SAFETY POLICY AND PROCEDURE MANUAL

TABLE OF CONTENTS

Chapter 15 Personal Protection

Electrical Protective Devices	**1910.137**
Personal Protective Equipment	**1910.132**
Respiratory Protection	**1910.134**

Chapter 16 Tools: Hand & Powered

Hand & Portable Powered Tools	**1910.241**

Chapter 17 Toxic & Hazardous Substances

Air Contaminants	**1910.1000**
Asbestos	**1910.1001**
Asbestos Management	**1910.1001A**
Bloodborne Pathogens	**1910.1030**
Exposure to Hazardous Chemicals in Laboratories	**1910.1450**
Hazard Communication	**1910.1200**
Lead in Construction	**1926.62**
Respirable Crystalline Silica	**1926.1153**
NCDOT Written Silica Exposure Control Plan	**1926.1153A**
Chromium VI	**1926.1126**

Chapter 18 Walking-Working Surfaces

Ladders	**1910.25**
Scaffolds	**1910.28**
Fall Protection	**1926.500**

Chapter 19 Welding & Cutting

Welding	**1910.252**

Secretary's Safety Message

The North Carolina Department of Transportation is committed to protecting employees, subcontractors, clients and the public from injuries and occupational illness both on and off the job. This premise is an agency value of greatest importance. We are committed to a goal of ZERO injuries and incidents by a belief that all injuries and occupational illnesses are preventable, and by providing a safe and healthful work environment for all our employees. Operating safely, with constant focus on accident prevention, occupational health, and operational risk management is the most efficient way to manage our business.

This philosophy and our ability to sustain this process will be evidenced by the following guiding principles:

- Senior management is responsible to support and monitor the safety, health and operational risk management process.

- The line organization is responsible and accountable to lead and implement the safety, health, and risk management process.

- Supervisors shall possess the skills and competencies commensurate with project safety, health, and risk management responsibilities.

- All employees must comply with safety, health, and risk management requirements and accept that working safely is a condition of employment.

- We will accomplish our work utilizing effective accident prevention strategies such as safety engineering and design, training, people based safety, and administrative controls to safeguard against workplace hazards.

- We will work towards continuous improvement.

- We will foster a culture that aligns safety, health and risk management with the other business objectives of NCDOT.

- We will conduct our business in compliance with all regulatory requirements.

- The emphasis will be on Safety, Health, and Risk Management Planning Process and the reduction of incidents will be the measure of our success.

J. E. Boyette

03/10/2020

J. Eric Boyette
Secretary of Transportation

Date:

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
SAFETY PHILOSOPHY

1. All accidents and injuries can be prevented.

2. Management/supervisors are responsible, and will be held accountable, for preventing injuries and occupational illnesses.

3. Occupational safety and health is part of every employee's total job performance.

4. Working safely is a condition of employment.

5. All workplace hazards can be safeguarded.

6. Training employees to work safely is essential and is the responsibility of management/supervision.

7. Prevention of personal injuries and accidents is good business.

DEPARTMENTAL GOALS

SHORT TERM GOALS

(0 - 1 YEAR)

1. Develop safety standards
2. Develop continuing safety training
3. Develop a continuous resource commitment
4. Keep up with Research & Development safety e fforts
5. Equipment acquisition to enhance safety
6. Safety modification of equipment
7. Safeguard and prioritize hazards
8. Comprehensive structured program
9. Formalize training program
10. Make necessary changes in personnel system
11. Establish limited incentive/reward program
12. Reorganize safety unit
13. Improve off-the-job safety
14. Change operating procedures with safety in mind
15. Reduce accident and injury rates by 20%
16. Reduce Worker's Compensation by 20%
17. Increase employee safety awareness

INTERMEDIATE GOALS

(1 - 3 YEARS)

1. Instill a safety attitude
2. Total line supervisor commitment
3. Develop safety standards and procedures
4. Develop continuing safety training
5. Keep up with Research and Development safety efforts
6. Equipment acquisition to enhance safety
7. Safety modification of equipment
8. Safeguard hazards
9. Make necessary changes in personnel system
10. Improve off-the-job safety
11. Reduce accident and injury rates by 50%
    a) Accidents: number and costs
    b) Lost work days, incidence rate
12. Reduce Worker's Compensation claims by 50%

LONG TERM GOALS

(4 YEARS +)

1. Zero accidents and zero injuries
2. Develop continuing safety training
3. Develop a continuous resource commitment
4. Keep up with research and development safety efforts
5. More equipment acquisition to enhance safety
6. Safety modification of equipment
7. Safeguard hazards
8. Eliminate Worker's Compensation expenditures
9. Establish a complete incentive/reward program
10. Instill a safety climate

CARDINAL RULES

These offenses may be grounds for dismissal:

- Failure to report all incidents (accidents, injuries and near misses) immediately
- Possession or use of illicit drugs or alcohol
- Possession of firearms
- Malicious destruction of NCDOT property
- Fighting or horseplay
- Falsification of NCDOT safety documents

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Safety Policy and Procedure Organization SPP# A -1

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to describe the organization of all the safety policy and procedures contained in this manual.

2.0 Scope and Applicability

A brief discussion is presented first to provide the user with some background information on the safety and health requirement.

Secondly, a very brief summary of the safety policy and procedure (SPP) is provided to introduce the reader to the contents. If the user desires additional detail, the user can read further.

Thirdly, to whom the safety policy and procedure applies within NCDOT is presented. Sometimes the applicability is general and/or is specific to job classification or job duties.

3.0 Reference

This section lists the federal standards that are catalysts for these safety policy and procedures.

4.0 Policy

This section includes a policy statement that is definitive and accurate and states why NCDOT has the policy and how the objectives of the policy will be met. Additionally, the second sentence generally will state NCDOT's position on workplace compliance to a safety and health requirement to minimize or eliminate recognized hazards.

The hierarchy of dealing with workplace hazards will always be engineering practices (try to engineer away the hazard), administrative practices (change employees' hours, task duration, task substitution, etc.), safe work practices (work safely around hazards once the preceding controls are in place), personal protective equipment (PPE) (provide a barrier against the hazards once all the preceding controls have been implemented), and training (recognize and avoid hazards).

5.0 General Responsibilities

This section includes a general statement of the overall responsibilities of all employees in NCDOT (managers/unit heads, supervisors, employees, Safety and Loss Control, Central Equipment Unit, and others as applicable).

6.0 Procedure

This section contains a general statement that lists the information that is to follow in the following subsections. This general statement introduces the administrative requirements of the safety policy and procedure.

6.1 Definitions

This section lists the applicable definitions for the safety policy and procedure.

6.2 General Provisions

This is the section of the safety policy and procedure where its general provisions and the program associated with it are detailed. Each provision of the safety policy and procedure is listed in separate sub/subsections as applicable.

6.2.1 Training

This section presents any training requirements associated with the safety policy and procedure. Additionally, training frequencies are also listed in this section.

6.2.2 - 6.2.x Specific Provisions of the Safety Policy and Procedure

These sections are the ***essence*** of the safety policy and procedure. These sections contain all the applicable details, guidelines, procedures, and technical information pertinent to the safety and health requirement covered by the safety policy and procedure.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

This section details the managers'/unit heads' responsibilities in implementing the applicable safety policy and procedure. Generally, managers/unit heads will be responsible for:

- Funding and budgeting
- Identification of affected employees
- Obtaining and coordinating training for the identified employees
- Auditing of the safety policy and procedure implementation and compliance (program audit and compliance)

6.3.2 Supervisors

This section details the supervisors' responsibilities in implementing the applicable safety policy and procedure. Generally, supervisors will be responsible for:

- Ensuring that employees are provided with PPE as necessary for their job
- Ensuring that employees are trained for their jobs
- Performing facility and jobsite audits

6.3.3 Employees

This section details the employees' responsibilities in implementing the applicable safety policy and procedure. Generally, employees will be responsible for:

- Complying with the applicable Safety Policy and Procedure
- Reporting unsafe acts or conditions

6.3.4 Safety and Loss Control

The section details Safety and Loss Control's responsibilities in implementing the applicable safety policy and procedure. Generally, Safety and Loss Control will be responsible for:

- Providing prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning a safety policy and procedure
- Assisting in developing or securing the required training
- Working with Purchasing and Central Equipment Unit to ensure that all newly purchased equipment, supplies, etc. comply with current safety regulations and safety policy and procedure
- Providing consultative and audit assistance to ensure effective implementation of a safety policy and procedure

Occupational Safety and Health System Management

SPP# A-2

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to actively manage and integrate occupational safety and health into the business in order to continuously reduce accidents, injuries, and illnesses and ensure ongoing compliance with occupational safety and health regulations.

2.0 Scope and Applicability

This safety policy and procedure provides guidelines to effectively manage Occupational Safety and Health (OSH) at NCDOT. This policy and procedure affects all NCDOT Division of Highways employees.

3.0 Reference

The following documents establish the framework for Division of Highways OSH systems:

- Secretary's Safety Message
- NCDOT Workplace Safety Manual (WSM)
- NCDOT Safety Policy & Procedure Manual (SPP)

As a minimum, Division/Unit OSH Systems shall be developed and maintained based upon these documents.

4.0 Policy

The Division of Highways Staff shall manage OSH as an integral part of the business to include an OSH System that delivers division-wide strategy, performance objectives, and process actions leading to continuous improvement in accident, injury, and illness prevention and maintenance of regulatory compliance. The system shall be measured for ongoing compliance and improvement.

5.0 General Responsibilities

It is the responsibility of each division/unit head, manager, and supervisor to ensure implementation of NCDOT's OSH System. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes objectives, and identifies specific responsibilities and documentation required to effectively manage NCDOT's OSH System.

6.1. Definitions

Hazard
Anything with the potential to harm people, property, or the environment. May be discovered in materials, equipment, locations, processes, or work methods.

Occupational Safety and Health (OSH)
Generic term for safety and health programs and systems for all operations.

OSH System
A structured approach to OSH management, which consists of processes.

Process
A documented series of actions or operations directed toward a particular result.

Risk
Likelihood and consequence of a hazard happening.

6.2. OSH System Management General Provisions

This section details the provisions of this safety policy with each provision discussed in a separate subsection. These provisions are:

- OSH Management Commitment
- OSH Objectives
- OSH Resources
- DOT Safety Policies & Procedures
- Training
- Hazard Assessment

6.2.1. OSH System Management Commitment

For an effective OSH System, Management Commitment must be clearly present and demonstrated to the entire work force. The following actions illustrate forms of Management Commitment that should be used:

- Communicate Division/Unit Management commitment for OSH to the entire workforce through action by participating in facility or work site walk-through audits. Division Engineers/Unit Heads with Field Operations and their direct reports should participate in at least twelve audits per year. Units without Field Operations should participate in the number of audits outlined in the Workplace Safety Manual.
- Communicate in writing Division/Unit Head OSH commitment to the entire workforce at least annually. The Division Engineer or Unit Head should issue this communication.
- OSH is a scheduled agenda item at routine Division Engineer/Unit Head staff meetings.
- Incentives, if used, should stress reward of positive performance or effort and are not to be a disincentive for reporting injuries, illnesses, or accidents. Examples include recognition for best safety audits or safety suggestions.

6.2.2. OSH Objectives

For an effective OSH System, clear objectives must be established, implemented, and monitored by the Division or Unit. The following objectives are essential for the continual improvement of OSH in accident, injury, and illness prevention and maintenance of regulatory compliance:

- Integrate OSH into business plans as a set of specific performance objectives.
- Monitor progress of specific performance objectives to ensure timely execution.
- Measure and monitor injury trends (total injuries, lost workday cases, most prevalent types of injuries) at least quarterly.
- Measure and monitor accident trends (total accidents, most prevalent types of accidents) at least quarterly.
- Establish a master plan for ongoing OSH training activities.
- Closure for action items identified in facility or work site audits.
- Conduct annual OSH system management assessment outlined in Appendices A, B, & C of this SPP.
  - Appendix A: OSH System Management Assessment Process
  - Appendix B: OSH System Management Assessment Audit Form
  - Appendix C: Guide for OSH System Management Assessment Auditor
- Specific performance objectives are a well-defined component of the annual performance management process for individuals within the Division or Unit.
- Injury trends and OSH assessments show improvement each year, or if they have attained a high level of performance, they are sustained at that level.

6.2.3. OSH Resources

Appropriate resources in the form of budget, personnel, and allocated time must be available for an effective OSH System. The following elements should be in place to ensure adequate OSH resources are available for the OSH System:

- Allocate resources for plans, especially OSHA compliance and injury, illness, and accident prevention.
- OSH responsibilities are clearly defined for all levels of the organization.
- For Divisions, an adequate safety staff is maintained which reports to the highest applicable management position for the Division. Safety & Loss Control safety staff shall provide support to Units.
- Adequate resources are budgeted for the safety staff to accomplish objectives by maintaining professional competency.

6.2.4. NCDOT Safety Policies and Procedures

The NCDOT Workplace Safety Manual and NCDOT Safety Policy and Procedure Manual provide the framework for NCDOT's OSH System. The Workplace Safety Manual details the NCDOT Safety Program and also includes Safe Operating Procedures for employees to perform their jobs safely. The Safety Policy and Procedure Manual contains Administrative and Regulatory Compliance procedures for NCDOT. For Safety Policies and Procedures to be effective, the following elements are necessary:

- NCDOT Workplace Safety Manual and Safety Policy & Procedure Manual are accessible to all employees.
- Hard copy versions are the latest revision.
- All new or modified NCDOT Safety Policies & Procedures are reviewed and approved by appropriate staff level.

6.2.5. Training

All management / supervision is trained to effectively manage OSH. Safety & Loss Control shall develop and assist in providing the appropriate training.

6.2.6. Hazard Assessment

The primary purpose of hazard assessment in OSH is to identify hazards prior to the occurrence of an incident. Facility and work site audits provide the mechanism for NCDOT to accomplish this task. To effectively manage the OSH System, the following processes should also be incorporated:

- A thorough formal OSH review is conducted of all Division/Unit facility capital improvement / renovation projects prior to the start of the project.
- Hazards are identified and risks are appropriately managed.

6.2.7. Documentation Requirements

The following documentation is required in order to adequately assess OSH System Management:

- Written OSH System plan.
- Division or Unit Head statement of Occupational Safety and Health Management Commitment.

6.3. Specific Responsibilities

6.3.1. Safety and Loss Control

Safety and Loss Control will develop policy and procedure that serves as the foundation of the NCDOT OSH System. Safety and Loss Control will also assist in developing and securing the required training for management/supervision related to implementation of OSH System Management in accordance with this SPP.

6.3.2. Safety Engineers/Safety Officers

Safety Engineers (SE)/Safety Officers (SO) will monitor and assist in the compliance components of the OSH system.

6.3.3. Division/Unit Heads

Division/Unit Heads will manage their respective division or unit OSH system.

APPENDIX A: OSH System Management Assessment Process

1. Purpose

The purpose of this assessment process is to carefully examine the Management of Occupational Safety and Health Systems at NCDOT for the continuous improvement in accident, injury, and illness prevention and maintenance of regulatory compliance. In so doing, the personnel at the Division or Unit being assessed and the personnel conducting the assessment gain insights to focus on parts of the OSH system that most need their attention and direction.

2. Format

The assessment process shall be conducted annually by the Division Unit as a self-assessment tool to establish a baseline for continual improvement of their respective OSH System. The OSH System Management Assessment Audit Form (Appendix B) shall be used to conduct the assessment, and the tabulated score has a maximum of 100 points. The elements for the audit are based on the OSH components found under General Provisions listed in the OSH System Management Policy and Procedure SPP# A-2.

- OSH Management Commitment
- OSH Objectives
- OSH Resources
- DOT Safety Policies & Procedures

Partial credit will be received for having portions of each element listed for the OSH Provision being assessed. Appendix C presents "Guide for OSH System Management Assessment Auditors" that should be used as an aid in this assessment process.

3. Scoring

For each assessment element on the audit form, the range of points obtainable is stated. Upon review of documented evidence, select the statement that correlates with the current status for that particular element to determine the score and enter it on the audit form. Upon completion of all assessment questions, tabulate the totals for each OSH Provision and enter the total scores for each Provision. The Total Management Assessment Score is the sum total for all Provisions with 100 points being the maximum achievable score. This score establishes the baseline for continual improvement of the OSH System by identifying system deficiencies. This useful management assessment tool assists the Division/Unit in establishing specific performance objectives for their OSH System. Subsequent annual OSH assessments should be used to indicate improvement or deficiencies in the OSH System.

