back to Safety electronically.

Contact information for our team.
Steve Wilson Cell: 580-434-2419 Direct: 940-369-8146 Primary
Steven.wilson2@unt.edu

Tyler Godby, Cell: 720-231-5680 Direct: 940-369-8790
Tyler.godby@unt.edu

Chris Erickson Cell: 214-240-6953 Direct: 940-565-2167
Chris.erickson@unt.edu

The permitting process is not meant to deal with emergency situations and managers should continue to handle those as they think best.

12 PLAN REVIEW

A review of this plan will be conducted by Risk Management Services at a minimum annually.

APPENDIX A: LOCKOUT/TAGOUT STANDARD OPERATING PROCEDURE

I. PURPOSE

The purpose of this Control of Hazardous Energy (Lockout/Tagout) SOP is to reduce the risk of 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.

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ll. 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 or equipment which must be locked, or a tagout system implemented.

Energized: Connected to an energy source or containing residual or stored energy.

Energy Source: Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

Hot tap: A procedure used in the repair, maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

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 startup 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.

Tagout device: A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to 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.

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lll.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:

1. 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.
2. 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.
3. 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.

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 each piece of machinery or equipment when any of the following elements exist:

1. The machine or equipment has the potential for stored or residual energy or reaccumulating of stored energy after shut down which could endanger employees.
2. The machine or equipment does not have a single energy source which can be readily

identified and isolated.

3. 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.
4. A single lockout device will not achieve a locked-out condition.
5. The lockout device is not under the exclusive control of the authorized employee performing the servicing or maintenance.
6. The servicing or maintenance creates hazards for other employees.
7. There have been accidents involving the unexpected activation or re-energization of the machine or equipment during servicing or maintenance.

IV. PROCEDURE

Specialized lockout/tagout devices shall be obtained and kept within each department for its use. Locks will be singularly identified and used solely for LOTO. Tags will also bear the name of the authorized person who placed the tag. Tags will be attached by the shank of the lock or with a nylon cable tie with a minimum locking strength of 50 pounds. When it is impossible to use a lock, tags will be attached with a cable tie.

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. Through training, employees will be required to possess the knowledge and skills required for safe application, usage, and removal of energy controls. Contact Risk Management Services for assistance in training employees in proper lockout/tagout procedures. Training shall include the following:

1. 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.
2. Each affected employee shall be instructed in the purpose and use of the energy control procedures.
3. 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:

1. 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.
2. 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.

3. 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.
4. Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.
5. Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.
6. 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.

V. 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:

1. If the machine or equipment is operating, shut it down using the normal procedures (depress stop button, open toggle switch, etc.)
2. 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, blinding or bleeding etc.
3. Lockout and/or Tagout the energy isolating devices with assigned individual locks and/or tags.
4. 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"**

5. The equipment is now Locked out or Tagged out.

Transfer of Lockout/Tagout: In order to minimize exposure to hazards from unexpected energization, startup 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 occur 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 shall 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:

1. Ensuring that all members of the group are afforded the full protection of the lockout or tag out;
2. Determining the hazard energy exposure status of the group members throughout the servicing and maintenance; and
3. 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:

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

Restoring machines or equipment to normal operation:

1. 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.

2. 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.

VI. 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.

A. Deenergizing Equipment

1. Safe procedures for deenergizing circuits and equipment shall be determined before circuits or equipment are deenergized.
2. 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.
3. 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.
4. 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.

B. Application of locks and tags

1. 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 to prevent persons from operating the disconnecting device.
2. Each tag shall contain a statement prohibiting unauthorized operation of the disconnecting device and removal of the tag.
3. 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.
4. 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.

5. A lock may be placed without a tag only under the following conditions:
    a. Only one circuit or piece of equipment is deenergized, and
    b. The lockout period does not extend beyond the work shift, and
    c. Employees exposed to the hazards associated with reenergizing the circuit or equipment are familiar with this procedure.

C. Verification of deenergized condition

1. A qualified person shall operate the equipment controls or otherwise verify that the equipment cannot be restarted.
2. 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.

D. Reenergizing equipment

1. 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.
2. Employees exposed to the hazards associated with reenergizing the circuit or equipment shall be warned to stay clear of circuits and equipment.
3. Each lock and tag shall be removed by the employee who applied it or under his direct supervision.
4. 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:

1. Verification by the immediate supervisor that the employee who applied the device is not at the facility,
2. Making all reasonable efforts to inform the authorized employee that his/her lockout or tagout device has been removed, and

3. Ensuring that the authorized employee has this knowledge before resuming work at the facility.

VII. EXTERNAL (CONTRACTORS, ETC.)

Whenever external servicing personnel are to be engaged in activities covered by the scope and application of this procedure, the designated UNT representative and the external employer shall inform each other of their respective lockout or tagout procedures. The designated UNT 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.

VIII. EFFECTIVENESS CRITERIA

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.

IX. 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

FORMS/RECORDS

7. UNT Lockout/Tagout Compliance Audit
8. UNT Contractor Lockout/Tagout Capability Inquiry

APPENDIX B: PERMIT REQUIRED CONFINED SPACE ENTRY PROGRAM
STANDARD OPERATING PROCEDURE

I. PURPOSE

The objective of the Permit Required Confined Space Entry Program is to allow workers to enter, perform work, and exit confined spaces safely. Permitted and non-permitted confined spaces are addressed as are some of the definitions used, the general responsibilities and requirements for these spaces, to include training and duties.

II. SCOPE

This program shall apply to all Permit Required Confined Space entry operations conducted at UNT. All employees, contractors, and subcontractors working in or near Permit Required Confined Spaces are required to follow this program. A contractor site-specific program may be used, providing it meets or exceeds the requirements set forth in this procedure.

III. DEFINITIONS

Acceptable entry conditions - The conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

Attendant – An individual stationed outside the permit space who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

Authorized Entrant – An employee who is authorized by the employer to enter a permit space.

Blanking or blinding - T absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

***Confined space** - A space that:

(1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and

(2) Has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and

(3) Is not designed for continuous employee occupancy.

Double block and bleed - The closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

Engulfment - The surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

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) is 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, impairment of ability to self-rescue (i.e., escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

(1) Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);

(2) 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 (1.52 m) or less.

(3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

(4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in subpart G, *Occupational Health and Environmental Control,* or in subpart Z, *Toxic and Hazardous Substances,* of this part and which could result in employee exposure in excess of its dose or 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.

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 (e.g., riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

Immediately Dangerous to Life or Health (IDLH) – Any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit 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 have the potential to contain, any hazard capable of causing death or serious physical harm.

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.

***Permit-Required Confined Space -** (permit space) A Permit Required Confined Space that has one or more of the following characteristics:

(1) Contains or has a potential to contain a hazardous atmosphere;

(2) Contains a material that has the potential for engulfing an entrant;

(3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or

(4) Contains any other recognized serious safety or health hazard.

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

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

Prohibited Condition - Any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

*These definitions are repeated in section V

IV. RESPONSIBILITIES

Everyone involved in a Permit Required Confined Space entry has specific responsibilities in ensuring the work is performed in a manner that provides the safest environment for entrants. This section discusses some of these responsibilities and duties. Though UNT's RMS department

oversees the administration of this program, it is the responsibility of each department to ensure compliance with this program when work is performed in areas under that department's control.

A) Risk Management Services (RMS) - The Director of RMS or his/her designated representative shall:
   a. Review and update the UNT Permit Required Confined Space Entry Program to comply with current 29CFR1910.146 and other standards for Permit Required Confined Space entry operations.
   b. Facilitate compliance with standards by periodic inspection of entry sites and canceling permits where unsafe conditions are present.
   c. Assist Department Heads, Managers, and Supervisors with:
      i. training as set forth in the program,
      ii. identification of Permit Required Confined Spaces,
      iii. identification of spaces that require a permit for entrance.
   d. Label all permit required confined spaces.
   e. Perform compliance reviews to assist in identifying areas for improvement.

B) Department Heads (or their designated representatives-Entry Supervisors) shall:
   a. Request Permit Required Entry Permits at least 2 days prior to entry.
   b. Ensure that the required atmospheric tests are performed at the permit required confined space and results are recorded on the permit prior to entry authorization
   c. Obtain and maintain all equipment necessary to complete the confined space entry project.
   d. Terminate the entry and cancel the permit when:
      i. Entry operations covered by the entry permit have been completed.
      ii. A condition that is not allowed under the entry permit arises in or near the permit space.
   e. Return completed entry document to RMS, after the entry has been cancelled.

C) Authorized Entrants - The person(s) authorized to enter a Permit Required Confined Space shall:
   a. Know the hazards that may be faced during entry, including the mode, signs or symptoms, and consequences of the exposure.
   b. Use proper equipment, which may include:
      i. Atmospheric testing and monitoring equipment,
      ii. Ventilating equipment needed to obtain acceptable entry conditions,
      iii. Communication equipment necessary to maintain contact with the attendant,
      iv. Personal protective equipment as needed,
      v. Lighting equipment as needed,
      vi. Barriers and shields as needed,
      vii. Equipment, such as ladders, needed for safe ingress and egress,
      viii. Rescue and emergency equipment as needed, and

ix. Any other equipment necessary for safe entry into and rescue from permit spaces.

c. 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.

d. Alert the attendant whenever:
   i. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or
   ii. The entrant detects a prohibited condition.

e. Exit the permit space as quickly as possible whenever:
   i. An order to evacuate has been given by the attendant or the entry supervisor,
   ii. The entrant recognizes any warning sign or symptom that indicates the space is becoming unsafe,
   iii. The entrant detects a prohibited condition, or
   iv. An evacuation alarm is activated.

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D) Attendants - Persons authorized to perform duties as attendants shall:

a. Be relieved of all other duties during time spent as attendant.
b. Know the hazards that may be faced during entry.
c. Understand symptoms entrants may exhibit.
d. Maintain an accurate Attendant Log for the permit space.
e. Remain outside the permit space during entry operations until relieved by another attendant.
f. Communicate with authorized entrants as necessary to monitor their status and to alert entrants of the need to evacuate the space when conditions warrant.
g. 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:
   i. If the attendant detects a prohibited condition,
   ii. If the attendant detects the behavioral effects of hazard exposure in an authorized entrant,
   iii. If the attendant detects a situation outside the space that could endanger the authorized entrants, and
   iv. If the attendant cannot safely perform all the duties required.
h. Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.
i. Attempt non-entry rescue when possible.
j. Take the following actions when unauthorized persons approach or enter a permit space while entry is underway:
   i. Warn the unauthorized persons to stay away from the permit space,
   ii. Advise unauthorized persons to exit immediately if they have

entered the permit space, and

iii. Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.

k. Perform no activity that might interfere with the attendant's sole duty to monitor and protect entrants.

V. IDENTIFYING PERMIT REQUIRED CONFINED SPACES

The first step toward conducting a safe Permit Required 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.

Confined Space is any space that has the following characteristics:

1. Large enough or so configured that an employee can bodily enter and perform assigned work.
2. Has limited or restricted means for entry or exit. Size, configuration, or location may make rescue efforts difficult.
3. 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.
4. Excavations 4' or deeper are considered and treated as Confined Spaces.