APPENDIX B: OSH System Management Assessment Audit Form

OSH Management Commitment (6.2.1)	
1. Is the Division/Unit Management Commitment to safety communicated to the entire work force through action by conducting a minimum of (12) facility or work site audits per year? (Scoring of 0-12 points received is based on total number of documented audits for the past 12-month period).	
(12) Division Engineer/Unit Head with Field Operations and their direct reports have conducted (12) or more audits each. (10) Division Engineer/Unit Head with Field Operations and their direct reports have conducted at least (10) audits each. (8) Division Engineer/Unit Head with Field Operations and their direct reports have conducted at least (8) audits each. (6) Division Engineer/Unit Head with Field Operations and their direct reports have conducted at least (6) audits each. (4) Division Engineer/Unit Head with Field Operations and their direct reports have conducted at least (4) audits each. (2) Division Engineer/Unit Head with Field Operations and their direct reports have conducted at least (2) audits each. (0) Division Engineer/Unit Head with Field Operations and their direct reports have conducted less than (2) audits each.	Score /**12**
2. Is the Division Engineer/Unit Head OSH commitment communicated to the entire work force at least annually? Cumulative Scoring (0 to 11 points) received is based on the methods of communication, which can be verified through documented evidence in the form safety meetings, letter or e-mail from Division Engineer/Unit Head, and postings for the past 12-month period.	
(6) OSH commitment has been communicated by the Division Engineer/Unit Head to the entire work force in the past 12-month period verbally through safety meetings. (3) OSH commitment has been communicated by the Division Engineer/Unit Head to the entire work force in the past 12-month period by letter or e-mail. (2) OSH commitment has been communicated by the Division Engineer/Unit Head to the entire work force in the past 12-month period through posting letter of e-mail from Division/Unit head. (0) OSH commitment has not been communicated by the Division Engineer/Unit Head. **Obtain Cumulative Scoring Total by Summing Points for Each Method of Communication Verified.**	Cumulative Score /**11**

APPENDIX B: OSH System Management Assessment Audit Form, continued

3. Is OSH a scheduled agenda item at routine Division/Unit Head staff meetings? Scoring (0 to 8 points) received based on the percentage of Division/Unit head staff meeting minutes or agendas documenting OSH as a scheduled item. Review staff meeting minutes or agendas for the past 12-month period.	
(8) OSH is a scheduled item on all Division/Unit Head staff meetings. (6) OSH is a scheduled item on at least 75% of Division/Unit Head staff meetings. (4) OSH is a scheduled item on at least 50% Division/Unit Head staff meetings. (2) OSH is a scheduled item on at least 25% Division/Unit Head staff meetings. (0) OSH is a scheduled item on less than 25% Division/Unit staff meetings.	Score /**8**
4. Are incentives used for safety that stress positive performance and not disincentives for reporting injuries? Scoring (0 to 4 points) received for documented evidence of incentives program in place for the past 12-month period.	
(4) Safety incentives are being used that stress positive performance. (2) Safety incentives are being used, but do not stress positive performance. (0) Safety incentives are not being used.	Score /**4**

APPENDIX B: OSH System Management Assessment Audit Form, continued

OSH Objectives (6.2.2)	
1. Scoring (3 points) received for each of the following elements based on documented evidence verifying the element is currently incorporated in your OSH System.	
1. OSH is integrated in business plans as a set of specific performance objectives. 2. Progress of specific performance objectives is monitored to ensure timely execution. 3. Injury trends (total injuries, lost workday cases, most prevalent types of injuries) are measured and reported to the Division/Unit at least quarterly. 4. Accident trends (total accidents, most prevalent type of accident) are measured and reported to the Division/Unit at least quarterly. 5. Master plan for training activities. 6. Closure or plan in place for of all action items identified in facility or work site audits. 7. OSH System Management Assessment measured and reported to the Division/Unit annually. 8. Measured results are a well-defined component for the annual performance appraisal process for Division/Unit performance.	Score /**24**
2. Do injury trends and OSH Assessments show improvement from the previous year, or if they have sustained a high level of performance by meeting the DOH goal, they are sustained at that level. Scoring (0 to 16 points) received for OSH performance measures.	
(16) Both of these OSH performance measures show improvement or meet DOH goal. (8) Only one of these OSH performance measures shows improvement or meets DOH goal. (0) Neither of these OSH performance measures shows improvement or meets DOH goal.	Score /**16**
OSH Resources (6.2.3)	
Scoring (4 points) received for each of the following elements based on documented evidence verifying the element is currently incorporated in your OSH System.	
1. Resources have been allocated for OSH plans to ensure OSHA compliance and injury, illness, and accident reduction. 2. OSH responsibilities are clearly defined for all levels of the Division/Unit. 3. An adequate safety staff is being maintained which reports to the highest management position for the Division/Unit. 4. Adequate resources are budgeted for the safety staff to accomplish objectives by maintaining professional competency.	Score /**16**

APPENDIX B: OSH System Management Assessment Audit Form, continued

NCDOT Safety Policies and Procedures (6.2.4)		
Scoring (3 points) received for each of the following elements based on documented evidence verifying the element is currently incorporated in your OSH System.		
1. NCDOT Workplace Safety Manual and Safety Policy & Procedure Manual are accessible to all employees. 2. Hard copy NCDOT Workplace Safety Manual and Safety Policy & Procedure Manual are the latest revision. 3. All new or modified NCDOT Safety Policy & Procedures are reviewed with comments provided to Safety and Loss Control as requested.	Score	**/9**

SCORING SUMMARY		
OSH Management Commitment (6.2.1)	Score	**/35**
OSH Objectives (6.2.2)	Score	**/40**
OSH Resources (6.2.3)	Score	**/16**
NCDOT Safety Policies and Procedures (6.2.4)	Score	**/9**
TOTAL MANAGEMENT ASSESSMENT SCORE	Score	**/100**

APPENDIX C: Guide for OSH System Management Assessment Auditors

Appendix B contains the OSH System Management Assessment Audit Form. The following information should be used as a guide for evaluating each element on the Audit Form.

OSH Management Commitment (6.2.1)

1. **Is the Division/Unit Head commitment to safety communicated to the entire work force through action by conducting a minimum of (12) facility or work site audits per year?**

   The action of conducting facility or work site walk-through audits by the Division Engineer or Unit Head is a clearly visible means of demonstrating OSH Management Commitment to the entire work force. Points are assessed based on the number of documented audits conducted by the Division Engineer/Unit Head for the past 12-month period.

2. **Is the Division/Unit Head OSH commitment communicated to the entire work force at least annually?**

   Communication of OSH commitment by the Division/Unit Head to the entire work force is another visible means of demonstrating Management Commitment to the entire work force. Cumulative points (11 total points maximum) are assessed based on the methods used to disseminate this communication to the work force. Each method of communication is listed below along with respective points received upon verification of documented evidence.

   - (6) Points for verbal communication based upon documented evidence such as copy of safety meeting agenda or minutes that show subject matter was covered. A random sampling of (5) separate locations within the Division or Unit should be used for this determination. Points will be received if documented evidence is available for (4) of those (5) locations. For Divisions or Units that entail several counties, locations should be chosen from different counties to provide a better indication of the extent this communication has be disseminated.
   - (3) Points for documented evidence in the form of letter or e-mail for this method of communication from the Division/Unit Head.
   - (2) Points for documented evidence of posting OSH commitment from Division/Unit Head may be determined observing such posting on Division/Unit office bulletin boards. A random sampling of (5) separate locations within the Division or Unit should be used for this determination. Points will be received if documented evidence is available for (4) of those (5) locations. For Divisions or Units that entail several counties, locations should be chosen from different counties to provide a better indication of the extent posting OSH commitment is being utilized. The same locations used to confirm verbal communication may also be used for this determination.

3. **Is OSH a scheduled agenda item at routine Division/Unit Head staff meetings?**
   OSH Management Commitment is clearly evident when OSH is a scheduled agenda item at routine Division/Unit Head staff meetings. Points are assessed based on the percentage of Division/Unit Head staff meetings where OSH was a scheduled agenda item. A review of Division/Unit Head staff meeting agendas or minutes for the past 12-month period should be used as the documented evidence to determine the percentage.

4. **Are incentives used for safety that stress positive performance and not disincentives for reporting injuries?**
   Safety incentives should stress positive performance if used. Recognition for outstanding audits or safety suggestions are good examples. Whereas, safety incentives for achieving lower incident rates may be a disincentive for reporting incidents.

OSH Objectives (6.2.2)

1. **In order for Management of OSH System to be effective, clear objectives must be established and implemented by the Division/Unit based on issues that offer the greatest opportunity for improvement. Points are assessed based on documented evidence for each of the following Objectives listed in the OSH System Management Policy and Procedure SPP# A-2 present.**

   - **OSH is integrated in business plans as a set of specific performance objectives.**
     NCDOT is in the business of building and maintaining the state's transportation system, but it is essential to remember the importance of a safe and healthy work environment. Integrating OSH in business plans as a set of specific performance objectives ensures safety and health is a primary consideration in all operations. A review of Division/Unit head staff meeting minutes for the past 12-month period will determine if OSH is part of the business plan with specific performance objectives.

   - **Progress of specific performance objectives is monitored to ensure timely execution.**
     To ensure specific OSH performance objectives are met, progress must be monitored to ensure timely execution by establishing target dates for those objectives. A review of Division/Unit head staff or safety committee meeting minutes for the past 12-month period will determine if progress of specific performance objectives has been monitored.

- **Injury trends (total injuries, lost workday cases, most prevalent types of injuries) are measured and reported to the Division/Unit at least quarterly.**

  Injury trends provide valuable insight to achieve ongoing improvement in overall OSH performance. In order to reduce and prevent injury to the NCDOT workforce, trending is a useful tool to determine focus areas. A review of Division/Unit head staff or safety committee meeting minutes for the past 12-month period will determine if Injury Trends have been reviewed at least quarterly in meeting this objective.

- **Accident trends (total accidents, most prevalent type of accident) are measured and reported to the Division/Unit at least quarterly.**

  Accident trends also provide valuable insight to achieve ongoing improvement in overall OSH performance. In order to reduce and prevent accidents to NCDOT equipment, trending is a useful tool to determine focus areas. A review of Division/Unit head staff or safety committee meeting minutes for the past 12-month period will determine if Accident Trends have been reviewed at least quarterly in meeting this objective.

- **Master plan for training activities.**

  Training is a vital component of OSH and having a master plan for training activities is key to ensuring applicable training is administered to the appropriate personnel. Documented evidence of a training plan or schedule for the current year will meet this objective.

- **Closure or plan in place for all action items identified in facility or work site audits.**

  Facility and work site auditing is an important key to improved safety performance. Auditing identifies hazards before an incident takes place. Closure or having a plan in place for all action items resulting from audits is essential for injury and accident prevention. Facility and/or work site audits conducted by the Division/Unit Head should be reviewed for the past 12-month period to determine if closure or plan is in place for all action items identified in the facility or work site audits.

- **OSH System Management Assessment measured and reported to the Division/Unit annually.**

  The OSH System Management Assessment is a tool for the continuous improvement of accident, injury, and illness prevention and maintenance of regulatory compliance. It should be used to identify and prioritize OSH issues based on factors such as the level of risk, potential for system improvement, standards, regulations, feasibility, and potential business consequences. A review of Division/Unit Head staff or safety committee meeting minutes for the past 12-month period will determine if OSH System Management Assessment has been measured and reported to the Division/Unit.

- **Measured results are a well-defined component for the annual performance appraisal process for Division/Unit performance.**

  Safety should be listed as one of the Key Responsibilities with measurable expectations for Division/Unit Management Staff on their Performance Management Work Plan to ensure OSH is a priority. Utilize the organization chart for the Division/Unit to determine the Management Staff (direct reports to the Division/Unit Head) for whose Performance Management Work Plan should be reviewed. Points will be received if at least 75% of the work plans reviewed list OSH as a measurable component.

2. **Do injury trends and OSH Assessments show improvement from the previous year or if they have sustained a high level of performance by meeting the DOH goal, they are sustained at that level?**

   Effective implementation and management of OSH should lead to improvement in injury trends and OSH Assessments. These OSH performance indicators allow for continuous improvement or sustaining a high level of performance by meeting or exceeding the DOH goal.

OSH Resources (6.2.3)

In order for Management of OSH System to be effective, appropriate financial, human and organizational resources must be available to the Division/Unit. Points are assessed for documented evidence that the following elements listed in the OSH System Management Policy and Procedure SPP# A-2 are being utilized.

1. **Resources have been allocated for OSH plans to ensure OSHA compliance and injury, illness, and accident reduction.**
   Based on results of recent OSHA inspections and NCDOT statewide compliance issues, available resources should be allocated to address the issues identified by Division/Unit head staff. Review of Division/Unit head staff or safety committee meeting minutes for the past 12-mont period to determine if resources have been allocated to address issues identified.

2. **OSH responsibilities are clearly defined for all levels of the Division/Unit.**
   Supervisors are responsible and should be held accountable for the safety of their employees, and each employee is expected to perform their duties in a safe and responsible manner. At the Division level and some Units, specific OSH responsibilities should be clearly defined for Safety Engineers, Safety Officers, or Safety Coordinators to maintain an effective OSH. Documented evidence may be in the form of job descriptions for those positions.

3. **An adequate safety staff is being maintained which reports to the highest management position for the Division/Unit.**
   Safety Engineers, Safety Officers, or Safety Coordinators typically comprise the safety staff roles for the Division/Unit. These resources play an important part in the effective implementation of OSH for continual improvement and integration into Division/Unit operations and should report to top management. Verification that the safety staff positions are currently filled and reporting to top management based on current organizational chart for the Division/Unit shall be used to determine if this OSH resource element is present.

4. **Adequate resources are budgeted for the safety staff to accomplish objectives by maintaining their professional competency.**
   Safety Engineers, Safety Officers, and Safety Coordinators must receive the appropriate training to maintain professional competency in order to accomplish objectives identified by the Division/Unit OSH System. Documented evidence that the safety staff has received training (safety seminars, workshops, courses, etc,) within the past 12-month period shall be used to determine if this OSH resource element is present.

APPENDIX C: Guide for OSH System Management Assessment Auditors, continued

NCDOT Safety Policies and Procedures (6.2.4)

NCDOT Safety Policies and Procedures in the form of the Workplace Safety Manual and Safety Policy and Procedure Manual provide the framework for NCDOT Occupational Safety and Health program. Points are assessed for documented evidence that the following elements listed in the OSH System Management Policy and Procedure SPP# A-2 are being utilized.

1. **NCDOT Workplace Safety Manual and Safety Policy & Procedures are accessible to all employees.**

   The Workplace Safety Manual and Safety Policy & Procedures are electronically accessible to all employees with computer access. Hard copies should be readily available in cases where a computer is not readily available. Interviewing a random sampling of (5) employees at separate locations within the Division or Unit should be used to determine accessibility. Points will be received if interviewees for those (5) locations can verify they have accessibility by showing where they have access. For Divisions or Units that entail several counties, locations should be chosen from different counties to provide a better indication of the extent NCDOT Workplace Safety Manual and Safety Policy & Procedures are accessible to all employees.

2. **Hard copy NCDOT Workplace Safety Manual and Safety Policy & Procedures are the latest revision.**

   The latest revision of both the Workplace Safety Manual and Safety Policy & Procedures is the electronic version available on the NCDOT Division of Highways Safety web site at <http://www.doh.dot.state.nc.us/safety>. A random sampling of (3) Workplace Safety Manuals and Safety Policy & Procedure Manuals at separate locations within the Division or Unit should be used to determine if they are the latest revision. Points will be received if the revision date for those (3) locations is same as the electronic version on the NCDOT Division of Highways web site. The same locations used to confirm accessibility to employees above may also be used for this determination.

3. **All new or modified NCDOT Safety Policy & Procedures are reviewed with comments provided to the OSH staff as requested.**

   To ensure proper communication throughout the Division/Unit, all new or modified NCDOT Safety Policy & Procedures should be reviewed with comments provided to the OSH staff providing feedback on any issues or concerns. Verification that the Division/Unit has Policy and Procedures Review mechanism in place to meet this requirement may be in the form of a Subcommittee or Division/Unit head staff meeting agenda item as the need arises for new or modified NCDOT Safety Policy & Procedures.

Violence in the Workplace SPP# A-4

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures for taking preventive action against violence in North Carolina Department of Transportation (NCDOT) workplaces.

2.0 Scope and Applicability

NCDOT recognizes that workplace violence is an occupational hazard. NCDOT supports a proactive approach in preventing workplace violence.

This policy and procedure provides guidelines for managing workplace violence in NCDOT. It includes provisions for management and employee training, a discussion of NCDOT's crisis management team, outlines prohibited behavior, and presents reporting and investigation requirements. This safety policy and procedure also presents confidentiality, discipline, and retaliation requirements and conditions.

This safety policy and procedure details the areas of responsibility for managers/unit heads, supervisors, employees, the crisis management team, Safety and Loss Control and Personnel Section within NCDOT.

3.0 Reference

This safety policy and procedure is established in accordance with the general statues of the Occupational Safety and Health Standards for General Industry.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT is committed to maintaining a safe, healthful, and efficient working environment where employees and the public are free from the threat of workplace violence. When these workplace violence hazards are recognized and identified then proper training and appropriate security measures will be implemented.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure regarding Violence in the Workplace. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Violence in the Workplace.

6.1 Definitions

Workplace Violence
Includes, but is not limited to, intimidation, threats, physical attack or property damage.

Threat
The expression of an intent to cause physical or mental harm. An expression constitutes a threat without regard to whether the party communicating the threat has the present ability to carry it out and without regard to whether the expression is contingent, conditional or future.

Physical Attack
Unwanted or hostile physical contact such as hitting, fighting, pushing, shoving or throwing objects.

Property Damage
Intentional damage to property which includes property owned by the State, employees, visitors or vendors.

Intimidation
Includes but is not limited to stalking or engaging in actions intended to frighten, coerce, or induce duress.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. The provisions adopted by NCDOT are:

- Training
- Crisis Management Team
- Prohibited Behavior
- Reporting and Investigation
- Confidentiality
- Discipline
- Retaliation
- Counseling

6.2.1 Training

All employees, including supervisors and managers will receive annual awareness training. These sessions will explain NCDOT's safety policy and procedure on workplace violence, as well as cover procedures for reporting and investigating threats, violent acts, and unsafe workplace conditions. In addition, employees will be informed of their responsibilities and of the measures they can take to protect themselves and their co-workers from workplace violence. Appendix A presents training guidelines for managers, supervisors, and employees.

6.2.2 Crisis Management Team

A crisis management team will be appointed by the secretary of NCDOT or his designee to assess NCDOT's areas of vulnerability. This will be accomplished by reviewing existing policies and procedures, evaluating the effectiveness of current security measures, investigating past occurrences of threats and violent acts, and surveying employees to identify their safety concerns.

The crisis management team should be comprised of human resources, legal, medical, security, public relations, and management personnel. It should also include an Employee Assistance Program counselor, psychiatrist, and/or expert on workplace violence. The team should include individuals with backgrounds in:

- Human resources
- Safety and health
- Public relations
- Management
- Investigation procedures
- Security
- Law
- Law enforcement
- Counseling
- Workplace violence

The crisis management team should determine what proactive measures can be taken to effectively address these weaknesses (e.g. enhancing physical security systems, training employees on communication and conflict resolution, hosting stress reduction programs, offering assistance to employees experiencing personal problems, etc.). (See Appendix B.)

Once this has been done, the team must consider what reactive measures NCDOT will take in the event that violence does occur.

The team's involvement in violence prevention should not stop at the planning stages. Its responsibilities should also include evaluating reported threats and concerns to determine the type of follow-up action or intervention that is necessary. In some cases, disciplinary action may sufficiently address the problem. In more extreme cases, law enforcement intervention may be required.

Quarterly, the team should review its strategies to identify what revisions, if any, are necessary to correct deficiencies or reflect changing conditions. During this review, the team may find it helpful to actively solicit comments and suggestions from the workforce.

6.2.3 Prohibited Behavior

Prohibited behaviors are those behaviors that are defined in section 6.1 of this safety policy and procedure and behaviors that:

- Threaten the safety of an employee and/or customer.
- Affect the health, life, or well-being of an employee and/or customer.
- Result in damage to company, employee, or public property (excluding vehicle and equipment accidents).

Such acts include, but are not limited to:

- Threatening, intimidating, coercing, harassing, or assaulting an employee or the public.
- Sexually harassing an employee or the public.
- Allowing unauthorized persons access to buildings without management permission.
- Using, duplicating, or possessing keys to buildings or offices within the building without authorization.
- Damaging, or attempting to damage, property of NCDOT, an employee, or the public.
- Carrying weapons (concealed or exposed) on NCDOT property unless the employee's possession of a weapon :

    - Is in compliance with North Carolina law; and
    - Is authorized by NCDOT; or
    - Is by an employee who is a certified law enforcement officer; or
    - Is required as a part of the employee's job duties with NCDOT; or
    - Is connected with training received by the employee in order to perform the responsibilities of their job with NCDOT.

Appendix C presents information on the types of workplace violence. Any unacceptable personal conduct as provided in NCDOT's Personnel Manual Policy shall subject the employee to disciplinary action up to and including dismissal.

In situations considered to be potentially volatile or where fitness for duty concerns exist, management has the option to consider the use of a management directed referral to the State Employees' Assistance Program.

6.2.4 Reporting and Investigation

Any employee (including a supervisor or manager) who has been threatened, is a victim of a violent act, witnesses any threats or violent acts, or learns of any threats or violent acts, is to report immediately such activity to their supervisor or the Personnel Section.

Each report will be promptly evaluated and investigated by the Crisis Management Team to determine what follow-up actions are necessary. The Crisis Management Team has the authority to request law enforcement intervention if it is thought to be necessary.

6.2.5 Confidentiality

Information about an incident or threat will be disclosed on a needs-to-know basis only, so that a fair and thorough investigation can be conducted and/or appropriate corrective action can be taken. Additionally, NCDOT will make every effort to ensure the safety and privacy of the individuals involved.

6.2.6 Discipline

An employee who engages in prohibited behavior will be subject to appropriate disciplinary action, as determined by the findings of the investigation. Such discipline may include warnings, demotion, suspension, or immediate dismissal. In addition, certain actions may cause the employee to be held legally liable under state and/or federal law.

6.2.7 Retaliation

Episodes of workplace violence can only be eliminated if employees are willing and able to report threats, violent acts and other unsafe conditions. To encourage employees to come forward without the fear of retaliation, NCDOT promises to promptly investigate all complaints of retaliation and impose appropriate disciplinary action, up to and including dismissal.

6.2.8 Counseling

Dealing with or being exposed to a violent or abusive situation can be unsettling. NCDOT will provide debriefing and counseling to reduce tension and stress. Follow-up counseling services can be provided and arranged by employee's supervisors as requested to affected employees.

If employees prefer external counseling for emotional and/or family support, they should be encouraged to contact the Employee Assistance Program.

In all instances, confidentiality is assured.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will be responsible for providing support to the Crisis Management Team in any of its investigations. They will also be responsible for identifying the vulnerable locations and work activities most susceptible to workplace violence (See Appendix D). Managers/Unit Heads will obtain and coordinate the required training for employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will assist managers in the identification of vulnerable locations and work activities within their organization.

6.3.3 Employees

Employees shall be responsible for reporting any acts of violence or threatening behaviors to their supervisor, Crisis Management Team or their Personnel Representative.

6.3.4 Crisis Management Team

The Crisis Management Team will be responsible for:

- Assessing areas of vulnerability by reviewing existing policies, evaluating security measures, investigating past incidents, and surveying employees.
- Determining proactive measures that can be taken to address NCDOT's weaknesses.
- Anticipating potential crises and formulate appropriate responses.
- Evaluating the validity of reported threats and safety concerns to determine follow-up actions.
- Reviewing and revising strategies to correct deficiencies or reflect changing conditions.

6.3.5 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure.

Additionally, Safety and Loss Control Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.6 Personnel Section

Personnel will develop and provide training to NCDOT employees on workplace violence. Additionally, Personnel Representatives will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A : Training Guidelines

Supervisor and Manager Training

When employees are respected and their concerns are addressed in a fair and timely manner, they are far less likely to resort to violence as a way of being heard. Creating this type of caring and nurturing work environment requires that supervisors and managers:

- Treat all employees fairly and respectfully.
- Are clear and consistent in their expectations.
- Involve employees in the decision-making process.
- Provide assignments that will keep employees interested and challenged.
- Provide assignments that are appropriate for the employees' skill levels.
- Set realistic workloads, deadlines, and performance standards.
- Ensure employees have the resources they need to complete assignments.
- Permit flexibility in working conditions for employees experiencing difficult times.
- Acknowledge and follow-through on employee requests and concerns.
- Provide regular and constructive feedback.
- Give recognition for a job well-done.
- Keep employees informed of what is going on in the organization.
- Provide opportunities for professional growth.

To help supervisors and managers improve their overall effectiveness in these areas, they should receive periodic training on the following management skills:

- Communication
- Team building
- Mentoring
- Problem solving
- Counseling

Keep in mind, however, that despite NCDOT's best efforts to create a healthy work atmosphere, there are bound to be some performance- and behavior-related problems. To keep these problems from spiraling out of control, supervisors and managers should be trained to recognize and handle them at the lowest possible level. This can be accomplished by providing training on:

- Conflict resolution
- Non-violent responses
- Disciplinary procedures
- Crisis management

APPENDIX A : Training Guidelines (Continued) 2

Employee Training

Incidents of workplace violence can also be reduced if employees are effective in their interactions with clients and co-workers. Since not all employees join the workforce with the necessary "people skills," the following skills should be taught:

- Customer service
- Communication
- Team building
- Problem solving
- Conflict resolution
- Non-violent response

It is also important that employees receive "awareness training" which should address:

- NCDOT's position on workplace violence (e.g. zero tolerance).
- Behaviors that are prohibited by NCDOT policy.
- Disciplinary action that will result from policy violations.
- Procedures for reporting and investigating threats, violent acts, and unsafe conditions.
- Measures that will be taken to ensure confidentiality.
- Steps NCDOT has taken to increase security.
- Each employee signing an acknowledgement form indicating they have received NCDOT's Violence in the Workplace training.

APPENDIX B: Violence Prevention Strategies

- What proactive measures are being taken to promote teamwork and create a supportive and friendly work atmosphere?
- What training is being provided to help employees, supervisors, and managers be more effective in their interactions with other employees and customers?
- What activities and programs are being sponsored to reduce employee stress?
- What procedures are being implemented to ensure that employee complaints/grievances are handled efficiently and effectively?
- What training is being provided to help supervisors and managers identify employees who are under excessive stress and who may be potentially violent?
- What is being done to increase sensitivity during any process of organizational change?

APPENDIX C: Types of Workplace Violence

Workplace violence is not always the result of a crazed employee. In fact, the majority of threats and violent acts are committed by individuals from outside the workplace. A spouse, relative, friend or acquaintance may be to blame when the incident involves a domestic or romantic dispute. In some cases, it may be that the assailant has no relationship to employees, but rather enters the establishment with the intent of committing a crime.

This distinction (e.g. the attacker's relationship to the workplace) is one way in which workplace violence is categorized. Understanding the motives and characteristics of each category (or type) will help you determine NCDOT's areas of vulnerability.

Violence in the Course of a Crime

Workplace violence that occurs during the course of a crime is usually committed by an individual who has no legitimate relationship to the workplace. While he may feign being a customer as a pretext to enter the establishment, his primary motive is to commit a robbery or other criminal act. Employees who are at greatest risk from this type of violence have face-to-face contact and exchange money with the public. They often work alone or in small numbers, and work late at night and early into the morning. Prime hours for such attacks are between 7 PM and 2 AM.

This type of violence accounts for the majority of workplace homicides, and represents irregular occurrences in the daily life of any particular at-risk establishment.

Characteristics of At-Risk Employees

- Have face-to-face contact with the public
- Exchange money with the public
- Are responsible for guarding valuable property
- Work during late night/early morning hours
- Work alone or in small numbers
- Work in high crime areas or community settings

Violence by a Current/Former Client or Customer

Threats and other acts of violence committed by current or former clients and customers are increasing in number and represent a daily occurrence. At greatest risk from this type of violence are employees who provide professional, safety, law enforcement, administrative or business services to the public.

Motives for this type of violence vary significantly. In the case of assaults against law enforcement officials, it may be revenge or simply an effort to resist arrest. For other service providers, violence maybe brought on by an attempt to resist treatment or by a general dissatisfaction with services received. And in some cases, it may just be a matter of being in the wrong place at the wrong time and getting caught in the cross-fire.

APPENDIX C: Types of Workplace Violence (Continued) 2

Violence that is Employment-Related

Employment-related violence is not associated with any specific type of workplace. The assailant may be a current or former employee, supervisor or manager. This individual may also be a spouse, lover, relative, friend or acquaintance of an employee. In most cases, the assailant's actions are motivated by psychological factors, as well as by difficulties in his relationship with the victim.

The primary target of employment-related violence is a co-worker, supervisor or manager. In committing the assault, the individual is typically seeking revenge for what is perceived as unfair treatment. Some circumstances that may trigger an attack include:

- An unsatisfactory review
- Disciplinary action
- Unresolved conflicts
- Drawn-out grievance period
- Unfavorable grievance resolution
- Loss of pay or benefits
- Demotion
- Dismissal or reduction in force
- Increased productivity demands
- Increased performance expectations

Increasingly, however, this type of violence involves domestic or romantic disputes. In such cases, an employee is threatened in the workplace by an individual with whom he or she is having a relationship outside of work.

While most employment-related violence is limited to threats, verbal harassment and non-fatal injuries, fatalities often attract significant media attention. As a result, they are made to appear much more common than they actually are. Statistics prove, however, that the other two types of workplace violence account for the vast majority of fatal episodes.

APPENDIX D: Workplace Security Assessment Form

Facility (Worksite):_____
Location:_____
Division/Unit:_____
Date:_____
Inspection No._____

Describe the physical layout of the establishment. Indicate its location to other businesses or residences in the area and access to the street. _____
_____
_____

Number/gender of employees on-site between 10 p.m. and 5 a.m. _____
Describe nature and frequency of client/customer/passenger/other contact: _____
_____

Yes No
o o Are cash transactions conducted with the public during working hours?
If yes, how much cash is kept in the cash register or in another place accessible to a robber? _____

Yes No
o o Is there a safe or lock-box on the premises into which cash is deposited?

What is the security history of the establishment and environs? _____
_____
_____

What physical security measures are present? _____
_____
_____

What work practices has the employer implemented to increase security'? _____
_____
_____

Yes No
o o Has security training been provided to employees? If so, has the training been effective?

Return to Work SPP# A-5

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures for returning injured North Carolina Department of Transportation (NCDOT) employees back to work with minimal time lost.

2.0 Scope and Applicability

Returning employees to work who have been injured in the performance of their jobs is an important component of NCDOT's loss control strategies. Benefits of a return to work program include:

- Faster, more effective healing
- Safer work environment
- Direct and indirect savings in lost wages, medical costs and productivity
- Improved morale by providing support to employees with alternate

assignments during recuperation in order to maintain desirable productivity levels
- Enhanced cross-training within NCDOT

Without a return to work program, employees have little incentive to return to work and are less likely to return to work the longer they are out of work.

This safety policy and procedure includes provisions for supervisory training, a discussion of the return to work process, presents details on NCDOT's preferred provider network and presents information on transitional work assignments, permanent job modifications and new position assignment requirements. This document also outlines priorities for employee placements after injury, presents Form 19-S, details how the program should be communicated and highlights how results of the program are tracked.

This document details the areas of responsibility for managers/unit heads, supervisors, employees, the Workers' Compensation Administrator, the Division Safety Officer, Safety and Loss Control and Personnel Section within NCDOT.

This safety policy and procedure does not address the entire Workers' Compensation process. (Refer to the Workers' Compensation Policy and Procedure Manual for those details.) This document applies to all NCDOT employees.

3.0 Reference

This safety policy and procedure is established in accordance with the North Carolina General Statute 97 (Workers' Compensation Act, 1994), the North Carolina Industrial Commission Rules and Regulations (1995) and the Americans with Disabilities Act (ADA).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. However when serious physical harm does occur to employees, NCDOT is committed to providing quality medical care and managing those costs associated with that medical care. NCDOT is also committed to the effective return to work of injured employees while enhancing their recovery.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure regarding Return to Work. Specific responsibilities are found in Section 6.3

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Return to Work.

6.1 Definitions

Alternate Duty
Duties assigned on either a short term or permanent basis, and medically approved by the authorized treating healthcare provider, to an injured employee.

Permanent Job Modification
Jobs that are permanently modified for employees that have permanent restrictions upon return to work following an injury.

Preferred Provider
A healthcare provider that has entered into an agreement with NCDOT to provide prompt healthcare services to an NCDOT employee injured during the performance of their jobs.

Transitional Work Assignment
Work assignments (duties) that are short term and that employees with temporary restrictions are given upon return to work following an injury.