Non-Permit Confined Space means a confined space that does not contain, nor have 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:

1. Contains or has the potential to contain a hazardous atmosphere.
2. Contains a material that has the potential for engulfing an entrant.
3. 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; or
4. Contains any other recognized serious safety or health hazard.

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

Department heads are responsible for ensuring safety requirements are followed and to evaluate potentially hazardous spaces within facilities or areas under their control. RMS will assist in these classifications and assist with training. Responsibility may be delegated to a competent person within the department. It may be determined that a space presents none of the characteristics that

would result in it being a permit required space. These spaces still require that the precautions of a confined space be followed.

VI. IDENTIFYING CONFINED SPACE HAZARDS

Once a space has been identified as confined, a determination must be made as to whether there are any other hazards that would require it to be classified as a Permit Required Confined Space. These hazards can be grouped into the following categories:

1. Oxygen deficient atmospheres
2. Flammable atmospheres
3. Toxic atmospheres
4. 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.

A. 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 the formation of rust on exposed surfaces in 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.

B. Flammable Atmospheres

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. Oxygen and acetylene hoses shall be removed when not in use.

Flammable atmospheres are the result of flammable gases or vapors reaching their Lower Explosive Limit (LEL). Entry is prohibited into any room or space with a concentration of 10% of the LEL or greater.

Another serious hazard is an oxygen enriched atmosphere, defined as a concentration greater than 23.5%. Entry is prohibited into any room or space with an oxygen concentration of 23.5% or greater.

Combustible gases or vapors can accumulate within a confined space when there is inadequate ventilation or air movement. 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 to

account for stratified air in confined spaces.

C. Toxic Atmospheres

Toxic Atmospheres may be present within a confined space as the result of one or more of the following:

1. 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.
2. Decaying matter can produce toxic gasses, flammable atmospheres, and oxygen deficient atmospheres.
3. 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. Generators, idling vehicle engines, and salamander heaters can produce carbon monoxide which is heavier than air.

D. 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 lines 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 present the possibility of engulfment. Employees shall be protected from cave ins by sloping, benching, shoring, or shielding systems when the depth of the excavation is four feet or greater and any time the excavation appears unstable.

Where practical, all personnel entering a Permit Required 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.

VII. RESCUE PROCEDURES

Rescue Procedures

In the event of an emergency, the attendant should:

1. Call 911, city of Denton Fire Department, by telephone or radio.
2. Attempt to remove the victim by use of the retrieval lines from outside the Permit Required Confined Space if this can be accomplished without creating further hazard for the entrant or the attendant.
3. 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.
4. 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 Permit Required Confined Space

for any reason.

5. Give EMS personnel any information they request.

VIII. REFERENCES

Title 29 of the Code of Federal Regulations Part 1910.146 – Permit – Required Confined Spaces. U.S. Government Printing Office.

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

IX FORMS/RECORDS

UNT Confined Space Permit

Confined Space Attendant Log

UNT Hot Work Permit

The hot work program is managed by the Fire & Life Safety portion of the RMS team.

APPENDIX C: ELEVATED WORK PROGRAM STANDARD OPERATING PROCEDURE

I. INTRODUCTION

OSHA requires that any time a worker is exposed to an unprotected side or edge and could potentially fall 6' or more, fall protection is required. Any time a worker can fall any distance and come into contact with dangerous machinery, hazardous chemicals or any other potential for serious harm, they must be protected from falls. An exception to this rule would be when work is performed from a properly installed ladder or scaffold. This Elevated Work Procedure closely follows 29 CFR 1926.500

Absent guardrails, parapet walls or other engineered barriers, an Elevated Work Permit is required. Work that typically requires an elevated work permit includes work performed on roofs, leading edges and any place an employee can fall and be seriously injured. Work performed from aerial lifts, on roofs or any other place that a Personal Fall Arrest System (PFAS) is required must be permitted.

Definitions used in this appendix are located here

II. PREVENTION

To prevent employees from being injured by falls, each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems. Some areas where fall protection may be required:

- Unprotected sides and edges
- Leading edges
- Hoist Areas
- Holes
- Formwork and reinforcing steel
- Ramps, runways, and other walkways
- Excavations
- Dangerous equipment
- Overhand bricklaying and related work
- Roofing work on Low-slope roofs
- Steep roofs
- Precast concrete erection
- Wall openings
- Walking/working surfaces not otherwise addressed

III. 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 +- 3" from the floor, a mid-rail at 21 inches height and a toe board (minimum of 4" high with no more than ½" 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) Warning Line 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 unprotected edge. High visibility flagging shall be installed on the cable/rope at intervals of not more than 6 feet. Safety Monitors are required any time a warning line system is employed without the use of Guardrails, Safety Nets, or Personal Fall Arrest Systems (PFAS).
D) Personal Fall Arrest System (PFAS): Minimum system consists of a body harness, lanyard, connector, and an anchorage point that will support a minimum of 5,000 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.

IV. TRAINING

Fall protection training for UNT 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 correct procedures for erecting, maintaining, inspecting and disassembling the Fall Protection Systems being used.

Supervisors are required to:

1. Work cooperatively with RMS to identify activities, personnel and activities with fall hazard exposure.
2. Purchase or obtain Fall Protection Systems consistent with typical jobs or maintenance activities.
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 the correct manner.
7. Assist departments in identifying where fall protection is required.
8. Provide fall protection training.
9. Attend training and successfully pass written and practical exams.
10. Know inspection procedures for Fall Protection Systems.
11. Request Elevated Work Permits when required.

(2) Each supervisor shall assure that each employee has been trained, as necessary, by a competent person qualified in the following areas:

(i) The nature of fall hazards in the work area.

(ii) The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used.

(iii) The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used.

(iv) The role of each employee in the safety monitoring system when this system is used.

(v) The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs.

(vi) The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection.

V. FORMS/RECORDS

Environmental Health and Safety

Occupational Health and Safety

Elevated Work Permit

UNIVERSITY of NORTH TEXAS

Risk Management Services

RESPIRATORY PROTECTION PROGRAM

Updated September 2024

Table of Contents

RESPIRATORY PROTECTION MANUAL

The University of North Texas (UNT) has a commitment and responsibility to protect the health and safety of its personnel. Many exposures can be effectively prevented by minimizing or eliminating the breathing of air that may be contaminated with harmful airborne contaminants including dusts, fogs, fumes, mists, gases, smokes, sprays, vapors, particulates, infectious droplets/aerosols, biological agents, chemicals, radiological hazards, or oxygen deficient atmospheres. This shall be accomplished, as far as feasible, by accepted engineering control measures such as enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials. When effective engineering controls are not feasible, or while they are being instituted, it is the aim of this program to ensure that respiratory protection is provided, utilized, and maintained in an appropriate and safe manner.

The purpose of the respiratory protection program is to ensure the protection of all UNT personnel from respiratory hazards through the proper use of approved respirators when necessary. Job specific respirators shall be provided by UNT and are to be used when engineering controls for respiratory hazards are not feasible or effective, while engineering controls are being installed or repaired, and for emergency or other temporary situations. Voluntary respirator use (when exposures are below levels requiring respiratory protection) is permitted at the request of the individual and upon review by Environmental Health & Safety and subsequent to a medical evaluation if necessary (See Appendix D-5). The procedures set forth in this manual apply to all UNT personnel. Non- UNT personnel working at UNT must comply with applicable respiratory protection requirements, such as the Occupational Safety and Health Administration Respiratory Protection Standard.

OBJECTIVE

UNT 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 UNT, and its employees comply with Occupational Safety and Health Administration (OSHA) respiratory protection requirements as found in 29 CFR 1910.134.

RESPONSIBILITIES

Employer

UNT is responsible for providing respirators to employees when they are necessary for health protection. UNT 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 UNT.

Environmental Health and Safety

UNT Environmental Health and Safety (EHS) serves as UNT Respiratory Protection Program (RPP) Administrator responsible for managing and administrating the RPP by:

- Identifying work areas, processes or tasks requiring respirator use;
- Assessing concentration of airborne contaminants and atmospheric conditions (e.g. oxygen level) through periodic monitoring;
- Evaluating hazards;
- Selecting respiratory protection options;
- Recommending appropriate respirators and cartridges/canisters;
- Fit testing all EHS respirator users, including elastomeric respirator users;
- Training respirator users fit tested by the EHS;
- Maintaining training and fit test records;
- Conducting periodic inspections of respirator storage and use;
- Ensuring proper respirator use per respirator specifications through periodic monitoring; and
- Evaluating and updating UNT RPP documentation annually and as needed.

Department Supervisor/Principal Investigators

- Identify personnel who may need to utilize respiratory protection.
- Ensure personnel understand when the use of respiratory protection is required.
- Purchase appropriate NIOSH approved respirators, cartridges/canisters, and replacement parts.
- Ensure that employees have had medical surveillance as required, including prior to using a respirator.
- Ensure that employees are fit tested and trained prior to using a respirator.
- Contact Occupational Health and or Infection Prevention, as appropriate, to perform any initial or follow- up exposure monitoring.
- Ensure that respirators are used, maintained, and stored per manufacturer's recommendations.
- Report any concerns with respiratory protection to Safety.

Individuals

- Use respirator in accordance with manufacturer's recommendations and training received.
- Clean (if appropriate) and inspect respirators before and after each use.
- Store respirators in an appropriate manner such as in a storage bag in a clean dry area away from possible contaminants.
- Store cartridges and canisters in sealed bags and away from possible contaminants.
- Report any problems with respiratory protection to the department supervisor/principal investigator.

DETERMINATION OF NEED FOR RESPIRATORY PROTECTION

It is each supervisor's responsibility to ensure that EH&S or Infection Prevention is initially notified of new situations that require an evaluation of the need for respiratory protection. If existing engineering controls are not sufficient to remove identified airborne hazards or new controls are not technologically or economically feasible, personnel may be required to wear respiratory protection. The following represent tasks that may require the use of respiratory protection:

- Those that liberate airborne contaminants including dusts, fogs, fumes, mists, gases, smokes, sprays, vapors, particulates, infectious droplets/aerosols, biological agents, chemicals, radiological hazards, or oxygen deficient atmospheres.
- Those that occur in areas where levels of the above airborne hazards exceed established occupational exposure limits or pose undo risk to employees.
- The processing, handling, storing, or disposing of hazardous substances.
- Emergency response to hazardous materials spills.
- Confine space entry.
- Those that required entry into areas determined to be Immediately Dangerous to Life and Health (IDLH)
    - Oxygen-deficient or potentially oxygen-deficient environments.

Safety will conduct exposure determinations to confirm or justify the need for, or continued use of, respiratory protection. Safety must also be notified when engineering or procedural changes occur which could affect employee or student exposure, or when new hazards are introduced into the workplace. This notification allows Safety to conduct appropriate exposure assessments to determine if the respirators in use are still appropriate for the hazards identified.

MEDICAL EVALUATION

Personnel will not be assigned to tasks requiring the use of respirators unless it has been determined that their health and physical condition will enable them to do so safely. EHS will provide a link for employees who are determined to need respiratory protection to receive that medical evaluation online.