Workers' Compensation Leave
Period of time that employees are recuperating from job-related injuries and during which the employee receive 66.667 % of their regular pay.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. The provisions adopted by NCDOT are:

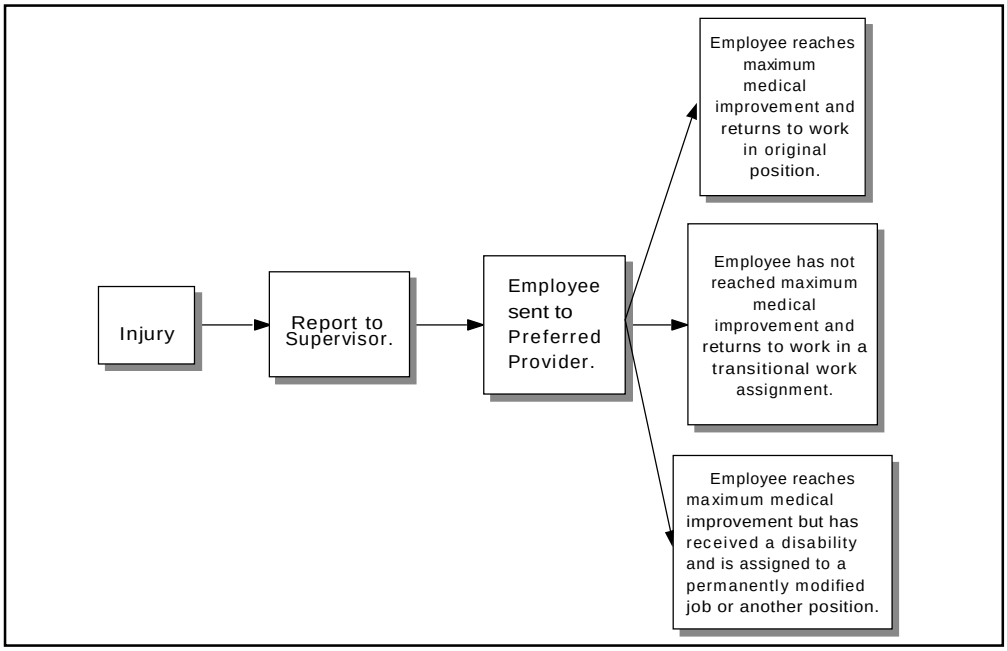
- Training
- Return to Work Process
- Return to Work Rules
- Preferred Provider Network
- Transitional Work Assignments
- Permanent Job Modifications and New Position Assignments
- Program Communication
- Form 19-S
- Tracking Results of the Return to Work Program

6.2.1 Training

The critical link in NCDOT'S Return to Work Program is supervisors accurately understanding their key role in this process. Therefore, supervisors should receive training that includes specific details on the Return to Work process and their responsibilities under this program. This training will be conducted as a one-time training with re-training every two years.

6.2.2 Return to Work Process

The following chart illustrates the major components of the return to work process.



When an employee, who has been injured on the job and placed on workers' compensation leave, has been released to return to work by the treating physician, there are three possible return to work scenarios.

Scenario 1 An employee has reached maximum medical improvement and has been released to return to work by the treating physician.

Scenario 2 An employee has not reached maximum medical improvement and is ready to return to a transitional work assignment (limited or modified work duty) with approval of the treating physician, but retains some disability which prevents successful performance in the original position.

Scenario 3 An employee has reached maximum medical improvement and has been released to return to work by the treating physician, but has received a disability which prohibits employment in his/her previous position.

For scenario 1, when an employee has reached maximum medical improvement and has been released to return to work by the treating physician, NCDOT shall return the employee to the original position he/she held prior to workers' compensation leave.

For scenario 2, when an employee has not reached maximum medical improvement and is ready to return to a transitional work assignment,

NCDOT shall provide work reassignment suitable to the employee's capacity which is both meaningful, productive and advantageous to the employee and NCDOT. This work reassignment shall be a temporary assignment and shall not exceed 90 days without approval from NCDOT personnel. When the employee reaches maximum medical improvement, NCDOT shall return the employee to the original position held prior to workers' compensation leave.

For scenario 3, when an employee has reached maximum medical improvement and has been released to return to work but has received a disability, NCDOT shall attempt to place the employee in a permanently modified job or another position suitable to the employee's capacity which is both meaningful, productive and advantageous to the employee and NCDOT. This work placement may be a permanent assignment or either a part-time or temporary assignment until a permanent assignment is found.

For scenario 3, work placements shall abide by the following:

- If a position is not available for work placement, NCDOT shall appoint the employee to the first suitable vacancy which occurs. During the interim period in which a suitable vacancy is not available, the employee shall be referred to the Office of State Personnel for reemployment assistance and a possible return to work in another agency.
- Work placement efforts shall continue for a period not to exceed 12 months except with the approval of NCDOT personnel section.
- In some cases the extent of disability may be that vocational rehabilitations will be necessary. If so, NCDOT shall make the necessary arrangements with the North Carolina Division of Vocational Rehabilitation for such training which may be necessary to assist the employee to obtain suitable employment consistent with his/her performance capabilities.

6.2.3 Return to Work Rules

The general rules of NCDOT's Return to Work Program include:

- Every employee should be entered into NCDOT's Return to Work Program upon medical certification that the employee may return to some type of work duty.
- Written return to work authorization must be obtained from the preferred provider.
- Every attempt should be made to modify the employee's current job to meet restrictions. (See Appendix A for Guidelines in Matching Employees to Alternate Duty.)
- An injured worker should not be placed in a job that pays more than the regular job.

- An injured worker should not be place in a job that has environmental advantages over the regular job except for short term modified duty assignments.
- Injured employees should usually be under the direct supervision of the supervisor in the area in which he/she is working. However, supervisors should understand their responsibility and be willing to work with employees not normally under their control.
- The Workers' Compensation Administrator and the treating physician shall make the final decision (with input from the injured's supervisor and Risk Management Personnel) as to when an employee returns to work in either his/her original position, a transitional work assignment, a permanently modified job or a re-assigned position.

6.2.4 Preferred Provider Network

NCDOT's preferred provider network is a list of physicians that have agreed to treat injured NCDOT employees when such injuries arise out of the performance of their job duties. This preferred provider list (network) should include orthopedic, neuro-surgeon, neurologist, urgent care or emergency room physicians.

This list shall be maintained by the division safety officer or the unit's safety representative with updated lists being made available to the Workers' Compensation Administrator. The preferred provider list (network) shall be updated annually.

6.2.5 Transitional Work Assignments

As applicable, employees may be provided with transitional work assignments during their recuperation in order to maintain desirable productivity levels. These assignments (sometimes called limited or modified duty) should be short term in nature (no greater than 90 days) until the employee is able to return to his/her original job assignment.

Ideally, these transitional work assignments should be already defined prior to an injury. Ideas for defining transitional work assignments include:

- Getting a list of jobs that may be performed on an annual, monthly, weekly or daily basis. Examples may include rainy day jobs, jobs that would require overtime or temporary help to complete or any jobs that employees may do on an occasional basis.
- Supervisors identifying tasks that do not come under any specific job title. These tasks could then be assigned as part of an transitional work position.
- Discussing and documenting jobs/tasks that would be good for transitional work assignments or modified jobs as a topic during a safety meeting.

Appendix B lists some common restrictions associated with different body part injuries that could be used to develop transitional work assignments.

6.2.6 Permanent Job Modifications and New Position Assignments

Permanent job modifications and new position assignments are used for employees who receive a permanent disability as a result of an injury. In many instances, permanent job modifications may be the same as transitional work assignments except the transitional work assignments are temporary in nature.

If an employee cannot be placed in a permanently modified job, then that employee may be assigned to another position that meets the restrictions imposed upon the employee by the treating physician.

6.2.7 Form 19-S

Appendix C presents Form 19-S (Supplemental Report of Injury) which must be completed upon the return to work of the employee. Copies of this completed form must be forwarded to the Workers' Compensation Unit and Safety and Loss Control.

6.2.8 Program Communication

NCDOT's Return to Work Program must be effectively communicated to injured employees, affected supervisors, and preferred providers.

Program communication will be achieved by the training of supervisors, safety orientation training for employees and the distribution of program literature.

For injured employees and affected supervisors, the Workers' Compensation Administrator's staff will forward, upon receipt of a Form 19, an Employee Handbook on Workers' Compensation and a return to work brochure that provides specific details on injured employees and affected supervisors responsibilities and required actions. The injured employee shall also receive a Workers' Compensation (WC) packet from their supervisor.

For preferred providers, they will receive an annual mailing of the Employee Handbook on Workers' Compensation, a WC packet, a return to work brochure and a copy of this safety policy and procedure from the Workers' Compensation Administrator's staff. Additionally, they will receive as needed verbal communication from the Workers' Compensation Administrator's staff and from Safety and Loss Control's Risk Management personnel.

6.2.9 Tracking Results of the Return to Work Program

Results of NCDOT's return to work program shall be tracked by annually compiling trends and statistical reports from the database derived from the Forms 19S.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will be responsible for:

- Providing resources and support to supervisors in the return to work process
- Assisting in the employee placement decisions as applicable
- Encouraging proper and ethical practices in all phases of the return to work process

6.3.2 Supervisors

Supervisors will be responsible for :

- Giving WC packets to injured employees as soon as practical following the injury
- Completing Form 19 upon the injury of an employee
- Pre-determining alternate duty options (transitional work assignments [Limited or modified duty] and permanent job modifications) for the positions under their supervisory control
- Providing job descriptions and alternate duty options to the Workers' Compensation Administrator, Risk Management personnel and preferred providers to secure employee placements after injuries
- Completing Form 19-S upon the return to work of the injured employee

6.3.3 Employees

Employees shall be responsible for promptly reporting any injuries to their supervisor and going to the preferred provider as directed by their supervisor. They will also cooperate with the Workers' Compensation Administrator's staff, preferred providers and Risk Management personnel in the treatment, recovery and return to work phases of the process.

6.3.4 Workers' Compensation Administrator

The Workers' Compensation Administrator will be responsible for:

- Administration of NCDOT's Return to Work Program
- Coordinating with preferred providers, Risk Management personnel, NCDOT personnel section and supervisors in the placement of employees into transitional work assignments, permanently modified jobs or new positions
- Coordinating the program communication aspects by ensuring that timely mailouts of program materials are performed within the criteria of this safety policy and procedure
- Coordinating vocational rehabilitation training for employees who have received a permanent disability as a result of a job injury
- Maintaining a central list of all NCDOT preferred providers

6.3.5 Division Safety Officer

The Division Safety Officer will be responsible for:

- Maintaining a up-to-date preferred provider list for his/her division and forwarding that list annually to the Workers' Compensation Administrator

6.3.6 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in and develop the appropriate training associated with this document. Also, Safety and Loss Control will annually compile trends and statisical reports for tracking results of NCDOT's return to work program.

Additionally, Safety and Loss Control's Risk Management Personnel will:

- Provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure
- Assist supervisors in returning employees back to work
- Communicate with preferred providers as needed on revelant aspects on NCDOT's Return to Work Program
- Coordinate placement decisions between the Workers' Compensation Administrator, the preferred providers, division/unit staff and supervisors
- Meet with injured employees to explain alternate duty position(s)

6.3.6 Personnel Section

Personnel Section will be responsible for :

- Assisting the Workers' Compensation Administrator and the Risk Management Personnel in placement decisions that require new position assignments
- Providing consultative services in wage and salary grade equity issues
- Approving temporary assignments greater than ninety days

APPENDIX A : Guidelines for Matching Employees to Alternate Duty

Alternate duty includes transitional work assignments (limited and modified duty), permanently modified jobs and new position assignments.

1. The supervisor should list all restrictions provided by the physician.

2. The supervisor should then list all alternate duty jobs and their wages, including regular jobs with modifications available.

3. The doctor's restrictions should then be matched to the best possible alternate duty. In the case where there may be a unique restriction from the physician, check the alternate duty job chosen to make sure it meets with the restrictions or can be modified to meet the restriction.

4. Take the identified and available job description(s) that meets restrictions. Examine the wage section to ensure that none of the alternate duty jobs pays more than the original job.

6. Forward the job description(s) to the physician's office and to the Risk Management personnel. The physician will sign off on all jobs that are appropriate and make comments as necessary for this particular case. The physician will forward them back to the supervisor and the Risk Management personnel.

7. If the physician has identified more than one job as appropriate, the best alternate duty position should be chosen to best meet NCDOT needs.

8. The Risk Management personnel will meet with the injured employee and physicians as needed to explain the alternate duty position.

APPENDIX B : Common Restrictions Based on Body Part

Lower Back	No lifting over ___ lbs. No repetitive bending No prolonged bending No prolonged sitting No prolonged standing
Wrist and Hand	No forceful gripping One arm work only Break every hour to stretch hands for 1-2 minutes No lifting with hand over five pounds Work at own pace - no production
Elbow	No forceful gripping No reaching with elbow extended No repetitive twisting of forearm
Shoulder	No reaching over head No reaching with extended elbows No reaching across body No lifting over ___ lbs.
Knee	No kneeling No crawling No squatting Limited walking No climbing stairs or ladders No lifting over ___ lbs.

APPENDIX C: Form 19-S

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Form 19-S

SUPPLEMENTAL REPORT OF INJURY

If Form 19, First Report of Injury, did not show that the injured employee had returned to work, This Form 19-S, Supplemental Report of Injury, must be completed and forwarded immediately upon the return to work of the employee, or upon termination of employment, death or retirement of the injured employee. Send the original of the completed form to Safety and Loss Control and a copy to the Workers' Comp Unit, Fiscal Section . All questions must be answered fully. (Please print clearly or type.)

Employee

1. Employee Name _____ 2. SSN# _____
3. Department Code _____ 4. Date of Injury _____
5. Nature of Injury _____

Return to Work

6. Date and time employee returned to work _____

	Yes	No	
7.	❑	❑	• Was the employee transferred to another job due to restrictions?
8.	❑	❑	• Was employee placed on modified duty? If yes, how long?
9.	❑	❑	• Did the Injured return to work and then lose more time for the same injury? If yes, please explain.

Lost Work Days

Under the current North Carolina Workers' Compensation Act, there is a 7 calendar day waiting period where no compensation for time lost from work is allowed except when the injury results in disability for more than 21 calendar days. (The 7 calendar day waiting period begins the day after the injured employee receives medical treatment.) If the disability exceeds 21 calendar days, then compensation is allowed from the date of the disability.

10. Total number of calendar days off from work _____
11. As applicable, enter the number of days of each appropriate category from which the injured employee was paid during the 7 calendar day waiting period:

____ Days of Vacation ____ Days of Compensatory Time ____ Days of Sick Leave
____ Days of Administrative Leave ____ Days of Leave Without Pay

12. Total number of Lost Work Days _____

Medical Care

	Yes	No	
13.	❑	❑	• Is this employee still receiving medical care? If yes, what is the estimated length of treatment?

14. Remarks _____

Supervisor

15. Supervisor's Name _____
16. SSN# _____ 17. Supervisor's Title _____
18. Signature _____ 19. Date _____

7/96 61-03418

Fleet Safety SPP# A-6

Quick Reference

Select this Link to view latest Revision changes

1.0 Purpose

The purpose of this safety policy and procedure is to establish a comprehensive Fleet Safety Program for North Carolina Department of Transportation (NCDOT) employees to ensure State and NCDOT owned/operated motor vehicles are driven and maintained is a safe manner.

2.0 Scope and Applicability

Vehicle driving safety is a critical component in reducing accidents caused by motor vehicles. The Fleet Safety Program is designed to reduce injuries and loss due to driver error.

This safety policy and procedure provides guidelines for training Safety Staff, Fleet Safety Instructors and employees in safe driving techniques. Additionally, it presents a discussion of the program components of NCDOT's Fleet Safety Program and confidentiality requirements.

It also details the areas of responsibility for managers/unit heads, supervisors, Fleet Safety Instructor-Trainers, Safety Staff, Fleet Safety Instructors, employees and Safety and Risk Management within NCDOT.

This safety policy and procedure covers all NCDOT drivers of NCDOT vehicles owned, leased or rented. Trucks covered by this safety policy and procedure include utility trucks (class code 0203) through tractor-trailers. Heavy equipment operation is not covered by this safety policy and procedure.

3.0 Reference

This document is established in accordance with NCDOT Safety Policy and Procedures, Best Practices and Motor Vehicle Laws of North Carolina.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, all employees who operate motorized vehicles (excluding heavy equipment) as part of their assigned duties or their position function must be trained in safe driving using NCDOT's Fleet Safety Program.

5.0 General Responsibilities

It is the responsibility of each Division Engineer, manager, unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on Fleet Safety. It is also the responsibility of each employee to immediately report any unsafe act or condition related to fleet safety to his or her supervisor.

6.0 Procedure

This section provides applicable definitions, establishes general provisions and identifies specific responsibilities required by NCDOT's safety policy and procedure on Fleet Safety.

6.1 Definitions

Commercial Driver's License (CDL). Driver's license for a specific class vehicle (by weight) and specific endorsements, when required. Please note age restrictions.

Commercial Motor Vehicle (CMV)

(1) A single vehicle with a gross vehicle weight rating (GVWR) of more than 26,001 pounds,

(2) A combination vehicle with a gross combination weight rating (GCWR) of 26,001 or more pounds, provided the GVWR of the vehicle(s) being towed is in excess of 10,000 pounds,

(3) A vehicle designed to transport 16 or more passengers (including the driver),

Division Fleet Safety Coordinator
Designated individual (within Division/Unit) who evaluates drivers, coordinates testing and schedules Fleet Safety driver training.

Fleet Safety Instructor-Trainer
Individuals who, through advanced fleet safety training and/or experience, are qualified to train Safety Officers and Fleet Safety Instructors on the fundamentals of NCDOT's Fleet Safety Program.

Fleet Safety Instructors
Individuals appointed by the Division Safety Staff to assist in administering the Fleet Safety Program.

Heavy Truck
Class Code 0203 (utility truck) and larger trucks

Psychophysical Tests
Tests that measure visual acuity, depth perception, peripheral vision, reaction time and color blindness.

State of NC/Unit Owned Vehicle/Equipment (State Owned)
For the purposes of this SPP vehicles owned/leased/rented by a state agency, division, unit, DOA Fleet Management regardless of procurement process and may/may not be assigned a state/public license plate shall be referred as state owned.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Program Components
- Confidentiality
- NCDOT Equipment Lighting Policy
- Drug and Alcohol Testing
- Cell Phone Use

6.2.1 Training

Training requirements of this safety policy and procedure include the following categories of personnel:

- Fleet Safety Instructor-Trainers
- Fleet Safety Instructors
- Employees

The Division Fleet Safety Coordinator and Fleet Safety Instructors shall receive training upon initial job assignment. Fleet Safety Instructor- Trainers will conduct this training. Appendix A details the training subjects and eligibility requirements for the Safety Officers and Fleet Safety Instructors. Periodic refresher training shall also be conducted at the discretion of Safety and Risk Management.

Employees whose job duties may include the operation of heavy trucks (class code 0203 and heavier) shall receive the Fleet Safety Training Course upon initial employment and/or job assignment. Training will be further be required for any driver who, in the performance of their duties, is involved in two or more equipment accidents within a three-year period shall receive the Fleet Safety Training Course and any other remedial training as deemed appropriate by the supervisor or Division Engineer. Driver refresher training shall be conducted every three years or earlier at the discretion of supervisors or the Division Engineer/Unit Head.

All other employees who operate automobiles and light duty trucks shall receive Defensive Driving Training upon initial assignment and, as a minimum, every three years thereafter. Appendix B highlights the major components of the Defensive Driving Training section of the Fleet Safety Program.

6.2.2 Program Components

The Fleet Safety Program includes the following components:

- Initial driver evaluation and selection (See Appendix C for driver screening and training process).
- Driver record check and evaluation.
- Psychophysical testing (See Appendix D for guidelines on conducting psychophysical testing)
- Classroom training
- In-vehicle road testing
- In-vehicle road training when deemed appropriate by supervisor or Safety Staff
- Fleet Safety files maintained at the Division headquarters (See Appendix E for Fleet Safety file requirements)
- Follow-up and remedial training
- Continuous documented preventive maintenance by drivers on their assigned vehicles (See Appendix F for a sample vehicle preventive maintenance checklist)

- Incident Review Committee's review and analysis of equipment accidents as detailed in the Workplace Safety Manual and SPP #A-2, Safety Program Policy and Procedure
- Employee recognition (e.g., incentive pins, plaques, vehicle rodeos, etc.)

6.2.3 Confidentiality

All driver Fleet Safety files will be considered confidential. These records will be locked when not in use. The contents of these files will not be divulged to anyone other than staff and supervisors who must have this information to determine the qualifications of drivers to operate state-owned equipment.

In accordance with General Statute 126-24 and as approved by the Secretary of NCDOT, Safety Engineers, Consultants, and Officers are authorized to have access to employee's personnel files to research employee safety records.

6.2.4 NCDOT Equipment Lighting Poicy

All NCDOT vehicles utilized in Work Zone or Road Construction/Maintenance operations are required to be equipped with Warning Lights per the NCDOT Equipment Lighting Policy.

See Appendix G for the NCDOT Equipment Lighting Policy.

6.2.5 Drug and Alcohol Testing

NCDOT has a Controlled Substance Abuse and Alcohol Misuse Standard Policy and Procedure administered by the Safety and Risk Management Controlled Substance and Alcohol Program Manager. NCDOT employees (CDL/Non-CDL) that operate state owned vehicles are subject to drug and/or alcohol testing.

CDL drivers are subject to the following types of testing:

1. Pre-Employment Testing
2. Random Testing
3. Follow-Up Testing
4. Reasonable Suspicion Testing
5. Post-Accident Testing

All other drivers are subject to the following types of testing:

1. Reasonable Suspicion Testing
2. Post-Accident Testing

See Appendix H for instructions on Post-Accident Drug and Alcohol Testing

6.2.5 Cell Phone Use

Hands-free is the only acceptable use of cell phones when operating a NCDOT vehicle per Federal Motor Carrier Safety Administration. Hand-held mobile devices are prohibited.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for taking an active role in the implementation and continuous support of the Fleet Safety Program. Additionally, Managers/Unit Heads are responsible for ensuring
compliance with the guidelines contained in this safety policy and procedure. They are also responsible for delegating and assigning specific responsibilities to assure that an effective Fleet Safety Program is maintained.

Manager/Unit Heads are responsible for designating an individual to act as the coordinator for the Fleet Safety Program. Additionally, they may designate two or more Fleet Safety Instructors to assist during times of peak load.

Managers/Unit Heads are responsible for ensuring that adequate funding is budgeted and available to support the Fleet Safety Program. They are also responsible for identifying the affected employees and ensuring employees are included in the program.

Manager/Unit Heads will obtain and coordinate the required training for
the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through the auditing process.

6.3.2 Supervisors

Supervisors who have drivers under their supervision are responsible for:

- Allowing drivers under their supervision to attend the required testing and training
- Informing the designate coordinator of changes in driver's status
- Assisting in the arrangements of training schedules and facilities
- Cooperating with the designated coordinator on driver information requests
- Ensuring that drivers perform Pre-Trip inspections on their assigned vehicles
- Ensuring that equipment is not abused
- Ensuring that equipment is not operated when it is unsafe and known to be defective

Supervisors who have employees under their supervision who have been appointed as Fleet Safety Instructors will cooperate with the designated coordinator in making the Fleet Safety Instructors available to assist during peak times or as requested by other Divisions.

Supervisors shall not permit any employee to operate a Commercial vehicle if they have not been adequately trained and/or tested.

Supervisors shall not permit any employee to operate a State owned or leased vehicle until a driver's record check regarding the employee has been processed and deemed satisfactory by the Division Coordinator.

Before permitting a driver to operate a State owned or leased vehicle, supervisors will ensure the driver has the appropriate North Carolina Driver's License for the assigned vehicle. Supervisors shall not permit any employee to operate a heavy truck until the employee has been road tested, evaluated and certified by the Division Coordinator or his designee.

Supervisors are responsible for promptly investigating all equipment accidents and completing all required documentation as detailed in the Workplace Safety Manual and SPP # A-2, Safety Program Policy and Procedure.

6.3.3 Fleet Safety Instructors-Trainers

Fleet Safety Instructor-Trainers are responsible for providing the Division Coordinator and Fleet Safety Instructors with NCDOT's standard Fleet Safety Instructor Course. The Fleet Safety Instructor-Trainers are also responsible for providing consultative services for Fleet Safety procedures.

To conduct a road test, the Fleet Safety Instructor-Trainers must have the appropriate CDL license.

6.3.4 Division Fleet Safety Coordinator

Division Fleet Safety Coordinators are responsible for coordinating and managing the Fleet Safety Program in their division/unit. They are also responsible for maintaining Fleet Safety files and records.

Division Coordinators will be responsible for issuing NC DOT Driver Licenses and coordinating skill and psychophysical tests as needed. They will assist supervisors in any matter related to the Fleet Safety Program.

6.3.5 Fleet Safety Instructors

Fleet Safety Instructors are responsible for assisting with Fleet Safety Training during peak times or as requested. This will include assisting with road testing and training, and classroom training. Fleet Safety Instructors shall comply with all the requirements of the Fleet Safety Program. They will assist supervisors in any matter related to the Fleet Safety Program.

6.3.6 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

All drivers of vehicles are responsible for staying current with regulations and notifying their supervisor of conditions or issues that may affect their ability to drive (i.e. medical conditions, prescriptions, accidents/mishaps/incidents, tickets, loss of license, etc...).

Any driver holding a CDL who is convicted of violating any State law or local ordinance relating to motor vehicle operations in this or any other state, other than parking violations, shall notify they supervisor in writing within 30 days of the conviction.

Any driver whose driver's license is suspended, revoked, or canceled, shall notify they supervisor upon reporting for duty. Failure to comply with this requirement is grounds for dismissal.

Employees who are designated as Fleet Safety Instructors shall comply with all the requirements of NCDOT's Fleet Safety Program.

6.3.7 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to Managers/Unit Heads, Supervisors and others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training. Additionally, Safety and Risk Management will provide training for Fleet Safety Instructor-Trainers and will provide technical guidance for the Fleet Safety Instructor-Trainers.

Division Safety Engineers, Consultants, and Officers will provide consultative assistance within their respective division to ensure the effective administration of this safety policy.

APPENDIX A: Training and Eligibility Requirements for Fleet Safety Instructors & Safety Staff

Training Subjects for Fleet Safety Instructor Course

- Safety Policy and Procedure A#6 – Fleet Safety
- Safe driving techniques
- Defensive driving
- Attitude, emotions and driving
- Training in accident avoidance techniques for specific accident types
- Processing driver record checks
- How to conduct road testing and training
- Driver evaluation
- Follow-up and remedial road training
- Conducting psychophysical tests
- Establishing and maintaining Fleet Safety driver files and records
- How to instruct

Fleet Safety Instructor Eligibility Requirements

- High school graduate (minimum)
- No more than two convictions of moving violations in the past 3 years
- No driver's license suspensions, revocations, cancellations or disqualifications in the past 5 years.
- No convictions of alcohol or drug related offenses in the past 10 years
- Experience or knowledge of driving Commercial vehicles
- Good verbal and written communication skills
- Ability to complete documentation forms accurately and neatly
- Dependable
- Safety conscious
- Ability to work with minimum supervision

APPENDIX B: Defensive Driving Training

As a minimum, the CDL defensive driving training components of the Fleet Safety Program shall include the following subject areas.

- Defensive Driving definitions
- Three basic steps of defensive driving
- The types of traffic conflicts
- Driving distractions
- Unpracticed driving skills
- Smith System Fundamentals (Space Cushion Driving Techniques)
- Space Cushion Driving Keys:
  - Key # 1- Aim High
  - Key # 2- Get the Big Picture
  - Key # 3- Keep Your Eyes Moving
  - Key # 4- Leave Yourself an Out
  - Key # 5- Make Sure They See You

Note: For all NCDOT Non-CDL drivers (All NCDOT employees who operate automobiles and light duty trucks) shall receive Non-CDL Defensive Driving Training covering the following subjects:

- Driving behaviors and conditions
- Distracted driving
- Aggressive drivers
- Becoming a defensive driver

APPENDIX C: Driver Screening and Training Process

Driver Record Check

Prospective drivers must meet the following standards to be eligible to operate NCDOT vehicles:

- No more than two convictions of moving violations within the past three years No convictions of an alcohol or drug related traffic offense within the past five years
- Valid, current North Carolina driver's license appropriate for the type of vehicle to be operated (*Note: Employees permanently residing in adjacent states may operate a DOT vehicle using a current, valid, appropriate driver's license from their state of residence.)*
- If a driver applicant has possessed an out-of-state driver's license in the past ten years, the driver's record from the state(s) involved shall be obtained. Such applicants and those who currently possess an out-of-state driver's licenses will be responsible for providing their driving records from the appropriate states.

Road Testing and Evaluation for CDL Drivers

Before a prospective employee is allowed to operate a heavy truck (class code 0203 and heavier vehicles), they must:

- Must complete Dump Truck and/or Low Boy training through NCDOT LMS or equivalent training
- Be road tested by the Division Fleet Safety Coordinator or a Fleet Safety Instructor
- Complete any needed road and/or classroom training as indicated by the Division Fleet Safety Coordinator or Fleet Safety Instructor who conducted the road test
- Be certified by the Division Fleet Safety Coordinator or Fleet Safety Instructor

Driver Applicant Screening

- All applicants complete Driver's Questionnaire and provide required driving information (CDL or other)
- Supervisor reviews driver applications and selects best applicants.
- Supervisor interviews best applicants and selects the best qualified for road testing.
- The supervisor, utilizing this information, then makes a final selection of the best- qualified applicant and forwards through normal channels.
- The Division Fleet Safety Coordinator or Fleet Safety Instructor will conduct a road test of the new hire and provide an evaluation along with training recommendations to the supervisor as soon as possible after hiring.
- The supervisor will then schedule employee for the first available Fleet Safety Course.

Annual Driver License Check

An annual driver license check will be conducted to ensure NCDOT drivers license are current and review any convictions which may warrant action.

APPENDIX D: Guidelines for Conducting Psychophysical Testing

Psychophysical testing will be included as a part of the Fleet Safety Training Course. In addition, the Division Fleet Safety Coordinator will coordinate psychophysical testing for drivers he/she deems appropriate in the following situations:

- Observation and evaluation of a driver indicates a problem may exist regarding the driver's visual acuity, depth perception, peripheral vision, reaction time or color blindness
- Following an incident in which there are indications that the driver's visual acuity, depth perception, peripheral vision, reaction time or color blindness may have been a contributing factor
- Upon request by the supervisor
- Upon request by the driver

If psychophysical testing indicates a driver's visual acuity is less than 20/40 with the use of both eyes, the Division Fleet Safety Coordinator shall immediately advise the driver's supervisor. The subject driver shall not be permitted to operate any NC DOT equipment until an eye specialist documents the subject driver's vision is at least 20/40 with the use of both eyes. If corrective lenses are needed in order for the driver to meet this requirement, the driver will be required to wear corrective lenses when operating NC DOT equipment.
If psychophysical testing indicates the driver to be deficient in-depth perception, peripheral vision, reaction time or color blindness, the Division Fleet Safety Coordinator will advise and train the driver on methods to compensate for the problem (s).

Divisions or Units whose Psychophysical testing unit is defective and which cannot be repaired or replaced, shall require employee to get Eye Exam to meet requirements of psychophysical testing. NCDOT will cover the cost of the eye exam.

APPENDIX E: Driver's Fleet Safety File Requirements

NCDOT Drivers' Fleet Safety files that are maintained at the division/unit headquarters will consist of the following:

- Driver Applicant Questionnaire
- DMV Driver's Record Check
- Road Test Documentation
- Equipment Accident and Property Damage Reports (Form 140) on the subject driver
- Incident Reports (Forms I-1, I-2 and I-3) on subject driver
- Psychophysical test score sheet (if applicable)
- Comments and evaluation by Division Fleet Safety Coordinator or Instructors

APPENDIX F: VEHICLE PREVENTATIVE MAINTENANCE

All vehicles operated by DOT personnel need to be inspected on a regular basis. Regular inspections must take place during the 5,000-mile period between scheduled preventive maintenance. Commercial Driver License Law for all vehicles in excess of twenty-six thousand pounds GVWR dictates such inspections. These inspections are required each day, prior to the vehicle being placed into service and shall be documented using NCDOT Pre-Trip Inspection books. However, there is no such policy or requirement for noncommercial vehicles. These vehicles shall be inspected once per week. **All employees shall be trained in the inspection of each item for their appropriate vehicle.**

In addition, each department head as prescribed in the following policy shall maintain the records of these inspections.

Non-Commercial Vehicles (Less than 10,000 lb. GVWR)

In order to assure the safe operating condition of the above referenced vehicles, it shall be the policy of the Department of Transportation that each vehicle shall be inspected at least once per week. To avoid confusion in this matter, it shall be required that each employee operating a vehicle for the first-time during a given week shall inspect the vehicle prior to operation. This may require the vehicle to be inspected several times during a given week. However, this will ensure that each employee operating a vehicle has checked that the vehicle is in safe working order. These inspections are to be performed in accordance with the inspection provided for non-CDL vehicles. Each item should be checked for proper condition and function.

Commercial Vehicles (10,000 lb. GVWR or More)

The state of North Carolina requires, under the Commercial Drivers License Law, that all such vehicles be inspected prior to being placed into service each day. It shall be the policy of the Department of Transportation to inspect all commercial motor vehicles in a manner to comply with this law. The following inspection sheets shall be followed in order to insure uniformity in these inspections.

Maintenance of forms

To maintain uniformity in the collection and security of all vehicle Pre-Trip inspections, the following shall be required. Each employee shall maintain daily inspections in the Pre-Trip Inspection CDL book provided for the vehicle during the calendar year. In the event that said vehicle is involved in an incident, a copy of the pages completed up to the time of the incident, shall be attached to the required incident investigation forms and submitted to the Safety Officer. The Inspection form shall be maintained with the incident investigation forms in the Division Office. This will ensure that all incident investigations will have documentation to support that the vehicle was in safe operating condition at the time of the incident. This policy shall apply to all vehicle inspection forms.

No vehicles shall be operated if it is unsafe to do so!

APPENDIX G: NCDOT Equipment Lighting Policy he

NC DOT EQUIPMENT LIGHTING POLICY
Mar-18

Listed below are the different class codes of NC DOT equipment and the appropriate types of warning lights to be installed on each class code. Please cross reference the type of light with the current year's Lighting Committee's Lighting Recommendations.

Note: Clear flashing lights are generally recognized as emergency vehicles such as, (Fire, Rescue and Law Enforcement). Amber flashing lights are generally recognized as roadway maintenance or construction equipment. Therefore, the committee recommends discontinuing (clear) lights and using the color (amber) for any new installation.