UNT shall bear the costs of the evaluation, which will be required at least every 36 months. Additional medical evaluations will be required for anyone that has physical changes that could potentially impact the user's ability to wear a respirator. The physician or PLHCP will be asked to sign a respirator use clearance form stating that the respirator user is physically able to work while wearing a respirator (Appendix D-2).

TYPES OF RESPIRATORS

There are two primary types of respiratory protective equipment one may utilize when appropriate engineering controls are not feasible. These types of respirators are referred to as air-purifying respirators and atmosphere supplying respirators. Each class of respirator may have tight-fitting and loose-fitting face pieces. An important aspect of respirator operation and classification is the air pressure within the face piece.

When the air pressure within the face piece is negative during inhalation, with respect to the

ambient atmospheric pressure, the respirator is classified as a negative-pressure respirator. When the air pressure within the face piece is positive during normal breathing, with respect to the ambient atmospheric pressure, the respirator is classified as a positive-pressure respirator. The concept of negative and positive pressure operation is important when considering potential contaminant leakage into the respirator.

The following is a description of air purifying and atmosphere supplying respirators and their limitations for use:

General Limitations

Not all personnel can wear respirators, and an adequate fit is required for a respirator to be effective. Individuals with impaired lung function, due to asthma or emphysema for example, may be physically unable to wear a respirator. Additionally, individuals who cannot get a good face piece seal or fit, including those individuals with facial hair that interfere with the face piece seal, will be unable to wear tight-fitting respirators. Also, respirator users may experience communication problems, vision challenges, fatigue, and reduced work efficiency.

Air-Purifying Respirators

Air-purifying respirators (APRs) are grouped into three general types: particulate removing, vapor and gas removing, and combination units designed to remove particulates, vapors, and gases. Particulate removing respirators are designed to reduce the concentrations of nuisance dusts, fibers, fumes, mists, toxic dusts, or any combination of these substances. This process is accomplished by passing ambient air through a filtration matrix that functions to provide the user with filtered air.

Vapor and gas removing respirators utilize sorbent materials housed in canisters or cartridges to adsorb and/or absorb vapors or gases from the contaminated air before it can enter the breathing zone of the worker. These cartridges or canisters are attached to the respirator and serve as air inlets. Combination cartridges and canisters remove contaminants by various filtering and adsorption mechanisms.

Air purifying respirators may be non-powered or powered units. Non-powered units consist of filtering face piece respirators and rubber (elastomeric) mask that must form a tight seal on the face. A powered air-purifying respirator (PAPR) is equipped with a blower, which pulls ambient air through an attached filter providing filtered air to the respirator face piece/hood. The face piece for a PAPR can be tight-fitting mask or consist of a hood or helmet (i.e. loose-fitting). Note that only tight-fitting respirators require fit testing, but all respirator users are required to be medically cleared to wear a respirator.

Type of Respirator	APF	Type of Respirator	APF
Air-Purifying		**Air-Line: Continuous Flow mode**	
Filtering Face piece	10	Half-Mask	50
Half-Mask	10	Full Face piece	1000
Full-Face piece	50	Loose-Fitting Face piece	25
Powered Air-Purifying		Helmet	25
Half-Mask	50	Hood	1000
Full-Face piece	1000	**Air-Line: Pressure Demand**	
Loose-Fitting Face piece	25	Half-Mask	50
Helmet	25	Full Face piece	1000
Hood	1000	**SCBA: Demand**	

Table 1. OSHA Assigned Protection Factors (APF)

The National Institute for Occupational Safety and Health (NIOSH) and the American National Standards Institute have provided respirators, listed in Table 1, with an Assigned Protection Factor (APF). This assigned value describes the minimum respiratory protection a respirator must provide the user when worn properly.

The APF must be higher than the Hazard Ratio (HR), which is defined by the following equation: ([concentration of the air contaminant] / [Permissible Exposure Limit]). Note that the concentration of the air contaminant is determined by area or personal monitoring, which stresses the importance of informing Safety when a hazardous material is utilized. This provides Safety with the opportunity to monitor the area and determine the concentration of potential airborne hazards present.

The Maximum Use Concentration (MUC) is the maximum concentration of an air contaminant that may be present in the ambient air when a specific respirator is utilized to filter and/or purify the air. The MUC is calculated by determining the exposure limit for a specific hazard and multiplying it by the APF for a selected respirator. Examples are provided in Footnotes assigned to Table 2. As demonstrated in Table 1 and 2, the greater the number, the greater the protection provided. Note MUCs cannot be applied to Immediately Dangerous to Life or Health (IDLH) conditions.

Assigned Protection Factor (APF)	Permissible Exposure Limit (PEL)	Maximum Use Concentration (MUC)
10[1]	10 mg/m^3 (8 hr. TWA)	100 mg/m^3
50[2]	0.75 ppm (8 hr. TWA)	37.5 ppm
1000[3]	1.0 ppm (8 hr.	1000 ppm

Table 2. Maximum Use Concentration (MUC) Calculations

Air Purifying Respirator Limitations

The use of non-powered APRs may result in additional physical stress due to an increased difficulty in breathing. Additionally, APRs must not be used in oxygen-deficient atmospheres (<19.5%) or in atmospheres that are IDLH. Examples of workplace situations that may be oxygen-deficient or IDLH include confined spaces and work areas that have high airborne concentrations of toxic chemicals. Work environments such as these will require a higher level of protection (see Atmosphere Supplying Respirators).

Sorbent Limitations

Cartridges and canisters contain sorbent (e.g., activated carbon) which is designed to remove specific air contaminants or mixtures of contaminants. During use, sorbent can become saturated leading to breakthrough and respirator user exposure to air contaminant(s). Respirator users must use only NIOSH approved cartridges or canisters and must read and follow the manufacturer's instructions specific to their use. Additionally, APRs with cartridges and canisters must be used in environments where the user has information on the levels or concentrations of ambient airborne hazards.

Atmosphere Supplying Respirators

Atmosphere supplying respirators (ASRs) provide the user with a source of breathable air that is independent of the ambient air. ASRs may be used to provide protection in oxygen-deficient or highly toxic atmospheres. There are several different types of atmosphere-supplying respirators that offer a superior degree of protection against hazardous atmospheres and airborne contaminants. However, ASRs use will require specific training and may require the user to meet certain physical fitness conditions.

Self-Contained Breathing Apparatus (SCBA)

The self-contained breathing apparatus (SCBA) is a unit that allows the user to directly carry their breathing air while facilitating the ability to use this air through an attached mask. SCBAs consist of a compressed air tank, harness, regulator system including gauges and appropriate mask connections, and a specific full-face mask as defined by the SCBA's manufacturer. SCBA systems must be used, cleaned, stored, and maintained in accordance with manufacturer recommendations.

SCBA Limitations

SCBAs are normally used when there is a short-term need to enter and/or escape from atmospheres that are or may be IDLH. Although these units provide a high degree of respiratory protection, SCBA systems have unique health and physical risk factors that must be evaluated prior to use. First, the respiratory protection provided by an SCBA is limited to the quantity of breathable air stored in the SCBA's air tank. This quantity is determined by the size of the air tank. Second, the user must be able to lift and support the full weight of the SCBA air tank on their back. Third, the user's consumption of air can reduce the work or escape time provided by the SCBA unit. Air consumption is impacted by temperature, pressure, humidity, and work rate, as well as the user's health condition.

Supplied Air Respirator (SAR)

The supplied air respirator (SAR) is a unit that is connected to a source of continuous breathable

air that allows the user to work within a hazardous atmosphere for extended periods when compared to an SCBA. SAR's will either include an air pump system with specialized air filters or a high-volume/high pressure air tank cascade system. These air supplying systems will provide breathable air through a secured air-line to the user mask. These units are lightweight but may limit the user's mobility. SARs are normally used when extended work periods are required in atmospheres that are not IDLH.

SAR Limitations

SAR use will be limited by the length of the air line and the overall structure of the work area, as well as can be impacted by any surface that binds, crimps, or compresses the air line. SAR use requires the presence of additional personnel to monitor air supply systems and the movement, as well as Safety of the air-line.

Combination ASRs

A combination air-line SAR with auxiliary SCBA (escape tank) is available and provides users with the highest degree of protection possible. These units allow the wearer to escape dangerous atmospheres if the SAR fails during use. These respirators are used when extended work periods are required in atmospheres that are or may be IDLH.

SELECTION OF RESPIRATORS

Only respirators that have been certified by NIOSH will be used in UNT Respiratory Protection Program. Respirators are certified as an assembly, and substitution of parts from other manufacturers or models is strictly prohibited. The respirator shall be used in compliance with the conditions of its certification, and the NIOSH label on cartridges/canisters or filters must not be obscured, removed, or defaced while it is in service. A filtering face piece respirator will be issued to an individual for his or her exclusive use and shall not be used by another individual. Elastomeric respirators may be used by more than one individual only after following appropriate decontamination and cleaning procedures.

Selection of an appropriate respirator will be based on the specific respiratory hazard(s) to which the individual is exposed and workplace and user factors that affect respirator performance and reliability. In order to assist personnel, identify and monitor for potential airborne hazards (e.g., particulates, aerosols, vapors, or gases) or hazardous atmospheres (i.e., oxygen deficiency), Safety will conduct air and exposure monitoring.

Half-face and full-face air-purifying respirators equipped with the appropriate respirator filters and/or cartridges/canisters will be used to provide protection against specific hazards in atmospheres that are ***not***:

- Oxygen deficient.
- Immediately dangerous to life and health (IDLH).
- Exceeding the limitations of the selected respirator filters or cartridges.

When exposure cannot be identified or reasonably estimated, the atmosphere shall be considered IDLH. In atmospheres where any of the aforementioned airborne hazards exist, at levels exceeding the capacity of air purifying respirators, employees shall use either a self-contained breathing apparatus (SCBA) or a positive pressure supplied air respirator equipped with an emergency escape

pack.

SELECTION AND USE OF RESPIRATOR CARTRIDGES OR CANISTERS

NIOSH and OSHA have published several documents defining and describing the labeling requirements for respirator cartridges and canisters. Respirator users must familiarize themselves with this labeling system to ensure the appropriate respirator cartridge or canister is selected and utilized.

In accordance with paragraphs 84.113 and 84.193 of 42 CFR 84, NIOSH incorporated ANSI K-13.1 – 19973, which specifies the color-coding requirements for respirator canister and cartridge labels. These colors (see table 3) provide a secondary means of identification specific to the hazardous materials that will be removed by the sorbent housed within selected canisters or cartridges. Additionally, NIOSH has established a standard lettering code (see table 4) that specifies what airborne hazards the canister or cartridges is rated/tested to remove from the ambient air.

Table 3: Cartridge/Canister Color Coding Chart

Contaminant	Color Coding on Cartridge/Canister
Acid gases	White
Hydrocyanic acid gas	White with 1/2 inch green stripe completely around the canister near the bottom
Chlorine gas	White with 1/2 inch yellow stripe completely around the canister near the bottom.
Organic vapors	Black
Ammonia gas	Green
Acid gases and ammonia gas	Green with 1/2 inch white stripe completely around the canister near the bottom.
Carbon monoxide	Blue
Acid gases & organic vapors	Yellow
Hydrocyanic acid gas and chloropicrin vapor	Yellow with 1/2 inch blue stripe completely around the canister near the bottom.
Acid gases, organic vapors, and ammonia gases	Brown
Radioactive materials, except tritium & noble gases	Purple (magenta)
Pesticides	Black with 1/2 inch purple stripe completely around the canister near the bottom.
Multi-Contaminant and CBRN agent	Olive
Any particulates - P100	Purple (Magenta
Any particulates - P95, P99, R95, R99, R100	Orange
Any particulates free of oil - N95, N99, or N100	Teal

Table 4: Cartridge/Canister Color Coding Chart

Air Contaminant	Letter Code	Air Contaminant	Letter Code
Ammonia	AM	Hydrogen Sulfide (escape only)	HS
Chlorine	CL	Methylamine	MA
Chlorine Dioxide	CD	Mercury Vapor	MV
Formaldehyde	FM	Organic Vapors	OV
Hydrogen Chloride	HC	Sulfur Dioxide	SD
Hydrogen Fluoride	HF		

TRAINING

To ensure the proper and safe use of a respirator, each user will be trained prior to fit testing and annually thereafter. This training will be documented, and training records will be maintained.

The training will include, but is not limited to the following:

- The regulations defining respiratory protection measures and standards.
- The components of a respiratory protection program.
- The nature, extent, and effects of respiratory hazards in the workplace.
- Medical evaluation, medical clearance, and fit testing.
- Why a respirator is necessary and the capabilities and limitations of respirators.
- An explanation of why a particular type of respirator has been selected for a specific respiratory hazard.
- The selection of respirator cartridges or canisters and the methods to identify or predict the cartridge' or canister's end of service life.
- How improper fit, usage, or maintenance can compromise the protective capacity of respirators.
- How environmental conditions, clothing, work rate, health status, and age may limit or prevent the effective use of a respirator.
- How facial features, the presence of facial hair, and facial scarring may impact a person's ability to use a respirator.
- How to inspect, put on and remove, and use a respirator.
- How to conduct a proper seal check.
- How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.
- The procedures, equipment, and supplies required to properly clean, maintain, and store respirators.
- The proper methods to report problems experienced when wearing a respirator.

Trainees will be provided the opportunity to demonstrate the retention of the information provided in this training course. Additionally, trainees may be skill tested to ensure they can select the proper respirator and cartridge/canister; as well as assemble; put on and seal check; and remove and clean the respirator.

VOLUNTARY USE

Personnel may voluntarily use a respirator under the following conditions:

- If the employer determines that this use will not pose a hazard to the individual. Safety must ensure the workplace airborne hazards are below established exposure limits.
- The employee or student must be medically cleared to wear the respirator.
- The employee or student must be provided with a copy of Appendix D-5 from 29 CFR 1910.134.

RESPIRATOR FIT TESTING

All UNT personnel required to wear respirators with tight-fitting face pieces must be properly fit tested as described in the standard. These procedures include quantitative (i.e., pass/fail based on measured leak detection) and qualitative (i.e., pass/fail based on sensed leak detection - taste or smell) fit tests. Quantitative fit testing is the preferred and most complete method of verifying the adequacy of the respirator's seal against the face.

Fit testing is performed before initial use of the respirator, when a new type of respirator is selected, when requested by the supervisor or the user, when recommended by Safety, or if there is a change in the user's physical condition or facial features that may compromise the fit of the respirator face piece or their ability to wear a respirator. The user shall be fit tested in the respirator make, model, and size that will be used.
Safety will fit test employees who have been medically cleared for both particulate filtering and elastomeric face piece respirators. Loose fitting respirators do not require fit testing but must be medically cleared to wear a respirator.

Employees or students who have facial hair that comes between the sealing surface of the face piece and the face or that which interferes with valve function (i.e., beards, "handlebar" mustaches, sideburns) shall be prohibited from wearing tight fitting face piece respirators. Other conditions that may prohibit tight-fitting respirator use includes missing dentures, facial scars, severe acne, or the use of headgear or eyewear that projects under the face piece seal. In these cases, respirator use is permitted as long as these conditions do not prevent an adequate seal. A loose-fitting powered air purifying respirator may be an alternative in these situations.

Fit-testing procedures are described in Appendix D-1.

USE AND MAINTENANCE OF RESPIRATORS

Visual Inspection:

Without regular respirator inspections, users cannot be sure that they are receiving adequate protection from airborne hazards. Respirators must be thoroughly inspected before each use, following cleaning, and periodically while in storage. Use the check list provided in Appendix D-8 to ensure the respirator is functional and ready for use.

UNT must replace, repair, or discard a respirator that is not functioning properly. Any respirator that fails an inspection shall be tagged "DO NOT USE" and stored away from functional respirators. Additionally, a defective respirator must, with no exceptions, be replaced or repaired before the user enters or returns to a workplace containing recognized airborne hazards.

Seal Checks:

The wearer of a respirator equipped with a tight-fitting face piece must check the seal of the face piece prior to each entry into an area containing anticipated or recognized airborne hazards. The seal may also be checked during use if the user questions the fit; however, it is essential that users

leave an area immediately if a respirator's seal is questioned.

The positive and negative pressure checks listed below, or the respirator manufacturer's recommended user seal check method shall be used.

- *Positive Pressure Check*
    - Close off the exhalation valve with the palm of the hand and exhale gently into the face piece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the face piece without any evidence of air leakage at the seal.
- *Negative Pressure Check*
    - Close off the inlet opening of the canister or cartridge by covering with the palms of the hands and inhale gently so that the face piece collapses slightly. Hold your breath for ten seconds. The face piece should remain slightly collapsed with no inward leakage.

Note that user seal checks <u>are not substitutes</u> for qualitative or quantitative fit tests.

Cleaning and Disinfection:

Elastomeric respirators must be cleaned following each use. Procedures recommended by the respirator manufacturer or those set forth in the following instructions may be used:

- Remove filters, cartridges, or canisters. Disassemble face pieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
- Wash components in warm (43°C/110°F maximum) water with a mild detergent or a disinfectant cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- Rinse components thoroughly in clean, warm (43°C/110°F maximum) water, preferably running water. Drain.
- When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in <u>*one*</u> of the following:
    - Hypochlorite solution (50ppm of Chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water 43°C/110°F.
    - Aqueous solution of iodine (50ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43°C/110°F.
    - Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
- Rinse components thoroughly in clean, warm (43°C/110°F maximum) water, preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on face pieces may cause contact dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
- Components should be hand-dried with a clean, lint-free cloth or air-dried.
- Reassemble face piece, replacing filters, cartridges, and canisters where necessary.
- Test the respirator to ensure that all components work properly.

Storage:

All respirators shall be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. Additionally, they shall be packed or stored to prevent deformation (i.e. crushing) of the face piece and exhalation valve. Additionally,

users should follow the manufacturer's storage instructions.

Full face elastomeric face piece respirator should be stored in a respirator storage bag (i.e. provided by the manufacturer or purchased). These bags provide holes for air exchange to remove excess moisture and prevent mildew formation. Respirators should not be hung by their straps as this could cause distortion of the mask area and damage the straps. The storage of used particulate filtering face piece respirators (e.g. N95s) is not permitted. These should be properly discarded after use.

Cartridges and canisters stored for reuse must be stored in sealable bags to prevent exposure to moisture. Sorbent present in cartridges and canisters will adsorb water which will decrease the effectiveness and life of these filtration units.

CHANGE-OUT SCHEDULE

A change out schedule describes how long a particular respirator cartridge or canister used can be used before contaminant breakthrough is predicted or identified. A schedule of this nature is based on objective data obtained through various research institutes, such as NIOSH, and from individual cartridge and canister manufacturers. The schedule may also take into consideration work rate, temperature, relative humidity, chemical concentration, and multiple chemical contaminants. To ensure that these cartridges are changed before they are no longer effective, a change out schedule is necessary.

Respirator users may no longer rely on warning properties (i.e. olfaction – sense of smell) as the sole basis for determining change schedules, however, respirator users should be trained to understand that abnormal odor or irritation is evidence of breakthrough. If the user detects odors or irritation, he/she must immediately leave the workplace, evaluate their respirator, and the respirator's cartridges/canisters. The supervisor and Safety must be notified to determine if the concentrations of airborne hazards have changed or if the respirator is defective.

When there is a mix of contaminants, the service life will be based on the contaminant with the shortest breakthrough time. Many manufacturers are now installing End of Service Life Indicators (ESLI's) on respirator cartridges. An ESLI is a system that changes color, therefore alerting the user that the cartridge must be replaced. The respirator user must strictly follow the manufacturer's guidelines to prevent health risks. The following tables provide methods or information for determining a cartridge or canisters change out schedule:

Table 5: Rules of Thumb for cartridge service life

If the chemicals boiling point > 70˚C and the concentrations is less than 200ppm, you can expect a service life of 8hrs at normal work rate.
Service life is inversely proportional to work rate.
Reducing concentrations by a factor of 10 will increase service life by a factor of 5
Humidity above 85% will reduce service life by 50%

Note: The generalizations listed below must be used in concert with a primary method of predicting service life for specific contaminants.
Adopted from the Chapter 36, "The Occupational Environment – Its Evaluation and Control"; American Industrial Hygiene Association Publication.

Table 6: Manufacturers Online Prediction software

Company	Web Link
3M	http://extra8.3m.com/SLSWeb/home.html
Scotts	https://www.scottsurelife.com/DesktopUI/SelectRegion.aspx
MSA	http://webapps.msanet.com/responseguide/
North	http://ezguide.northSafety.com/help/html/esLifeMain.aspx
OSHA	https://www.osha.gov/SLTC/etools/respiratory/change_schedule.html
Bullard	http://www.bullard.com/V3/resources/MAXXLife/

Note that these companies may have mobile apps for IPhones and Android phones.

Table 7: Chemical Cartridge and Canister Change-Out Schedule

Chemical	Recommended Change Out Schedule
Acrylonitrile 1910.1045 (h)(2)(ii)	End-of-service life or at the end of each work shift, whichever occurs first.
Benzene 1910.1028 (g)(2)(ii)	End-of-service life or at the beginning of each shift, whichever occurs first
1,3-Butadiene 1910.1051 (h)(2)(ii)	Every 1,2, or 4 hours dependent on concentration and at the beginning of each shift
Formaldehyde 1910.1048 (g)(3)(ii)	Cartridges – every 3 hours or end of shift, whichever is sooner Canisters – every 2 or 4 hours according to schedule in (g)(3)(iv)
Vinyl Chloride 1910.1017 (g)(3)(ii)	End-of-service life or end of shift in which they are first used, whichever comes first.
Methylene Chloride 1910.1052 (g)(2)(ii)	Canisters may only be used for emergency escape and must be replaced after use.