Class Code	DESCRIPTION	OPTION	SPECIFIED LIGHTS
O200	Van w/ Aerial Device	Option 1	Two (2) 17" light bar, low profile LED-A, separated.
		Option 2	One (1) 48" LED-A light bar.
O200	Carryall/Van	Option 1	One (1) 17" light bar, low profile LED-A AND Four (4) corner LED-A perimeter lights AND One (1) 30" rear mount LED-A; top center inside.
		Option 2	One (1) 48" LED-A light bar. AND Four (4) corner LED-A perimeter lights AND One (1) 30" rear mount LED-A; top center inside.

APPENDIX G: NCDOT Equipment Lighting Policy (Continued)

Class Code	DESCRIPTION	OPTION	SPECIFIED LIGHTS
0201, 0202, 0221, 0220, 0222	Pick-up (Trans. Supv.) (Bridge Maint. Supv.) (VERTS) (Pre-line) ect.	Option 1	Two (2) 17" light bar, low profile LED A, separated *AND* Four (4) corner LED A perimeter lights.
		Option 2	One (1) 48" LED A light bar. *AND* Four (4) corner LED A perimeter lights.
		Option 3	One (1) 23" LED A light bar *AND* Four (4) corner LED A perimeter lights.
0201, 0202, 0221, 0220, 0222	White Supervisor Vehicles (Only 0201,0202, 0221, 0220, 0222 class codes)	Option 1	Two (2) 17" light bar, low profile LED A, separated *AND* Four (4) corner LED A perimeter lights.
		Option 2	One (1) 48" LED A light bar. *AND* Four (4) corner LED A perimeter lights.
		Option 3	One (1) 23" LED A light bar *AND* Four (4) corner LED A perimeter lights.
0203	Sign Truck, Aerial Device, Mechanics Service Truck		One (1) 48" LED A light bar. AND Twelve (12) corner LED amber perimeter lights.

APPENDIX G: NCDOT Equipment Lighting Policy (Continued)

Class Code	DESCRIPTION	OPTION	SPECIFIED LIGHTS
0203, 0233	Special Paint Marking Truck		Two (2) 17" light bar, low profile LED A, separated *AND* Four (4) corner LED A perimeter lights. *AND* Two (2) grill mounted LED lights
0203	Cone Retrieval Truck		Two (2) 17" light bar, low profile LED A, separated Two (2) LED amber strobes in grill Twelve (12) corner LED strobes on bed corners. One (1) 30"X60" LED arrow board.
0204, 0224,	Crew Cab Pickup	Option 1	Two (2) 17" light bar, low profile LED A, separated *AND* Four (4) corner LED A perimeter lights.
		Option 2	One (1) 48" LED A light bar. *AND* Four (4) corner LED A perimeter lights.
		Option 3	One (1) 23" LED A light bar *AND* Four (4) corner LED A perimeter lights.
0205, 0212 &0232 After 2018 Buy	Dump/Tandem/Tri-Axle Combination of 6 lights Placed as follows		Two (2) high intensity strobe lights mounted on each side of headboard. Two (2) 6" Oval LED mounted on the side of the headboard Two (2) 6" Oval LED mounted on the front of the headboard Two (2) 6" Oval LED mounted on the rear of the bed post
0206	Aerial Device	Option 1	Two (2) 17" light bar, low profile LED A, separated *AND* Four (4) corner LED amber perimeter lights.
		Option 2	One (1) 23" LED A light bar *AND* Four (4) corner LED amber perimeter lights.
0206 / 0209/0233 After 2018 Buy	Flat Bed Dump Combination of 6 lights Placed as follows		Two (2) high intensity strobe lights mounted on each side of headboard. Two (2) 6" Oval LED mounted on the side of the headboard Two (2) 6" Oval LED mounted on the front of the headboard Two (2) 6" Oval LED mounted on the rear of the bed post

APPENDIX G: NCDOT Equipment Lighting Policy (Continued)

Class Code	DESCRIPTION	OPTION	SPECIFIED LIGHTS
0233	Herbicide Sprayer truck		One (1) rear facing 4'x8' arrow board Two (2) LED A 17" low profile light bars separated Eight (8) corner LED A perimeter lights on the bed Two (2) corner LED A perimeter lights on front of the truck.
0206	Truck Mounted Patcher		Two (2) 17" light bar, low profile LED A, separated.
0205, 0206/3230	Truck w/Crash Attenuator		Two (2) high intensity strobes mounted on each side of headboard and amber arrow board (96" X 48").
0206, 0209, w/1305, 0219 w/1302	Truck w/800 gal. and 1500 gal. distributor bodies	Option 1	One (1) 17" light bar, low profile LED A
		Option 2	One (1) high intensity strobe light, cab mounted.
0210	IMAP ONLY		One (1) 42" light bar, low profile LED with red arrow stick. One (1) 30 X 60 led arrow board. Four (4) amber strobes mounted on front grill. Ten (10) amber strobes on 4 corners of bed. Two (2) rear facing red strobes on back of bed. (Truck must be Park for Red warning lights to activeate)
0214, 0230	Bridge Insp. Aerial Device		Two (2) 17" light bar, low profile LED A, separated. *AND* Four (4) corner LED amber perimeter lights.
0213, 0230	Truck Mounted Cane		Two (2) 17" light bar, low profile LED A, separated. *AND* Four (4) corner LED amber perimeter lights.
0217	Low boy Truck/Tractor		Two (2) 17" light bar, low profile LED A, separated.
0219	Mobile Sweeper, truck mounted		One (1) high intensity strobe light mounted on rear arrow strip.
0219	Center Paint Machine		Two (2) 17" light bar, low profile LED A, separated *AND* Front & rear facing arrow board, type 4' X 8'

APPENDIX G: NCDOT Equipment Lighting Policy (Continued)

Class Code	DESCRIPTION	OPTION	SPECIFIED LIGHTS
0219 w/1730			
0304, 0314	Backhoe/Loader		One (1) permanent mount high intensity strobe light. Two (2) LED Flush Mount to the rear.
0302, 0303, 0306, 0312	Mower Tractor Broom Tractor		One (1) 17" light bar, low profile LED A
0313	Guard Rail Mower		One (1) single LED perimeter on left rear fender facing rear. (***NOTE*** On Guard Rail mower -- Install one LED on each rear fender)
0900	Grader		One (1) or two (2) high intensity strobe lights, cab mounted.
1011	Asphalt Machine		One (1) pole mounted high intensity strobe.
1300	Tar Kettle		Pulling truck should have proper lights for its class code.
1404	Sweeper		One (1) high intensity strobe light , cab mounted.
2002	Wheel Loader		One (1) magnetic mount *OR* One (1) permanent mount High intensity strobe light.
2009	Belt Loader		One (1) high intensity strobe light, cab mounted.
2501, 2510	Patch Roller 4 6 Ton Patch Roller 5 8 Ton		One pedestal mount or ROPS mount high intensity strobe light.
2852	Ditcher		One (1) high intensity strobe light, cab mounted or one magnetic mount high intensity strobe light.
2853	Stone/Sand Spreader		Two (2) pedestal mount high intensity strobe lights.
3153	Lube Truck		Two (2) 17" light bar, low profile LED A, separated *AND* Four (4) corner LED amber perimeter lights.
3206	Low boyTrailer		No additional lights, red flags required by permit at widest point and rear of load on over width/over length. (Remember to use proper lighting on escort vehicles.)
3214	Sign Trailer		Two (2) Pole Mounted High intensity strobe light, *OR* Two (2) pedestal Mount High intensity strobe lights.
4124	Truck W/Traffic Service Package		Two (2) 17" light bar, low profile LED A, separated *And* Four (4) corner LED amber perimeter lights.

APPENDIX G: NCDOT Equipment Lighting Policy (Continued)

Class Code	DESCRIPTION	OPTION	SPECIFIED LIGHTS
4127, 4129	In-Body Salt Spreader	Option 1	Proper lighting for primary class code and one downward facing chute mounted work light. Optional: One (1) high intensity strobe light, rear center mount.
		Option 2	Proper lighting for primary class code and one downward facing chute mounted work light. Optional: One (1) high intensity strobe light, rear center mount. *AND* A 12 volt tractor light wired to come on when truck is put into reverse.
4135, 4136, 4159	Fork Lift		One (1) high intensity strobe light mounted on top of operator enclosure.
4170	Hydroseeder		Two (2) 17" light bar, low profile LED A, mounted on rails at corner of operator station.

*-Grill-Mounting-Kit---(Light-and-90-Degree-Grill-Mount,-LED-A)-
F150-Flange-Mount-Kit---(Light-and-Corner/Surface-Mount,-LED-A)
Ford-Super-Duty-Flange-Mount-Kit---(Light-and-Corner/Surface-Mount,-LED-A)-
Replacement-Light---(Included-with-kits-above)

APPENDIX H: Post-Accident Drug and Alcohol Testing

DRIVER INSTRUCTIONS
POST-ACCIDENT DRUG AND ALCOHOL TESTING

A DOT drug and alcohol post-accident test SHALL be conducted following any accident an employee is involved in while on duty where:

- A life is lost or
    - If operating a motor vehicle, the NCDOT driver is cited for a moving traffic violation and any individual involved is transported for medical treatment
    - If operating a motor vehicle, the NCDOT driver is cited for a moving traffic violation and a vehicle involved is disabled and removed from the scene by other than its own power.

DRIVER INSTRUCTIONS immediately following an accident:

1. Contact your Supervisor
    a. Provide description of accident.
    b. Provide your physical location.
2. Supervisor will determine if DOT drug and alcohol testing is required (DOT testing required only if accident meets the criteria described first paragraph)
3. Supervisor or driver contacts your Personnel Technician/Division Safety Engineer, Safety Consultant, or Safety Officer.
4. Personnel Technician/Safety Officer advises Supervisor or driver which collection site will be used for testing.
5. Driver advises collection site personnel that a post-accident drug screen and a breath alcohol test are both required.
6. Driver is sent home pending results of post-accident testing. Your Personnel Technician will advise the Controlled Substances and Alcohol section at 919-814-2159.
7. Any questions or concerns during after-hours post-accident collection process, should be referred immediately to NCDOT's substance abuse testing contractor, SafetyFirst at 800-245-1150.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Air Compressor Storage Tanks SPP# 1910.169

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the protection of North Carolina Department of Transportation (NCDOT) employees working with or on compressed air equipment.

2.0 Scope and Applicability

Air compressors are used for a variety of applications in NCDOT. Air compressor storage tanks store excess air that is generated from the compressor. Thus, air compressor storage tanks provide a convenient and readily accessible air source. However, because of the air pressure within these storage tanks, potential dangers can develop if certain practices and precautions are not followed.

This safety policy and procedure provides guidelines for the safe use of air compressor storage tanks. It includes provisions for training, discussion on where these air compressor storage tanks are used, and guidelines for locating drains and traps on air compressor storage tanks. Additionally, it presents requirements for gauges and valves and installation of gauges, valves, drains and traps.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure applies to NCDOT employees who, as a result of their job duties, are exposed to or use Air Compressor Storage Tanks.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.169) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.306).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT will not tolerate malfunctioning air compressor storage tanks that are a threat to employee safety. When these hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Air Compressor Storage Tanks will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Air Compressor Storage Tanks. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Air Compressor Storage Tanks.

6.1 Definitions

Air Compressor Storage Tank
Pressurized vessel that stores air generated from an air compressor.

Drain Valve
A valve that is installed at the lowest point of an air compressor storage tank to provide for the removal of accumulated oil and water.

Trap
A device which uses venting head pressure to purge the tank from condensed water.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Applications
- Drains and Traps
- Gauges and Valves
- Installation Requirements

6.2.1 Training

Affected employees will be trained in:

.

- The purpose of air compressor storage tanks
- The basic operation of air compressor storage tanks
- Maintenance requirements of drains and traps
- Reading gauges and operating valves
- Identifying damage and defects in the storage tanks

This training shall be performed upon initial employment and/or job reassignment. Periodic refresher training shall also be conducted at the discretion of the supervisor.

6.2.2 Applications

Air compressor storage tanks are typically used for tire inflation, pneumatic tool use, hoisting, and chipping. All air compressor storage tanks shall be operated and maintained in accordance with industry standards.

6.2.3 Drains and Traps

Drain valves must be located beneath a tank at the lowest point on all new equipment. Drain valves must be opened once a week to purge water build-up unless they are automatically operated traps.

6.2.4 Gauges and Valves

All air compressor storage tanks shall be equipped with a least one safety valve and pressure gauge. Gauges and safety valves will be tested at least every six months to ensure proper operation.

No valve of any type shall be placed between the air receiver and its safety valve.

6.2.5 Installation Requirements

Air compressor storage tanks shall be installed such that all drains, handholes, and manholes are easily accessible. Air compressor storage tanks shall never be buried underground or located in an inaccessible place.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available for the purchase and repair of air compressor storage tanks in their areas. Additionally, they will be responsible for identifying the employees affected by this safety policy and procedure.

Managers/Unit Heads will obtain and coordinate the required training for affected employees. Managers/Unit Heads will also ensure proper use and maintenance through regular standard audits of air compressor storage tanks.

6.3.2 Supervisors

Supervisors will ensure that only those employees who have been trained to work with air compressor storage tanks will be allowed to operate such equipment.

Supervisors will ensure that equipment as needed is available and is in good working condition. If the equipment is not in good working condition, they will ensure that such equipment is repaired.

Supervisors will ensure that air compressor storage tanks are inspected every six months and that employees are provided with Personal Protective Equipment (PPE) as necessary for their job. Appendix A provides a generic checklist for use by supervisors.

6.3.3 Employees

Employees will inspect air compressor storage tanks prior to use and note any damage or defects. Employees shall immediately report any damages or defects to their supervisors. Employees will empty manual drains and taps on a regularly scheduled basis.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable as necessary on any matter concerning this safety policy and procedure. Additionally, Safety and Loss Control will assist in developing or securing required training.

Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased air compressor storage tanks comply with current safety regulations.

Safety Engineers will provide consultative service and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Air Compressor Storage Tank Checklist

Air Compressor Storage Tank Location _____

Air Compressor Storage Tank ID#_____

Air Compressor Storage Tank Manufacturer ID#_____

Maximum allowable working pressure of the air compressor storage tank (PSI)_____

Yes	No	
o	o	Are all drains, handles, and manholes easily accessible?
o	o	Is a drain pipe and valve installed on the lowest point of the air compressor storage tank?
o	o	Is the drain valve opened and frequently drained to prevent the accumulation of excessive amounts of liquids?
o	o	Does the air compressor storage tank have a pressure gauge?
o	o	Do the safety valves operate to prevent the internal tank pressure from exceeding 10% beyond the maximum allowable working pressure of the air compressor tank?

Author:	Paul Roberts	Revision #:	2
Approved By:	Bobby Lewis	Date Revised:	December 2019

SAFETY POLICY & PROCEDURE

Select this Link to view latest Revision changes

Compressed Gas Cylinders SPP#1910.101

Quick Reference

Contents

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures through which North Carolina Department of Transportation (NCDOT) employees receive the training and proper equipment needed to safely perform welding operations..

2.0 Scope and Applicability

The welding process joins metal parts. Welding processes require heat and sometimes other substances to produce the weld. Byproducts resulting from the welding process include fumes and gases which can be serious health hazards to employees. Additionally, safety hazards can exist such as the potential for fire or explosion and injuries from arc radiation, electrical shock, or materials handling.

This safety policy and procedure provides guidelines for safely performing welding operations. It presents provisions for training, discussion on types of welding, safe work practices, and employee protection requirements. It also presents critical details on hot work permits, work in confined spaces, ventilation requirements when performing welding operations, and inspection requirements.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment unit within NCDOT.

This safety policy and procedure affects all employees who are exposed by their job duties to welding and torch cutting operations. These welding and torch cutting operations occur at but are not limited to equipment repair shops, equipment fabrication shops, ferry maintenance and construction operations such as bridge and road repair and maintenance.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.251-257) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.350-.354).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, welding operations will be performed only by authorized and trained employees. When welding hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Welding will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT'S safety policy and procedure on Welding. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT'S safety policy and procedure on Welding.

6.1 Definitions

Approved
Listed or approved by a nationally recognized testing laboratory.

Confined Space
A space that is not designed for human occupancy, has limited openings for entry and exit, may lack adequate ventilation, and may contain or produce dangerous air contamination.

Hazardous
Any act, condition, or substance which poses health and safety risks to employees.

Hot Work Permit
A permit allowing employees to perform work involving welding, cutting, or any task that would deplete oxygen, create toxic fumes and vapors, or create the potential for fire or explosion.

Pulmonary
Any body function related to the lungs.

Welder/Welding Operator
Any operator of electric or gas welding and cutting equipment.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Types of Welding
- Welding Hazards
- Safe Work Practices
- Hot Work Permits
- Employee Protection
- Work in Confined Spaces
- Inspection

6.2.1 Training

Employees who perform welding operations will be trained to:

- Recognize the hazards associated with various welding operations
- Know the safe work practices for welding operations
- Understand the importance and requirements of Hot Work Permits
- Use the appropriate personal protective equipment (PPE) for the job
- Recognize confined spaces and the requirements associated with them
- Understand the importance of regular inspections of welding equipment, attachments, and accessories

This training shall be made available upon initial employment or job re- assignment. Refresher training shall be provided upon the discretion of the supervisor.