Table 8: Particulate Filter Change-Out Schedule

N-series	
Protection against solid and water based particle - N95 - N99 - N100	All N series filters have no specific service time. They may be used multiple shifts and may continue until a breathing resistance is noted or become visibly soiled. **OR** At the first sign of physical damage.
R-series	
Protection against any particles (including oil aerosols). - R95 - R99 - R100	All R series filters have a useful service time of an 8-hour shift.
P-series	
Protection against any particles (including oil aerosols). - P95 - P99 - P100	All P series filters have varying service times. See manufacturer's time use limitations for more information.

RECORDKEEPING

A written copy of this program and the OSHA Respiratory Protection Standard shall be kept by EHS and made available to all employees who wish to review it.

UNT will record and maintain appropriate documentation for the Respiratory Protection Program. The following is a list of those items that will be documented and who is responsible for each:

- **Medical Evaluation –** EHS shall maintain copies of the physician's written recommendation regarding each employee's ability to wear a respirator, for employees covered under the Respiratory Protection Program.
- **Fit testing –** all fit testing documentation will be maintained by EHS as described in this document.
- **Training –** all initial and follow up training documentation will be maintained by EHS.
- **Inspection – emergency use respirators shall be inspected monthly and the inspection shall be documented (see Appendix D-7 and D-8) and maintained by the user.**

Safety will conduct periodic inspections and program evaluations to determine the continued effectiveness of the Respiratory Protection Plan. Program will be reviewed as necessary but at least annually.

EHS periodically inspects and evaluates UNT workplaces to ensure implementation and effectiveness of the Respiratory Protection Plan. The EHS RPP evaluations include regular site inspections, air monitoring, records review and consultations with UNT employee respirator users and the users' supervisor. EHS considers the respirator users':

- 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 EHS. These findings will be reported to UNT administration, and the report will list plans to correct deficiencies in the respirator program and target dates for the implementation of those corrections.

DEFINITIONS

The following definitions are important terms used in the respiratory protection standard:

- **Airborne (or Respiratory) Hazards** may result from harmful airborne contaminants including dusts, fogs, fumes, mists, gases, smokes, sprays, vapors, particulates, infectious droplets/aerosols, biological agents, chemicals, radiological hazards, or oxygen deficient atmospheres. The proper selection and use of a respirator depends upon an initial determination of the concentration of the hazard or hazards present in the workplace, or the presence of an oxygen deficient atmosphere. Airborne hazards generally fall into the

following basic categories:

- **Dusts**. Particles that are formed or generated from solid organic or inorganic materials by reducing their size through mechanical processes such as crushing, grinding, drilling, abrading, or blasting.
- **Fumes**. Particles formed when a volatilized solid, such as a metal, condenses in cool air. This physical change is often accompanied by a chemical reaction, such as oxidation. Examples are lead oxide fumes from smelting, and iron oxide fumes from arc-welding. A fume can also be formed when a material such as magnesium metal is burned or when welding or gas cutting is done on galvanized metal.
- **Mists**. A mist is formed when a finely divided liquid is suspended in the air. These suspended liquid droplets can be generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersed state, such as by splashing, foaming, or atomizing. Examples are the oil mist produced during cutting and grinding operations, acid mists from electroplating, acid or alkali mists from pickling operations, paint spray mist from spraying operations, and the condensation of water vapor to form a fog or rain.
- **Gases**. Gases are formless fluids that occupy the space or enclosure, and which can be changed to the liquid or solid state only by the combined effect of increased pressure and decreased temperature. Examples are welding gases such as acetylene, nitrogen, helium and argon; and carbon monoxide generated from the operation of internal combustion engines. Another example is hydrogen sulfide, which is formed wherever there is decomposition of materials containing sulfur under reducing conditions.
- **Vapors**. Vapors are the gaseous form of substances that are normally in the solid or liquid state at room temperature and pressure. They are formed by evaporation from a liquid or solid and can be found where parts cleaning and painting takes place and where solvents are used.
- **Smoke**. Smoke consists of carbon or soot particles resulting from the incomplete combustion of carbonaceous materials such as coal or oil. Smoke generally contains droplets as well as dry particles.
- **Oxygen deficiency**. An oxygen deficient atmosphere has oxygen content below 19.5% by volume. Oxygen deficiency may occur in confined spaces, which include, but are not limited to, storage tanks, process vessels, towers, drums, tank cars, bins, sewers, septic tanks, underground utility tunnels, manholes, and pits.

- ***Air-purifying respirator*** means a respirator with an air-purifying filter, cartridge, or canister that removes specific airborne hazards by passing ambient air through the air-purifying element.
- ***Atmosphere-supplying respirator*** means a respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.
- ***Canister or cartridge*** means a container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.
- ***Demand respirator*** means an atmosphere-supplying respirator that admits breathing air to the face piece only when negative pressure is created inside the face piece by inhalation.
- ***Emergency situation*** means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an

uncontrolled significant release of an airborne contaminant.

- ***Employee exposure*** means exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.
- ***End-of-service-life indicator (ESLI)*** means a system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.
- ***Escape-only respirator*** means a respirator intended to be used only for emergency exit.
- ***Filter or air purifying element*** means a component used in respirators to remove solid or liquid aerosols from the inspired air.
- ***Filtering face piece (dust mask)*** means a negative pressure particulate respirator with a filter as an integral part of the face piece or with the entire face piece composed of the filtering medium.
- ***Fit factor*** means a quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.
- ***Fit test*** means the use of a protocol to qualitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test QLFT and Quantitative fit test QNFT.)
- ***Helmet*** means a rigid respiratory inlet covering that also provides head protection against impact and penetration.
- ***High efficiency particulate air (HEPA) filter*** means a filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.
- ***Hood*** means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.
- ***Immediately dangerous to life and health (IDLH)*** means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape form a dangerous atmosphere.
- ***Interior structural firefighting*** means the physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures, which are involved in a fire situation beyond the incipient stage. (See 29 CFR 1910.155)
- ***Loose-fitting face piece*** means a respiratory inlet covering that is designed to form a partial seal with the face.
- ***Negative Pressure Respirator (tight fitting)*** means a respirator in which the air pressure inside the face piece is negative during inhalation with respect to the ambient air pressure outside the respirator.
- ***Oxygen Deficient Atmosphere*** means an atmosphere with oxygen content below 19.5% by volume.
- ***Physician or other licensed health care professional (PLHCP)*** means an individual who's legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide, or be delegated the responsibility to provide, some or all of the health care services required by paragraph (e) of this section.

- ***Positive Pressure Respirator*** means a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.
- ***Powered Air-purifying Respirator (PAPR)*** means an air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.
- ***Pressure Demand Respirator*** means a positive pressure atmosphere-supplying respirator that admits breathing air to the face piece when the positive pressure is reduced inside the face piece by inhalation.
- ***Qualitative Fit Test (QLFT)*** means a pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.
- ***Quantitative Fit Test (QNFT)*** means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.
- ***Respiratory Inlet Covering*** means that portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a face piece, helmet, hood, suit, or a mouthpiece respirator with nose clamp.
- ***Self-Contained Breathing Apparatus (SCBA)*** means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.
- ***Service Life*** means the period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.
- ***Supplied-Air Respirator (SAR) or Airline Respirator*** means an atmosphere- supplying respirator for which the source of breathing air is not designed to be carried by the user.
- ***Tight-Fitting Face Piece*** means a respiratory inlet covering that forms a complete seal with the face.
- ***User Seal Check*** means an action conducted by the respirator user to determine if the respirator is properly sealed to the face.

APPENDIX D-1 - FIT TEST PROCEDURES
Appendix D-1 to § 1910.134

Part I. OSHA-Accepted Fit Test Protocols

A. **Fit Testing Procedures--General Requirements**. The employer shall conduct fit testing using the following procedures. The requirements in this appendix apply to all OSHA- accepted fit test methods, both QLFT and QNFT.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.
2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.
3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.
4. The test subject shall be instructed to hold each chosen face piece up to the face and eliminate those that obviously do not give an acceptable fit.
5. The more acceptable face pieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.
6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:
    a. Position of the mask on the nose
    b. Room for eye protection
    c. Room to talk
    d. Position of mask on face and cheeks
7. The following criteria shall be used to help determine the adequacy of the respirator fit:
    a. Chin properly placed.
    b. Adequate strap tension, not overly tightened
    c. Fit across the bridge of the nose.
    d. Respirator of proper size to span distance from nose to chin.
    e. Tendency of respirator to slip
    f. Self-observation in mirror to evaluate fit and respirator position.
8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks described in Appendix D-2 of this section or those recommended by the respirator manufacturer, which provide equivalent protection to the procedures in Appendix D-2. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to-side and up and down slowly while taking in a few slow deep breaths. Another face piece shall be selected and retested if the test subject fails the user seal check tests.
9. The test shall not be conducted if there is any hair growth between the skin and the face piece

sealing surface, such as stubble beard growth, beard, mustache or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.

10. If a test subject exhibits difficulty in breathing during the tests, she or he shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing her or his duties.
11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.
12. Exercise regimen. Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.
13. The fit test shall be performed while the test subject is wearing any applicable Safety equipment that may be worn during actual respirator use which could interfere with respirator fit.
14. Test Exercises.
    a. The following test exercises are to be performed for all fit testing methods prescribed in this appendix, except for the CNP method. A separate fit testing exercise regimen is contained in the CNP protocol. The test subject shall perform exercises, in the test environment, in the following manner:
        i. Normal breathing. In a normal standing position, without talking, the subject shall breathe normally.
        ii. Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.
        iii. Turning head side to side. Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.
        iv. Moving head up and down. Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).
        v. Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song.

            Rainbow Passage. When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

        vi. Grimace. The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT).
        vii. Bending over. The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test

environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

viii. Normal breathing. Same as exercise (1).

b. Each test exercise shall be performed for one minute except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

B. Qualitative Fit Test (QLFT) Protocols

1. General

a. The employer shall ensure that persons administering QLFT are able to prepare test solutions, calibrate equipment and perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

b. The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

2. Isoamyl Acetate Protocol. **Note:** This protocol is not appropriate to use for the fit testing of particulate respirators. If used to fit test particulate respirators, the respirator must be equipped with an organic vapor filter.

a. Odor Threshold Screening. Odor threshold screening, performed without wearing a respirator, is intended to determine if the individual tested can detect the odor of isoamyl acetate at low levels.

i. Three 1-liter glass jars with metal lids are required.

ii. Odor-free water (e.g., distilled or spring water) at approximately 25 deg. C (77 deg. F) shall be used for the solutions.

iii. The isoamyl acetate (IAA) (also known at isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a 1-liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.

iv. The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.

v. The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.

vi. A test blank shall be prepared in a third jar by adding 500 cc of odor- free water.

vii. The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.

viii. The following instruction shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain

water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the test conductor which bottle contains banana oil."

ix. The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue in the subject.

x. If the test subject is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.

xi. If the test subject correctly identifies the jar containing the odor test solution, the test subject may proceed to respirator selection and fit testing.

b. Isoamyl Acetate Fit Test

i. The fit test chamber shall be a clear 55-gallon drum liner suspended inverted over a 2- foot diameter frame so that the top of the chamber is about 6 inches above the test subject's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.

ii. Each respirator used for the fitting and fit testing shall be equipped with organic vapor cartridges or offer protection against organic vapors.

iii. After selecting, donning, and properly adjusting a respirator, the test subject shall wear it to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well-ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.

iv. A copy of the test exercises and any prepared text from which the subject is to read shall be taped to the inside of the test chamber.

v. Upon entering the test chamber, the test subject shall be given a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with
0.75 ml of pure IAA. The test subject shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.

vi. Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. This would be an appropriate time to talk with the test subject; to explain the fit test, the importance of his/her cooperation, and the purpose for the test exercises; or to demonstrate some of the exercises.

vii. If at any time during the test, the subject detects the banana-like odor of IAA, the test is failed. The subject shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.

viii. If the test is failed, the subject shall return to the selection room and remove the respirator. The test subject shall repeat the odor sensitivity test, select and put on another respirator, return to the test area and again begin the fit test procedure described in (b) (1) through (7) above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the subject shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned

by this time.

ix. If the subject passes the test, the efficiency of the test procedure shall be demonstrated by having the subject break the respirator face seal and take a breath before exiting the chamber.

x. When the test subject leaves the chamber, the subject shall remove the saturated towel and return it to the person conducting the test, so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

3. Saccharin Solution Aerosol Protocol. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

a. Taste threshold screening. The saccharin taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of saccharin.

i. During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches in diameter by 14 inches tall with at least the front portion clear and that allows free movements of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

ii. The test enclosure shall have a 3/4-inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

iii. The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his/her slightly open mouth with tongue extended. The subject is instructed to report when he/she detects a sweet taste.

iv. Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. The nozzle is directed away from the nose and mouth of the person. This nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

v. The threshold check solution is prepared by dissolving 0.83 gram of sodium saccharin USP in 100 ml of warm water. It can be prepared by putting 1 ml of the fit test solution (see (b)(5) below) in 100 ml of distilled water.

vi. To produce the aerosol, the nebulizer bulb is firmly squeezed so that it collapses completely, then released and allowed to fully expand.

vii. Ten squeezes are repeated rapidly and then the test subject is asked whether the saccharin can be tasted. If the test subject reports tasting the sweet taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

viii. If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

ix. If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the saccharin is tasted. If the test subject reports tasting the sweet taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

x. The test conductor will take note of the number of squeezes required to solicit a taste response. If the saccharin is not tasted after 30 squeezes (step 10), the test subject is unable to taste saccharin and may not perform the saccharin fit test. Note to paragraph 3. (a): If the test subject eats or drinks something sweet before the screening test, he/she may be unable to taste the weak saccharin solution.

xi. If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

xii. Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

xiii. The nebulizer shall be thoroughly rinsed in water, shaken dry, and refilled at least each morning and afternoon or at least every four hours.

b. Saccharin solution aerosol fit test procedure.

i. The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

ii. The fit test uses the same enclosure described in 3. (a) above.

iii. The test subject shall don the enclosure while wearing the respirator selected in section
I. A. of this appendix. The respirator shall be properly adjusted and equipped with a particulate filter(s).

iv. A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

v. The fit test solution is prepared by adding 83 grams of sodium saccharin to 100 ml of warm water.

vi. As before, the test subject shall breathe through the slightly open mouth with tongue extended, and report if he/she tastes the sweet taste of saccharin.

vii. The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of saccharin fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test. A minimum of 10 squeezes is required.

viii. After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

ix. Every 30 seconds the aerosol concentration shall be replenished using one half the original number of squeezes used initially (e.g., 5, 10 or 15).

x. The test subject shall indicate to the test conductor if at any time during the fit test the taste of saccharin is detected. If the test subject does not report tasting the saccharin, the test is passed.

xi. If the taste of saccharin is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

xii. Since the nebulizer has a tendency to clog during use, the test operator must make periodic checks of the nebulizer to ensure that it is not clogged. If clogging is found at the end of the test session, the test is invalid.

4. Bitrex™ (Denatonium Benzoate) Solution Aerosol Qualitative Fit Test Protocol.

The Bitrex™ (Denatonium benzoate) solution aerosol QLFT protocol uses the published saccharin test protocol because that protocol is widely accepted. Bitrex™ is routinely used as a taste aversion agent in household liquids which children should not be drinking and is endorsed by the American Medical Association, the National S afety Council, and the American Association of Poison Control Centers. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

a. Taste Threshold Screening. The Bitrex™ taste threshold screening, performed without wearing a respirator, is intended to determine whether the individual being tested can detect the taste of Bitrex™.

   i. During threshold screening as well as during fit testing, subjects shall wear an enclosure about the head and shoulders that is approximately 12 inches (30.5 cm) in diameter by 14 inches (35.6 cm) tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts # FT 14 and # FT 15 combined, is adequate.

   ii. The test enclosure shall have a \3/4\ inch (1.9 cm) hole in front of the test subject's nose and mouth area to accommodate the nebulizer nozzle.

   iii. The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended.
   The subject is instructed to report when he/she detects a bitter taste

   iv. Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the Threshold Check Solution into the enclosure. This Nebulizer shall be clearly marked to distinguish it from the fit test solution nebulizer.

   v. The Threshold Check Solution is prepared by adding 13.5 milligrams of Bitrex™ to 100 ml of 5% salt (NaCl) solution in distilled water.

   vi. To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely, and is then released and allowed to fully expand.

   vii. An initial ten squeezes are repeated rapidly and then the test subject is asked whether the Bitrex™ can be tasted. If the test subject reports tasting the bitter taste during the ten squeezes, the screening test is completed. The taste threshold is noted as ten regardless of the number of squeezes actually completed.

   viii. If the first response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter tasteduring the second ten squeezes, the screening test is completed. The taste threshold is noted as twenty regardless of the number of squeezes actually completed.

   ix. If the second response is negative, ten more squeezes are repeated rapidly and the test subject is again asked whether the Bitrex is tasted. If the test subject reports tasting the bitter taste during the third set of ten squeezes, the screening test is completed. The taste threshold is noted as thirty regardless of the number of squeezes actually completed.

   x. The test conductor will take note of the number of squeezes required to solicit a taste response.

   xi. If the Bitrex is not tasted after 30 squeezes (step 10), the test subject is unable to taste Bitrex and may not perform the Bitrex fit test.

xii. If a taste response is elicited, the test subject shall be asked to take note of the taste for reference in the fit test.

xiii. Correct use of the nebulizer means that approximately 1 ml of liquid is used at a time in the nebulizer body.

xiv. The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every four hours.

b. Bitrex Solution Aerosol Fit Test Procedure.

i. The test subject may not eat, drink (except plain water), smoke, or chew gum for 15 minutes before the test.

ii. The fit test uses the same enclosure as that described in 4. (a) above.

iii. The test subject shall don the enclosure while wearing the respirator selected according to section I. A. of this appendix. The respirator shall be properly adjusted and equipped with any type particulate filter(s).

iv. A second DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent is used to spray the fit test solution into the enclosure. This nebulizer shall be clearly marked to distinguish it from the screening test solution nebulizer.

v. The fit test solution is prepared by adding 337.5 mg of Bitrex to 200 ml of a 5% salt (NaCl) solution in warm water.

vi. As before, the test subject shall breathe through his or her slightly open mouth with tongue extended, and be instructed to report if he/she tastes the bitter taste of Bitrex.

vii. The nebulizer is inserted into the hole in the front of the enclosure and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20 or 30 squeezes) based on the number of squeezes required to elicit a taste response as noted during the screening test.

viii. After generating the aerosol, the test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

ix. Every 30 seconds the aerosol concentration shall be replenished using one half the number of squeezes used initially (e.g., 5, 10 or 15).

x. The test subject shall indicate to the test conductor if at any time during the fit test the taste of Bitrex is detected. If the test subject does not report tasting the Bitrex, the test is passed.

xi. If the taste of Bitrex is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried and the entire test procedure is repeated (taste threshold screening and fit testing).

5. Irritant Smoke (Stannic Chloride) Protocol. This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

a. General Requirements and Precautions

i. The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

ii. Only stannic chloride smoke tubes shall be used for this protocol. (3) No form of test enclosure or hood for the test subject shall be used.

iii. The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

iv. The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the build-up of irritant smoke in the general atmosphere.

b. Sensitivity Screening Check. The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke.

i. The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

ii. The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

iii. The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

c. Irritant Smoke Fit Test Procedure

i. The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

ii. The test subject shall be instructed to keep his/her eyes closed.

iii. The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the face piece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within six inches of the respirator.

iv. If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

v. The exercises identified in section I.A. 14. of this appendix shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

vi. If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

vii. Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke.

Failure to evoke a response shall void the fit test.

viii. If a response is produced during this second sensitivity check, then the fit test is passed.

C. Quantitative Fit Test (QNFT) Protocols

The following quantitative fit testing procedures have been demonstrated to be acceptable: Quantitative fit testing using a non- hazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; Quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; Quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a face piece to quantify the respirator fit.

1. General
    a. The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly and ensure that test equipment is in proper working order.
    b. The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.
2. Generated Aerosol Quantitative Fit Testing Protocol
    a. Apparatus
        i. Instrumentation. Aerosol generation, dilution, and measurement systems using particulates (corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS] or sodium chloride) as test aerosols shall be used for quantitative fit testing.
        ii. Test chamber. The test chamber shall be large enough to permit all test subjects to perform freely all required exercises without disturbing the test agent concentration or the measurement apparatus. The test chamber shall be equipped and constructed so that the test agent is effectively isolated from the ambient air, yet uniform in concentration throughout the chamber.
        iii. When testing air-purifying respirators, the normal filter or cartridge element shall be replaced with a high efficiency particulate air (HEPA) or P100 series filter supplied by the same manufacturer.
        iv. The sampling instrument shall be selected so that a computer record or strip chart record may be made of the test showing the rise and fall of the test agent concentration with each inspiration and expiration at fit factors of at least 2,000. Integrators or computers that integrate the amount of test agent penetration leakage into the respirator for each exercise may be used provided a record of the readings is made.
        v. The combination of substitute air-purifying elements, test agent and test agent concentration shall be such that the test subject is not exposed in excess of an established exposure limit for the test agent at any time during the testing process, based upon the length of the exposure and the exposure limit duration.
        vi. The sampling port on the test specimen respirator shall be placed and constructed

so that no leakage occurs around the port (e.g., where the respirator is probed), a free air flow is allowed into the sampling line at all times, and there is no interference with the fit or performance of the respirator. The in-mask sampling device (probe) shall be designed and used so that the air sample is drawn from the breathing zone of the test subject, midway between the nose and mouth and with the probe extending into the face piece cavity at least 1/4 inch.

vii. The test setup shall permit the person administering the test to observe the test subject inside the chamber during the test.

viii. The equipment generating the test atmosphere shall maintain the concentration of test agent constant to within a 10 percent variation for the duration of the test.

ix. The time lag (interval between an event and the recording of the event on the strip chart or computer or integrator) shall be kept to a minimum. There shall be a clear association between the occurrence of an event and its being recorded.