6.2.2 Types of Welding

Several types of welding operations are used in NCDOT. The most common welding operations in NCDOT include:

- Gas welding and cutting
- Arc welding and cutting
- Resistance welding

The gas welding process unites metals by heating. The gases commonly used as the fuel gas are oxygen and acetylene. The gas cutting process removes metal by a chemical reaction of the base metal with oxygen at an elevated temperature.

The arc welding and cutting processes uses electric current and two welding leads. One welding lead is connected to the electric power supply while the other lead is attached to the work surface.

Resistance welding is a metal-joining process where welding heat is generated at the joint by the resistance to the flow of electric current.

6.2.3 Uses

Compressed gas cylinders are used for variety of purposes in NCDOT. Compressed gas cylinders in NCDOT are commonly used in metal cutting operations. Cylinders should be handled carefully and only used for their designated purpose. See SPP# 1910.252, Welding, for additional related information.

6.2.4 Types

Compressed gas cylinders are used for a variety of gases in NCDOT. These gas cylinders fall into the following categories:

- Flammable
- Toxic and Poison
- Liquid

The flammable gas cylinder predominantly used in NCDOT is acetylene. Acetylene is used in torch heating, welding, and ferrous metal cutting operations.

Toxic and poison gas cylinders are used in a variety of applications within NCDOT. Methyl Bromide is the most common of these gas cylinders. These cylinders should be marked with a poison gas label.

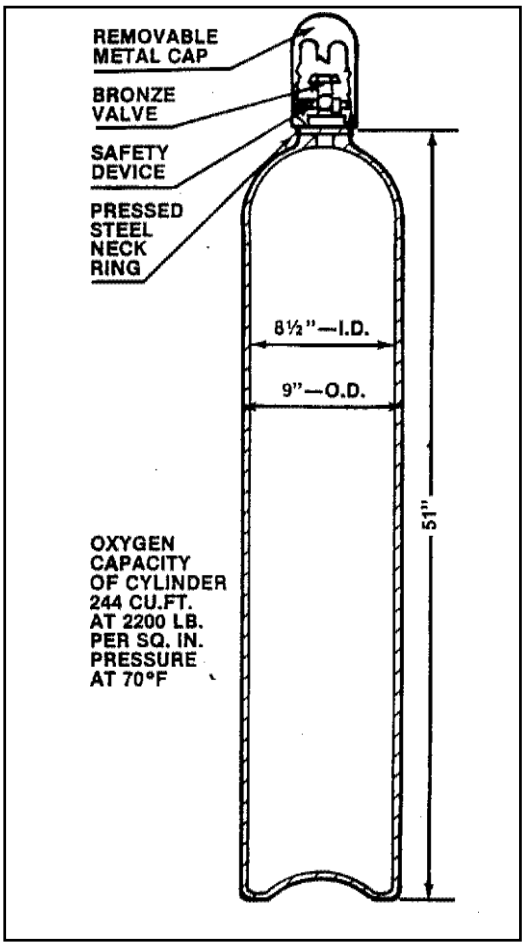


Figure 1

6.2.5 Inspection

Compressed gas cylinders should be visually inspected daily for leaks, cracks, etc. This visual inspection will include the cylinder, safety relief devices, valves, protection caps and stems. If a cylinder is thought to be defective, it should be returned to the supplier for replacement. Under no circumstances should employees attempt to repair defective cylinders. Gages should be checked to ensure that the gas under pressure is not left in hoses when operations are completed.

6.2.6 Marking

For the purpose of identifying the gas content, compressed gas cylinders shall be legibly marked with either the chemical or trade name of the gas. Such marking shall be by means of stenciling, stamping, or labeling, and shall not be readily removable. Whenever practical, the marking shall be on the shoulder of the cylinder for easy identification.

6.2.7 Transportation

Transporting gas cylinders requires careful consideration and appropriate precautions. These considerations and precautions include:

- Motor vehicle transport of cylinders
- Flammable gas and oxidizer cylinders transport
- Hand truck (dolly) transport of cylinders
- Cylinder transport precautions

Motor vehicle transport of cylinders shall only be done with vehicles equipped with racks or other means of securing the cylinders. Cylinders containing liquefied hydrogen or toxic gases shall be transported in open body vehicles.

Flammable gas and oxidizer cylinders transport must not be done together nor with poisons or corrosives. However, oxygen and acetylene cylinder joint transport is allowed if:

- The cylinders are transported in the rear truck bed below the cab level
- A roll bar is installed over the rear truck bed to prevent the cylinders from falling out of the truck bed in the event of the vehicle overturning

Red label, yellow label, white label, green label, or poison label materials are not to be transported on the same load. Poison label materials are not to be transported with food or other items intended for human consumption.

Hand truck (dolly) transport of cylinders shall be used for the transfer of compressed gas cylinders from loading area to shop or laboratory or other within-building transfers.

Cylinder transport precautions include:

- Cylinders having the valve protection cover in place while being transported (inter- and intra-building transport)
- Cylinders not being rolled or lifted by the valve or valve cap for moving
- Cylinder valves being shut off and valve caps in place during transit from location to location
- Cylinders that are dropped during transit being taken out of service and returned to the supplier for inspection
- Cylinders being securely supported at all times during transport
- Smoking being prohibited during loading, unloading, and hand transportation of flammable gas cylinders

6.2.8 Storage

The storage of compressed gas cylinders requires some basic precautions and guidelines. These include:

- General cylinder storage precautions
- Specific gas cylinder storage guidelines
- Cylinder storage room guidelines

General cylinder storage precautions include:

- Cylinders being secured in an upright position in a safe, dry, well- ventilated place prepared and reserved for the purpose
- Cylinders not being kept in unventilated enclosures such as lockers
- Cylinders not being stored in the same area as flammable substances, such as oil and volatile liquids or near sources of heat, such as radiators or furnaces
- Cylinders not being stored near elevators, gangways, stairwells, or other places where they can easily be knocked down or damaged
- Cylinders being stored on a level fireproof floor
- Cylinders stored in the open being protected from contact with the ground and against extremes of weather
- Cylinder storage being planned so that cylinders are used in the order that they are received from the supplier
- Empty and full cylinders being stored separately, with empty cylinders being plainly identified as such to avoid confusion
- Empty cylinders being grouped together that have held the same contents

Specific gas cylinder storage guidelines include additional precautions and guidelines for oxygen, hydrogen, and acetylene and liquefied fuel gas cylinders.

- **Oxygen cylinders shall not be stored within 20 feet (6 meters) of highly combustible materials, oil, grease, wood shavings, or cylinders containing flammable gases.**
- For NCDOT operations, oxygen and acetylene shall be paired and secured on a common transfer cart for use. If not to be used in next 24 hrs., valves must be shut off, regulators removed, and protective caps put in place.

- For applications where oxygen and acetylene will be stored on the transfer cart for more than 24 hrs., the cart must have a ½ hour fire rated barrier at least 5 ft. tall. See Figures 2 and 3.

Figure 2

Figure 3

- For oxygen and acetylene storage closer than 20 feet, cylinders should be separated by a wall or barrier with a fire-resistance rating of at least ½ hour.
- Hydrogen cylinders storage locations shall be permanently placarded as follows: "HYDROGEN-FLAMMABLE GAS-NO SMOKING-NO OPEN
- FLAMES," or equivalent.
- Acetylene and liquefied fuel gas cylinders should be stored with the valve end up. If storage is within 100 feet (30.5 meters) of each other and not protected by automatic sprinklers, the total capacity of acetylene cylinders stored and used inside the building should be limited to 2,500 cubic feet. Acetylene storage areas must be well ventilated and open flames must be prohibited.
- Acetylene storage rooms should have no other compressed gases.

Cylinder storage room guidelines include:

- Storage rooms for cylinders containing flammable gases being well ventilated to prevent the accumulation of explosive concentrations of gas
- No ignition sources being permitted
- Smoking being prohibited
- All permanent wiring being in conduit
- Electric lights (portable and fixed) being equipped with guards to prevent breakage
- Electric switches being located outside the room

6.2.9 Cylinder Protection

All gas cylinders with a water capacity of over 30 pounds shall be equipped with a valve protection cap or with a collar or recess to protect the valve. Protective cap must remain in place unless in use.

6.2.10 Service

Cylinder service, modifications or repairs will be performed by an authorized individual other than a NCDOT employee. Any damaged or faulty equipment will be repaired or replaced by the service representative.
Cylinder valves that cannot be opened by hand will not be forced open with tools and will be returned to the supplier for service.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of compressed gas cylinder equipment and related supplies. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to handle any compressed gas cylinders.

Supervisors will also note defective cylinders and tag them for repair.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure. They shall report any defective or damaged cylinders to their supervisor.

6.3.4 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training.

Safety and Risk Management will also work with Central Equipment Unit to ensure that all newly purchased compressed gas cylinders equipment and supplies comply with current safety regulations and this safety policy and procedure. Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Inventory Unit

Central Equipment Unit will maintain an inventory or source through State Contract supplier related parts and supplies for compressed cylinders.

Appendix A: Compressed Gas Cylinders Safety Handling Guidelines

- Accept only cylinders approved for use in interstate commerce for transportation of compressed gases.
- Do not remove or change the marks and numbers stamped on the cylinders.
- Cylinders must never be dragged, pushed, or pulled across the floor.
- Transport cylinders weighing more than a total of 40 pounds (18.2 kg) using hand truck or motorized truck, securing them from falling.
- Keep the cylinders clean and protect them from cuts or abrasions.
- Do not lift compressed gas cylinders with an electromagnet. Where cylinders must be handled by a crane or derrick, as on construction jobs, carry them in a cradle or suitable platform and take extreme care that they are not dropped or bumped. Do not use slings.
- Do not drop cylinders or allow them to strike each other violently.
- Do not use cylinders for rollers, supports, or any purpose other than to contain gas.
- Do not tamper with safety devices in valves or on cylinders.
- Consult the supplier of the gas when in doubt about the proper handling of a compressed gas cylinder or its contents.
- Clearly indicate “EMPTY” with marking or tags on empty cylinders that are to be returned to the vendor.
- Close cylinder valves and replace valve protection caps, if the cylinder is designed to accept a cap.
- Load cylinders to be transported to allow as little movement as possible. Secure them to prevent violent contact or upsetting.
- Always consider cylinders to be full and handle them with corresponding care.
- Secure compressed gas cylinders at all times. Cylinders must not be left “free- standing”, e.g., cylinders unloaded from truck to loading dock must be secured until placed on a hand truck for delivery within the building.
- Compressed gas cylinders should never be subjected to a temperature above 125^{0}F.
- Never place cylinders where they might become part of an electrical circuit.
- Do not re-paint cylinders.
- Never use a flame to detect flammable gas leaks. Always use soapy water.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Diving Operations SPP# 1910.401

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the protection and safety of North Carolina Department of Transportation (NCDOT) employees who perform diving operations.

2.0 Scope and Applicability

Underwater diving operations can present substantial risks to employees who perform diving if safe practices and procedures are not followed. Underwater obstructions and improper diving techniques can present hazards to NCDOT employees who perform diving operations.

This safety policy and procedure will aid NCDOT employees who perform diving operations. It includes provisions for training and a listing of general dive team requirements. Procedures are presented for pre-dive activities, dive activities, and post-dive activities. Additionally, information is presented on SCUBA diving, surface-supplied air diving, and liveboating. Equipment and recordkeeping requirements are also detailed.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, dive team members, designated person-in-charge, Bridge Maintenance Unit, and Safety and Loss Control within NCDOT.

This safety policy and procedure affects any bridge employee who as a result of job duties is involved in diving operations.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.401-441) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.1071-1092).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, diving operations will not be performed until all hazards are eliminated or minimized. When diving hazards exist that cannot be eliminated, engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Diving will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head,supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Diving. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to the supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT’s safety policy and procedure on Diving.

6.1 Definitions

Acfm
Actual cubic feet per minute.

Bottom Time
The total elapsed time measured in minutes from the time the diver leaves the surface in descent to the time the diver begins ascent.

Bursting Pressure
The pressure at which a pressure containment device would fail structurally.

Cylinder
A pressure vessel for the storage of gases.

Decompression Sickness
A condition with a variety of symptoms which may result from gas or bubbles in the tissue of divers after pressure reduction.

Decompression Table
A profile or set of profiles of depth-time relationships for ascent rates and breathing mixtures to be followed after a specific depth-time exposure or exposures.

Dive Location
A surface or vessel from which a diving operation is conducted.

Dive Team
Divers and support employees involved in a diving operation, including the designated person-in-charge.

Diver
An employee working in water using underwater apparatus which supplies compressed breathing gas at the ambient pressure.

Diver-Carried Reserve Breathing Gas
A supply of air or gas sufficient under standard operating conditions to allow the diver to reach the surface or another source of breathable air.

Diving Mode
A type of diving requiring specific equipment, procedures, and techniques.

Fsw
Feet of sea water (or equivalent static pressure head).

Liveboating
The practice of supporting a surface-supplied air or mixed gas diver from a vessel which is underway.

SCUBA Diving
A diving mode independent of surface supply in which the diver uses open circuit self-contained underwater breathing apparatus.

Standby Diver
A diver at the dive location available to assist other divers.

Umbilicals
The composite hose bundle between a dive location and a diver or bell, or between a diver and a bell, which supplies the diver or bell with breathing gas, communications, power or heat.

Working Pressure
The maximum pressure to which a pressure containment device may be exposed under standard operating conditions.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- General Requirements
- Pre-Dive Procedures
- Procedures During Dive
- Post-Dive Procedures
- SCUBA Diving
- Surface-Supplied Air Diving
- Liveboating
- Equipment
- Recordkeeping

6.2.1 Training

NCDOT employees will have the experience or training necessary to perform assigned tasks in a safe manner. Dive supervisors are responsible for ensuring all dive team members receive the following training in:

- The proper use of equipment and tools
- The techniques of the assigned diving mode
- Dive operations and emergency procedures
- Cardiopulmonary Resuscitation (CPR) and first aid
- Physics or physiology for those exposed to or who control the exposure of others to hyperbaric conditions

6.2.2 General Dive Team Requirements

Supervisors will assign tasks to dive team members in accordance with training and experience. All training will be supervised to ensure competency and accuracy in the given assignments.

No employee will be asked to perform dives that are inconsistent with their level of training.

NCDOT will provide at each dive location a Safe Practice Manual. This manual will be available to each dive team member and contain the following information:

- A copy of this safety policy and procedure
- Safety procedures and checklist for diving operations
- Assignments and responsibilities of the dive team members
- Equipment procedures and checklists
- Emergency procedures for fire, equipment failure, adverse environmental conditions, and illness and injury

6.2.3 Pre-Dive Procedures

The following equipment and information will be provided at each dive location for all employees to review prior to the dive. Supervisors are responsible for ensuring this information is available and accurate.

- A list of emergency aid facilities, hospitals, available physicians, and transportation available at the location
- The nearest U.S. Coast Guard Rescue Coordination Center
- A physician-approved first aid kit consistent with the dangers posed by diving
- An American Red Cross standard first aid handbook or its equivalent
- A bag-type manual resuscitator with transparent mask and tubing Planning a diving operation will include an assessment of the safety and health aspects of:

- Diving mode
- Surface and underwater conditions and hazards
- Breathing gas supply (including reserves)
- Thermal protection
- Diving equipment and systems
- Dive team assignments and physical fitness of dive team members including any known impairments
- Repetitive dive designation or residual inert gas status of dive team members

- Decompression and treatment procedures (including altitude corrections)
- Emergency procedures

All dive team members will be briefed on the task to be undertaken, procedures for the diving mode, any unusual hazards, and any modifications to operating procedures necessitated by the specific diving operation.

The breathing gas supply system, including reserve breathing gas supplies, masks, helmets, and thermal protection will be inspected for defects and proper operation prior to each dive.

When diving from surfaces other than vessels in areas capable of supporting marine traffic, a rigid replica of the international code flag will be used to warn marine traffic of the dive location. In addition, any operation involving night diving will include an illuminated flag.

6.2.4 Procedures During Dive

The following dive procedures will be outlined prior to the dive and all dive members will be trained in the proper methods and use of equipment:

- A ladder or platform capable of supporting the diver will be provided for safely entering and exiting the water. The ladder or platform will extend below the water surface to ensure a proper foot and hand-hold.
- A means will be provided to assist injured divers onto the vessel and out of the water.
- An operational two-way communication system will be available at each dive location to obtain emergency assistance. In addition, a communication system will be used between each surface-supplied air or mixed gas diver and a dive team member at the dive location.
- Dive profiles for each diver will be maintained including depth-time, gas change schedules, and decompression tables if necessary.
- Decompression, repetitive, and no decompression tables (as appropriate) shall be at each dive location.
- Power tools will be de-energized prior to entry or removal from the water.
- Welding and burning current will be supplied with a switch to interrupt the current flow. The switch shall be tended by a dive team member in voice communication with the diver performing the welding or burning.
- Welding equipment will be properly grounded to prevent shock hazards.
- Welding cables and equipment will be maintained in excellent condition.