x. The sampling line tubing for the test chamber atmosphere and for the respirator sampling port shall be of equal diameter and of the same material. The length of the two lines shall be equal.

xi. The exhaust flow from the test chamber shall pass through an appropriate filter (i.e., high efficiency particulate filter) before release.

xii. When sodium chloride aerosol is used, the relative humidity inside the test chamber shall not exceed 50 percent.

xiii. The limitations of instrument detection shall be taken into account when determining the fit factor.

xiv. Test respirators shall be maintained in proper working order and be inspected regularly for deficiencies such as cracks or missing valves and gaskets.

b. Procedural Requirements

i. When performing the initial user seal check using a positive or negative pressure check, the sampling line shall be crimped closed in order to avoid air pressure leakage during either of these pressure checks.

ii. The use of an abbreviated screening QLFT test is optional. Such a test may be utilized in order to quickly identify poor fitting respirators that passed the positive and/or negative pressure test and reduce the amount of QNFT time. The use of the CNC QNFT instrument in the count mode is another optional method to obtain a quick estimate of fit and eliminate poor fitting respirators before going on to perform a full QNFT.

iii. A reasonably stable test agent concentration shall be measured in the test chamber prior to testing. For canopy or shower curtain types of test units, the determination of the test agent's stability may be established after the test subject has entered the test environment.

iv. Immediately after the subject enters the test chamber, the test agent concentration inside the respirator shall be measured to ensure that the peak penetration does not exceed 5 percent for a half mask or 1 percent for a full-face piece respirator.

v. A stable test agent concentration shall be obtained prior to the actual start of testing.

vi. Respirator restraining straps shall not be over-tightened for testing. The straps shall be adjusted by the wearer without assistance from other persons to give a

reasonably comfortable fit typical of normal use. The respirator shall not be adjusted once the fit test exercises begin.

vii. The test shall be terminated whenever any single peak penetration exceeds 5 percent for half masks and 1 percent for full face piece respirators. The test subject shall be refitted and retested.

viii. Calculation of fit factors.

a) The fit factor shall be determined for the quantitative fit test by taking the ratio of the average chamber concentration to the concentration measured inside the respirator for each test exercise except the grimace exercise.

b) The average test chamber concentration shall be calculated as the arithmetic average of the concentration measured before and after each test (i.e., 7 exercises) or the arithmetic average of the concentration measured before and after each exercise or the true average measured continuously during the respirator sample.

c) The concentration of the challenge agent inside the respirator shall be determined by one of the following methods:

(1) Average peak penetration method means the method of determining test agent penetration into the respirator utilizing a strip chart recorder, integrator, or computer. The agent penetration is determined by an average of the peak heights on the graph or by computer integration, for each exercise except the grimace exercise. Integrators or computers that calculate the actual test agent penetration into the respirator for each exercise will also be considered to meet the requirements of the average peak penetration method.

(2) Maximum peak penetration method means the method of determining test agent penetration in the respirator as determined by strip chart recordings of the test. The highest peak penetration for a given exercise is taken to be representative of average penetration into the respirator for that exercise.

(3) Integration by calculation of the area under the individual peak for each exercise except the grimace exercise. This includes computerized integration.

(4) The calculation of the overall fit factor using individual exercise fit factors involves first converting the exercise fit factors to penetration values, determining the average, and then converting that result back to a fit factor. This procedure is described in the following equation:

$$\text{Overall Fit Factor} = \frac{\text{Number of exercises}}{1/ff_1 + 1/ff_2 + 1/ff_3 + 1/ff_4 + 1/ff_5 + 1/ff_6 + 1/ff_7 + 1/ff_8}$$

Where ff1, ff2, ff3, etc. are the fit factors for exercises 1, 2, 3, etc.

ix. The test subject shall not be permitted to wear a half mask or quarter face piece respirator unless a minimum fit factor of 100 is obtained, or a full-face piece respirator unless a minimum fit factor of 500 is obtained.

x. Filters used for quantitative fit testing shall be replaced whenever increased breathing resistance is encountered, or when the test agent has altered the integrity of the filter media.

3. Ambient aerosol condensation nuclei counter (CNC) quantitative fit testing protocol. The ambient

aerosol condensation nuclei counter (CNC) quantitative fit testing (Portacount™) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full-face piece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

a. Portacount Fit Test Requirements

i. Check the respirator to make sure the sampling probe and line are properly attached to the face piece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 series 100, series 99, or series 95 particulate filter) per manufacturer's instruction.

ii. Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.

iii. Check the following conditions for the adequacy of the respirator fit: Chin properly placed; Adequate strap tension, not overly tightened; Fit across nose bridge; Respirator of proper size to span distance from nose to evaluate fit and respirator position.

iv. Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting face piece, try another size of the same model respirator, or another model of respirator.

v. Follow the manufacturer's instructions for operating the Portacount and proceed with the test.

vi. The test subject shall be instructed to perform the exercises in section I. A. 14. of this appendix.

vii. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

b. Portacount Test Instrument

i. The Portacount will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.

ii. Since the pass or fail criterion of the Portacount is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this Appendix.

iii. A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

4. Controlled negative pressure (CNP) quantitative fit testing protocol. The CNP protocol provides an

alternative to aerosol fit test methods. The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator face piece to generate and then maintain a constant negative pressure inside the face piece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, air flow out of the respirator is equal to air flow into the respirator. Therefore, temporarily sealed respirator constant yields a direct measure of leakage air flow into the respirator. The CNP fit test method measures leak rates through the face piece as a method for determining the face piece fit for negative pressure respirators. The CNP instrument manufacturer Dynatech Nevada also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employee's own respirator. To perform the test, the test subject closes his or her mouth and holds his/her breath, after which an air pump removes air from the respirator face piece at a pre-selected constant pressure. The face piece fit is expressed as the leak rate through the face piece, expressed as milliliters per minute. The quality and validity of the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full-face piece respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the screening test.

a. CNP Fit Test Requirements.
    i. The instrument shall have a non-adjustable test pressure of 15.0 mm water pressure.
    ii. The CNP system defaults selected for test pressure shall be set at -- 15 mm of water (-0.58 inches of water) and the modeled inspiratory flow rate shall be 53.8 liters per minute for performing fit tests. (**Note:** CNP systems have built-in capability to conduct fit testing that is specific to unique work rate, mask, and gender situations that might apply in a specific workplace. Use of system default values, which were selected to represent respirator wear with medium cartridge resistance at a low-moderate work rate, will allow inter- test comparison of the respirator fit.)
    iii. The individual who conducts the CNP fit testing shall be thoroughly trained to perform the test.
    iv. The respirator filter or cartridge needs to be replaced with the CNP test manifold. The inhalation valve downstream from the manifold either needs to be temporarily removed or propped open.
    v. The test subject shall be trained to hold his or her breath for at least 20 seconds from the individual who conducts the CNP fit test.
    vi. The QNFT protocol shall be followed according to section I. C. 1. of this appendix with an exception for the CNP test exercises.

b. CNP Test Exercises
    i. Normal breathing. In a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject needs to hold head straight ahead and hold his or her breath for 10 seconds during the test measurement.
    ii. Deep breathing. In a normal standing position, the subject shall breathe slowly and deeply for 1 minute, being careful not to hyperventilate. After the deep breathing exercise, the subject shall hold his or her head straight ahead and hold his or her

breath for 10 seconds during test measurement.

iii. Turning head side to side. Standing in place, the subject shall slowly turn his or her head from side to side between the extreme positions on each side for 1 minute. The head shall be held at each extreme momentarily so the subject can inhale at each side. After the turning head side to side exercise, the subject needs to hold head full left and hold his or her breath for 10 seconds during test measurement. Next, the subject needs to hold head full right and hold his or her breath for 10 seconds during test measurement.

iv. Moving head up and down. Standing in place, the subject shall slowly move his or her head up and down for 1 minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling). After the moving head up and down exercise, the subject shall hold his or her head full up and hold his or her breath for 10 seconds during test measurement. Next, the subject shall hold his or her head full down and hold his or her breath for 10 seconds during test measurement.

v. Talking. The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song for 1 minute. After the talking exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

vi. Grimace. The test subject shall grimace by smiling or frowning for 15 seconds.

vii. Bending Over. The test subject shall bend at the waist as if he or she were to touch his or her toes for 1 minute. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT units that prohibit bending at the waist. After the bending over exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement.

viii. Normal Breathing. The test subject shall remove and re-don the respirator within a one-minute period. Then, in a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject shall hold his or her head straight ahead and hold his or her breath for 10 seconds during the test measurement. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of a respirator shall be tried.

c. CNP Test Instrument.

i. The test instrument shall have an effective audio warning device, or a visual-warning device in the form of screen tracing that indicates when the test subject fails to hold his or her breath during the test. The test must be terminated and restarted from the beginning when the test subject failed to hold his or her breath during the test. The test subject may be refitted and retested.

ii. A record of the test shall be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style and size of respirator used; and date tested.

5. Controlled negative pressure (CNP) REDON quantitative fit testing protocol.

a. When administering this protocol to test subjects, employers must comply with the requirements specified in paragraphs (a) and (c) of Part I.C.4 of this appendix ("Controlled

negative pressure (CNP) quantitative fit testing protocol"), as well as use the test exercises described below in paragraph (b) of this protocol instead of the test exercises specified in paragraph (b) of Part I.C.4 of this appendix.

b. Employers must ensure that each test subject being fit tested using this protocol follows the exercise and measurement procedures, including the order of administration, described below in Table A-1 of this appendix.

Table A-1. -- CNP REDON Quantitative Fit Testing Protocol

Exercises[1]	Exercise procedure	Measurement procedure
Facing Forward	Stand and breathe normally, without talking, for 30 seconds.	Face forward, while holding breath for 10 seconds.
Bending Over	Bend at the waist, as if going to touch his or her toes, for 30 seconds.	Face parallel to the floor, while holding breath for 10 seconds
Head Shaking	For about three seconds, shake head back and forth vigorously several times while shouting.	Face forward, while holding breath for 10 seconds.
REDON 1	Remove the respirator mask, loosen all face piece straps, and then re-don the respirator mask.	Face forward, while holding breath for 10 seconds.
REDON 2	Remove the respirator mask, loosen all face piece straps, and then re-don the respirator mask again.	Face forward, while holding breath for 10 seconds.

[1]Exercises are listed in the order in which they are to be administered.

c. After completing the test exercises, the test administrator must question each test subject regarding the comfort of the respirator. When a test subject states that the respirator is unacceptable, the employer must ensure that the test administrator repeats the protocol using another respirator model.

d. Employers must determine the overall fit factor for each test subject by calculating the harmonic mean of the fit testing exercises as follows:

$$\text{Overall Fit Factor} = \frac{N}{\left[1/FF_1 + 1/FF_2 + \ldots\ 1/FF_N\right]}$$

Where:
N = The number of exercises;
FF1 = The fit factor for the first exercise;
FF2 = The fit factor for the second exercise;
and FFN = The fit factor for the nth exercise.

Part II. New Fit Test Protocols

A. Any person may submit to OSHA an application for approval of a new fit test protocol. If the application meets the following criteria, OSHA will initiate a rulemaking proceeding under section 6(b)(7) of the OSH Act to determine whether to list the new protocol as an approved protocol in this Appendix D-1.

B. The application must include a detailed description of the proposed new fit test protocol. This application must be supported by either:

1. A test report prepared by an independent government research laboratory (e.g., Lawrence

Livermore National Laboratory, Los Alamos National Laboratory, the National Institute for Standards and Technology) stating that the laboratory has tested the protocol and had found it to be accurate and reliable; or

2. An article that has been published in a peer-reviewed industrial hygiene journal describing the protocol and explaining how test data support the protocol's accuracy and reliability.

C. If OSHA determines that additional information is required before the Agency commences a rulemaking proceeding under this section, OSHA will so notify the applicant and afford the applicant the opportunity to submit the supplemental information. Initiation of a rulemaking proceeding will be deferred until OSHA has received and evaluated the supplemental information.
APPENDIX D-2 USER SEAL CHECK PROCEDURES

Appendix D-2 to 1910.134: User Seal Check Procedures: (Mandatory)

The individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix, or the respirator manufacturers recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

I. Face piece Positive and/or Negative Pressure Checks

A. *Positive pressure check.* Close off the exhalation valve and exhale gently into the face piece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the face piece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

B. *Negative pressure check.* Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the face piece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the face piece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

II. Manufacturer's Recommended User Seal Check Procedures

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures.

APPENDIX D-3 RESPIRATORY CLEANING PROCEDURES

Appendix D-3 to 1910.134: Respirator Cleaning Procedures (Mandatory)

These procedures are provided for employer use when cleaning respirators. They are general in nature, and the employer as an alternative may use the cleaning recommendations provided by the manufacturer of the respirators used by their employees, provided such procedures are as effective as those listed here in Appendix D-3. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth in Appendix D-3, i.e., must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

I. Procedures for Cleaning Respirators

A. Remove filters, cartridges, or canisters. Disassemble face pieces by removing speaking diaphragms, demand and pressure- demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

B. Wash components in warm (43 deg. C [110 deg. F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

C. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain.

D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:

1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 deg. C (110 deg. F); or,

2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 deg. C (110 deg. F); or,

3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

E. Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on face pieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

F. Components should be hand-dried with a clean lint-free cloth or air-dried.

G. Reassemble face piece, replacing filters, cartridges, and canisters where necessary.

H. Test the respirator to ensure that all components work properly.

APPENDIX D-4 MEDICAL QUESTIONNAIRE

To The Individual: **Can you read?** (circle one) **YES NO**

Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you.

To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section II. (Mandatory)

Questions 1 through 9 **must be answered by every employee who has been selected to use any type of respirator**. (Please circle "YES" or "NO" or check the appropriate box):

1. Do you *currently* smoke tobacco, or have you smoked tobacco in the last month:

   YES NO

2. Have you *ever had* any of the following conditions?

Condition	Had in past	Have at Present	Never had
Seizures (fits)			
Diabetes (sugar disease)			
Allergic reactions that interfere with your breathing			
Claustrophobia (fear of closed-in Places)			
Trouble smelling odors			

3. Have you *ever had* any of the following pulmonary or lung problems?

Condition	Had in past	Have at Present	Never had
Asbestosis			
Asthma			
Chronic bronchitis			
Emphysema.			
Pneumonia			
Tuberculosis			
Silicosis			
Pneumothorax (collapsed lung)			
Lung cancer			
Broken ribs			
Any chest injuries or surgeries			
Any other lung problems that you've been told about Explain:			

4. Do you *currently* have any of the following symptoms of pulmonary or lung illness?

Condition	Yes	No
Shortness of breath		
Shortness of breath when walking fast on level ground or walking up a slight hill or incline		
Shortness of breath when walking with other people at an ordinary pace on level ground		
Have to stop for breath when walking at your own pace on level ground		
Shortness of breath when walking or dressing yourself		
Shortness of breath that interferes with your job		
Coughing that produces phlegm (thick sputum)		
Coughing that wakes you early in the morning		
Coughing that occurs mostly when you are lying down		
Coughing up blood in the last month		
Wheezing		
Wheezing that interferes with your job		
Chest pain when you breathe deeply		
Any other symptoms that you think may be related to lung problems? Explain:		

5. Have you *ever had* any of the following cardiovascular or heart problems?

Condition	Had in past	Have at Present	Never had
Heart Attack			
Stroke			
Angina			
Heart Failure			
Swelling in your legs or feet (not caused by walking)			
Heart arrhythmia (heart beating irregularly)			
High blood pressure			
Any other heart problem that you've been told about? Explain:			

6. Have you *ever had* any of the following cardiovascular symptoms?

Condition	Had in past	Have at Present	Never had
Frequent pain or tightness in your chest			
Pain or tightness in your chest during physical activity			
Pain or tightness in your chest that interferes with your job			
In the past two years, have you noticed your heart skipping or missing a beat			
Heartburn or indigestion that is not related to eating			
Any other symptoms that you think may be related to heart or circulation problems? Explain:			

7. Do you *currently* take medication for any of the following problems?

Condition	Yes	No
Breathing or lung problem		
Heart trouble		
Blood pressure		
Seizures (fits)		

8. If you've used a respirator, have you *ever had* any of the following problems? (If you've never used a respirator, go to question 9):

Condition	Yes	No
Eye irritation		
Skin allergies or rashes		
Anxiety		
General weakness or fatigue		
Any other problem that interferes with your use of a respirator? Explain:		

9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire: **YES** **NO**

10. Have you *ever lost* vision in either eye (temporarily or permanently) **YES** **NO**

    If yes, was vision loss permanent? **YES** **NO**

11. Do you *currently* have any of the following vision problems?

Condition	Yes	No
Wear contact lenses		
Wear glasses		
Color blind		
Any other eye or vision problem Explain:		

12. Have you *ever had* an injury to your ears, including a broken eardrum? **YES NO**

13. Do you *currently* have any of the following hearing problems?

Condition	Yes	No
Difficulty Hearing		
Wear a hearing aid		
Any other hearing or ear problems? Explain:		

14. Have you *ever had* a back injury? **YES** **NO**

15. Do you *currently* have any of the following musculoskeletal problems?

Condition	Yes	No
Weakness in any of your arms, hands, legs, or feet		
Back pain		
Difficulty fully moving your arms and legs		
Pain or stiffness when you lean forward or backward at the waist		
Difficulty fully moving your head up or down		
Difficulty fully moving your head side to side		
Difficulty bending at your knees		
Difficulty squatting to the ground		
Climbing a flight of stairs or a ladder carrying more than 25 lbs.		
Any other muscle or skeletal problem that interferes with using a respirator? Explain:		

APPENDIX D-5 INFORMATION FOR VOLUNTARY RESPIRATOR USE

Information for Individuals Using Respirators When Not Required Under the Standard **Appendix D-5 to Sec. 1910.134.**

Respirators are an effective means of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirator's limitations.

2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.

3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.

4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

APPENDIX D-6 Respirator Users Approval Document

On ___/___/___ , I do hereby attest that upon reviewing medical questionnaire and based on my best
(Date)
medical judgment, _____is (initial all that apply):
(Name)

_____ Approved to wear the following respirators:

_____ Filtering Face Piece (N-95 dust mask) Escape Only Respirator

_____ Half Mask Respirator

_____ Full Mask Respirator

_____ SCBA

_____ Are approved with the following conditions _____

_____ Not approved for respirator use

_____ _____
Signature of PLHCP Representative Date

On __/_____/_____, _____passed a respiratory fit test for a

_____ respirator(s) and received training in compliance with OSHA standard 29 CFR 1910.134.

_____

Signature of Safety Representative

APPENDIX D-7 Respirator Use and Maintenance Log

UNT Medical Center Respiratory Protection Program
Use and Maintenance Log

Respirator Type: _____ Respirator I.D. #: _____
Manufacturer: _____ Model Number: _____
Date Placed in Service: _____

Date	Assigned to Whom or Location of Storage	Inspection/Maintenance and Charging (SCBAs) Information	Serviced By

APPENDIX D-8 – Respirator Use and Maintenance Checklist

Particulate Filtering Face Piece Respirator (e.g. N-95)		Condition Status
Filter	Filter is not torn, punctured, distorted, crushed, excessive soiled, or wet	☐
	NIOSH approval number is present on the respirator	☐
	If valve is present, it is functional	☐
	Verified the correct model and size based on fit testing information.	☐
Straps	Straps are not broken, torn, or overtly stretched (i.e. lost elasticity)	☐

SCBA Air Tank and Harness		Condition Status
Harness	Harness assemble is clean and dry	☐
	Harness strap buckles and fasteners are present and functional	☐
Tank	All gauges are undamaged and functional.	☐
	Tank connection valve is clean and free of debris and soap and disinfectant residue.	☐
	Tank connections O-ring gasket is present and not cracked, distorted, or crushed.	☐
	Tank low air pressure regulator vibration system is functional	☐
	Tank is clean and dry.	☐
	Tank is not cracked, dented, scratched, or otherwise damaged.	☐
	Tank gauge indicates that the tank is filled to ≥ 90% of manufacturer's recommended pressure level.	☐

Elastomeric (Rubber Face Masks)		Condition Status
Face Piece	Verified the correct model and size based on fit testing information.	☐
	Cartridge or Canister connection if not broken, cracked, or distorted.	☐
	Respirator is free of dirt, debris, and soap and disinfectant residues	☐
	Mask rubber is not cracked, torn, distorted, serrated, or crushed	☐
	Mask lens is not cracked, overtly scratch, or incorrectly mounted	☐
	Lens mounting clips are not broken	☐
	Nose cone is not distorted or crushed	☐

Head Straps	Strap attachments are not torn or overtly stretched (i.e. lost elasticity)	☐

	Straps are not broken, torn, or overtly stretched (i.e. lost elasticity)	☐
	Strap fasteners/buckles are present and functional	☐
Inhalation/ Exhalation Valves	Valves inserts into the face piece are free of dust, dirt, debris, hair, and soap and disinfectant residue	☐
	Valve inserts are proper seated into the face piece	☐
	Valve is properly installed into the valve body	☐
	Valve inserts are not cracked, chipped, torn, or distorted.	☐
Cartridge or Canister	You are aware of the air borne hazard and its concentration	☐
	You have selected the proper cartridge or canister for the hazard present in the workplace.	☐
	You have verified that the cartridge or its packaging has the NIOSH approval information.	☐
	You have verified that the selected cartridge or canister is within the expiration date, has been stored properly, and has not been previously used.	☐
	Cartridge or canister gaskets are present and function and the treads are not worn	☐
	Cartridge or canister is not damaged (i.e. cracks, dents, or penetrations)	☐
	Cartridge or canister is correctly installed and secured to the face piece.	☐

REVISION HISTORY

April 2020

June 2021

July 2024

September 2024

Environmental Health and Safety

Risk Management Services

University of North Texas

Denton, TX