- Welders will be provided with insulating gloves.
- Explosives will be handled only by qualified employees and according to NCDOT's Safety Policy and Procedure on Explosives.

All dives will be terminated when any of the following situations occur:

- A diver requests termination
- A diver fails to answer or respond correctly to communications or signals from a dive team member
- Communication is lost and cannot be quickly re-established
- A diver begins to use diver-carried reserve breathing gas or the dive location reserve breathing gas

6.2.5 Post-Dive Procedures

After any dive, the supervisor at the dive location will complete the following post-dive procedures:

- Check the physical condition of each diver
- Instruct the diver to report any physical problems
- Alert the diver to the potential hazards of flying after diving

For each dive performed, a record will be maintained which includes the following:

- Names of dive team members and the supervisor in charge
- Date, time, and location of dive
- Diving modes used
- General nature of work performed
- Approximate underwater time and water conditions
- Maximum depth and bottom time for each diver

6.2.6 SCUBA Diving

When SCUBA diving, the following rules will be observed:

- Diving will not be conducted at depths greater than 130 fsw
- Diving will not be conducted at depths greater than 100 fsw unless a decompression chamber is available
- Diving will not be conducted against currents exceeding one knot unless line-tended or enclosed
- A standby diver will be on location while a diver is in the water
- A diver will be line-tended or accompanied by another diver in continuous visual contact in water depths greater than 6 feet
- A diver will be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces
- A diver-carried reserve breathing gas supply will be provided for each diver consisting of:

- A manual reserve (J valve) or
- An independent reserve cylinder with a separate regulator or connected to the underwater breathing apparatus
- The valve of the reserve breathing apparatus being in the closed position prior to the dive

6.2.7 Surface-Supplied Air Diving

The following rules will be observed when using surface-supplied air:

- Surface-supplied air diving will be limited to a depth of 190 fsw
- A decompression chamber will be provided for dives exceeding 100 fsw
- Each diver will be continually tended while diving
- A diver will be stationed at the underwater point of entry when diving is conducted in enclosed or physically confining spaces
- Each operation will have a primary breathing gas supply sufficient to support divers for the duration of the planned dive including decompression if applicable
- A diver-carried reserve breathing gas supply will be provided except when heavy gear is worn or where physical space does not permit
- A standby diver will be on location while a diver is line-tended in the water

6.2.8 Liveboating

The following will be observed when performing liveboating operations:

- Liveboating will not be allowed in rough seas which significantly impede diver operation
- Liveboating will only be conducted in daylight hours
- The propeller will be stopped prior to divers entering the water
- A device will be used to minimize the possibility of hose entanglement in the prop
- Two-way voice communication will be used between the vessel operator and the designated person-in-charge
- A standby diver will be available while a diver is in the water
- A diver-carried reserve breathing gas supply will be used by each diver

6.2.9 Equipment

Each piece of equipment will be maintained in excellent working condition and inspected and tested prior to each dive. Typical dive equipment includes:

- Air compressor
- Hoses
- Umbilicals
- SCUBA tanks
- Gauges
- Masks and helmets
- Weight belts and safety harnesses
- Flotation devices

Any modifications or repairs will be logged indicating the type of repair performed, the date of the repair, and the initials of the person performing the repairs.

Air compressors will be fitted with a volume tank with a check valve on the inlet side, a pressure gauge, a relief valve, and a drain valve. Each compressor will also comply with the following requirements:

- Each inlet will be located away from areas containing exhaust gas or other contaminants
- Respirable air from the air compressor that is supplied to a diver will contain:
  - A level of carbon monoxide no greater than 20 ppm
  - A level of carbon dioxide no greater than 1,000 ppm
  - A level of oil mist not greater than 5 milligrams per cubic meter
  - No noxious or pronounced odor
- The outlet of the air compressor system will be tested for air purity every 6 months

Hoses will have a rated bursting pressure at least equal to 4 times the working pressure. Hoses will be tested at least annually to 1.5 times their working pressure. All hoses will have the ends taped, capped, or plugged when not in use.

Hose connectors will be made of corrosion-resistant material and be designed in such a way as to prevent accidental disengagement.

Umbilicals will be marked in 10-foot increments to 100 feet beginning at the diver's end, and in 50 foot increments thereafter.

SCUBA tanks will be stored in a secure manner to prevent falling or being knocked over. These tanks are not provided with valve caps.

Go back to page 1

Gauges indicating diver depth will be used for all dives except SCUBA dives. Each gauge will be deadweight tested or calibrated against a master reference gauge every 6 months. Also, these gauges will be tested when there is a discrepancy greater than 2 percent of full scale between any 2 equivalent gauges.

Each SCUBA diver will wear a cylinder pressure gauge capable of being monitored by the diver during the dive.

Masks and helmets for surface supplied air and mixed-gas will be equipped with an exhaust valve and a non-return valve. These valves will be located at the attachment point between the helmet or mask and hose and will close readily and positively. Masks and helmets will have a minimum ventilation rate of 4.5 acfm at any depth at which they are operated.

Weight belts and safety harnesses will be provided to each diver. The weight belt or assembly will be capable of quick release. A safety harness with a positive buckling device and with an attachment point will be worn, except when heavy gear or SCUBA equipment is used.

Except when heavy gear is worn or when SCUBA diving, a safety harness will be worn with a positive buckling device and an attachment point.

Flotation devices capable of being inflated and maintaining the diver at the surface in a face-up position will be used in SCUBA diving. This inflatable flotation device will have a manually activated inflation source independent of the breathing supply, an oral inflation device, and an exhaust valve. A buoyancy compensator will have an inflation source separate from the breathing gas supply.

6.2.10 Recordkeeping

If an employee is injured and as a result of the injury is hospitalized for 24 hours or more, a report outlining the incident and the extent of any injuries suffered in the accident is required. Additionally, all recordkeeping requirements outlined in NCDOT's safety program are also applicable.

These records will be maintained at the division office for review by NCDOT accident investigators, at the request of employees' designated representative, or any state agency authorized to view such documents.

All records will be maintained on file for a period of 5 years, with the exception of the Safe Practice Manual which will be replaced as changes in equipment or procedures are implemented.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of diving equipment and related supplies in their areas. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors are responsible for ensuring that employees do not perform diving activities unless they have been trained. Supervisors will also assign tasks to dive team members in accordance with training and experience.

Supervisors on the dive team will be designated as the person-in-charge. Supervisors will be responsible for all aspects of the dive operation and will be present at each dive location to ensure dive team members' safety. They are also responsible for ensuring that all the pre-dive and post-dive procedures are performed.

Supervisors will also ensure that all diving equipment is properly inspected and maintained. Any defective diving equipment will be identified and removed from service for repair.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

6.3.4 Dive Team Members

Dive team members are responsible for complying with all the applicable provisions of this safety policy and procedure. They will report any unsafe condition immediately to their supervisor at any point in a dive operation.

Dive team members are responsible for inspecting their dive equipment prior to use and following good maintenance practices for the care of their diving equipment.

6.3.5 Bridge Maintenance Unit

Bridge maintenance unit will be responsible for providing technical guidance and assistance to diving operations and assist in developing or securing the required training. They will also work with Purchasing and Central Equipment Unit to ensure that the proper equipment is made available for diving operations and complies with this safety policy and procedure and current safety regulations.

Bridge Maintenance Unit will also be responsible for maintaining and updating the Safe Practice Manual. This manual should be updated as equipment and procedures change.

6.3.6 Safety and Loss Control

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Author:	P. Roberts	Revision #:	3
Approved By:	Bobby Lewis	Date Revised:	July 2020

SAFETY POLICY & PROCEDURE

Electrical Related Safe Work Practices SPP# 1910.333

Select this Link to view latest Revision changes

Table of Contents

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures for North Carolina Department of Transportation (NCDOT) employees who may be exposed to electrical related hazards.

2.0 Scope and Applicability

Electrical accidents are generally caused by unsafe conditions, unsafe acts, or combinations of the two. Some unsafe electric equipment and installations can be identified by the presence of faulty insulation, improper grounding, loose connections, defective parts, ground faults in equipment, or unguarded live parts.

Environments containing flammable vapors, liquids, or gases, areas containing corrosive atmospheres, and wet and damp locations are some unsafe environments affecting electrical safety. Some unsafe acts such as the failure to de-energize electrical equipment when it is being repaired or inspected, the intentional use of defective and unsafe tools, or the use of tools or equipment too close to energized parts are all contributors to electrical hazards.

This safety policy and procedure provides guidelines for safely working around electrical hazards. It includes provisions for training, lockout/tagout requirements, and discussions of why safety related work practices are required. Guidelines are also presented for specific types of work practices and the required precautionary practices when using portable electric equipment and while being in hazardous locations. Additionally, it presents examples of signs, labels and marking requirements.

This document details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Risk Management within NCDOT.

This safety policy and procedure affects the following job classifications within NCDOT:

- Bridge Maintenance Technicians
- Traffic Control Technicians
- Bridge Maintenance Electricians
- Any other NCDOT Electricians

The following job classifications may be affected by this safety policy and procedure if they are exposed to parts of electrical circuits operating at 50 volts or more:

- Electrical and Electronic Engineers
- Electric and Electronic Technicians
- Machine Operators
- Maintenance Mechanics and Technicians

Additionally, any other employee who as a result of their job duties is exposed to electrical related hazards is also affected by this safety policy and procedure.

3.0 Reference

This safety policy and procedure dealing with Electrical Related Safe Work Practices is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.331-335) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.416-417).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public.

Therefore, as a minimum, these requirements will be followed in NCDOT:

- Power equipment will be plugged into wall receptacles with power switches in the off position.
- Electrical equipment will be unplugged by grasping the plug and pulling. Cords should never be pulled or jerked to unplug the equipment due to excessive strain exerted on cord insulation which may pull away from the plug resulting in exposed wiring.
- Frayed, cracked, or exposed wiring on equipment cords must be taken out of service and replaced.
- "Cheater plug" (three prong/two prong adapter used for non-grounded receptacles), extension cords with junction box receptacle ends, or other makeshift plug/receptable devices will not be used.
- Temporary or permanent storage of materials must not be allowed within three feet of any electrical panel or electrical equipment.
- Any electrical equipment causing shocks must be taken out of service and tagged with a "DANGER- DO NOT USE" tag or equivalent.

When electrical hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Electrical Related Safe Work Practices will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Electrical Related Safe Work Practices. It is also the responsibility of each NCDOT employee to immediately report any unsafe act or condition to their supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides definitions, establishes general provisions, and identifies specific responsibilities as required by NCDOT's safety policy and procedure on Electrical Related Safe Work Practices.

6.1 Definitions

Electrical Hazards
Any risk of electrical shock that is not reduced to a safe level by the electrical installation.

Exposed

Part of any electrical circuit that is capable of being inadvertently touched or having an unsafe approach distance for an individual.

Hazardous Classified Location
Locations which are classified hazardous depending on the properties of the flammable vapors, liquids or gases, or combustible dusts or fibers which may be present and the potential that a flammable or combustible concentration or quantity is present.

Ground
A conducting connection between an electrical circuit or equipment and the earth, or to some conducting body that serves in place of the earth.

Ground-Fault Circuit-Interrupter (GFCI)
A device whose function is to interrupt the electric circuit to the load when a fault current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device (fuse or circuit breaker) of the supply circuit.

Qualified Person
Those persons who are permitted to work on or near exposed energized parts and are trained in electrical safe work practices.

Safety Related Work Practices
Skills and techniques used to safely perform work activities near or on electrical equipment.

Wet Location
Indoor or outdoor locations subject to intrusion or saturation with water or other liquids where electrical equipment or wiring may be present, such as vehicle washing areas, vehicle service areas, and locations unprotected and exposed to weather.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. The provisions adopted by NCDOT are:

- Training
- Lockout/Tagout Requirements
- Safety Related Work Practices
- Portable Electric Equipment
- Hazardous Locations
- Protective Equipment
- Labels, Signs, and Markings

6.2.1 Training

It is the responsibility of each exposed employee's immediate supervisor to ensure that the employee has received the training necessary to safely perform his or her duties. This training will be given via classroom and on-the-job instruction and is to be documented.

Exposed employees shall be trained in and familiar with the safety related work practices required by 29 CFR Part 1910 section 331 through 335, and safety related work practices contained within the National Electric Code as they pertain to their respective job assignments. Additional training requirements for Qualified Persons are also mandated.

Employees will be trained in specific hazards associated with their potential exposure. This training will include isolation of energy, hazard identification, premises wiring, connection to supply, generation, transmission, distribution installations, clearance distances, and emergency procedures.

Qualified Persons shall, at a minimum, be trained in and familiar with:

- The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.
- The skills and techniques necessary to determine the nominal voltage of exposed live parts.
- The approach distances specified in Appendix A and the corresponding voltage to which NCDOT qualified persons may be exposed.
- Arc Flash Hazard Awareness and requirements for PPE for live electrical work.

6.2.2 Lockout/Tagout Procedure

All electrical energy sources must be locked out or tagged out or both when any employee is exposed to direct or indirect contact with parts of fixed electrical equipment or circuits. Refer to SPP# 1910.147, Control of Hazardous Energy (Lockout/Tagout), for additional detail.

6.2.3 Safety Related Work Practices

Safety related work practices will be used to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts. Safety related work practices will be consistent with the nature and extent of the associated electrical hazards.

Specific types of work practices covered by this safety policy and procedure include:

- Working with De-energized Parts
- Working with Energized Parts
- Vehicular and Mechanical Equipment near Overhead Lines and Underground Lines
- Illumination
- Conductive Materials and Equipment
- Portable Ladders
- Housekeeping

Appendix B details these specific work practices. Appendix C provides an electrical safety checklist to assess electrical hazards in your workplace.

6.2.4 Portable Electric Equipment

All portable electric equipment will be handled in such a manner that will not damage or reduce service life. Flexible cords connected to equipment may not be used for raising or lowering equipment and will not be used if damage to the outer insulation is present. Additionally, visual inspections are required and unauthorized alterations of the grounding protection are not allowed to ensure the safety of employees.

Prior to each shift, a visual inspection will be performed for external defects and for possible internal damage.

Attachment plugs and receptacles may not be connected or altered which would prevent proper continuity of the equipment grounding conductor. In addition, these devices may not be altered to allow the grounding pole of a plug to be inserted into slots intended for connection to the current-carrying conductors.

6.2.5 Hazardous Locations

Portable electric equipment and flexible cords used in highly conductive work locations or in job locations where employees are likely to contact water or conductive liquids shall be approved by the manufacturer for those locations. The hazardous locations that employees should be aware of include, wet locations and locations where combustible or flammable atmospheres are present.

For wet locations, employees' hands will not be wet when plugging and unplugging energized equipment. Energized plug and receptacle connections will be handled only with protective equipment if the condition could provide a conductive path to the employee's hand (if, for example, a cord connector is wet from being immersed in water). In addition, ground-fault circuit interrupter (GFCI) protection is required for some equipment/locations and is also recommended for use in all wet or highly conductive locations.

For combustible/flammable atmospheres, all electric equipment and wiring systems in classified locations must meet The National Electric Code requirements for that particular classification. See Appendix D for definitions of Classified Locations.

6.2.6 Protective Equipment

Employees working in areas where there are potential electrical hazards will be provided with and use protective equipment that is appropriate for the work to be performed. *(Traffic Control Technicians who service traffic signal cabinets at ground level will not be required to wear electrical safety boots or rubber insulating gloves. This is because of the low source voltages of the traffic signal cabinets and the concrete pad on which the cabinet resides. However, safe electrical work practices shall still be followed.)*

Examples of Personal Protective Equipment (PPE) which might be needed for protection against electric shock include but are not limited to:

- Nonconductive hard-hats, gloves, and foot protection or insulating mats
- Eye and face protection whenever there is danger from electric arcs or flashes
- Insulated tools or handling equipment
- Protective shields and barriers to protect against electrical shock and burns

Additionally, other ways of protecting employees from the hazards of electrical shock will be implemented, including insulation and guarding of live parts. Insulation provides an electrical barrier to the flow of current. The insulation must be appropriate for the voltage and the insulating material must be undamaged, clean, and dry. Guarding prevents the employee from coming too close to energized parts. It can be in the form of a physical barricade or it can be provided by installing the live parts out of reach from the working surface. For additional detail, refer to SPP# 1910.137, Electrical Protective

6.2.7 Signs, Labels and Markings

Safety signs, safety labels, barricades or other means (see Figure 1) will be used where necessary to warn and protect employees from contact with electrical hazards.

Figure 1

Electrical equipment shall be marked with the manufacturer's name, trademark, or other descriptive marking is placed on the equipment. Other markings shall be provided giving voltage, current, or wattage. The marking shall be of sufficient durability to withstand the environment involved.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funding is available to provide proper equipment, supplies, and training for exposed employees. They will also be responsible for identifying the employees affected by this safety policy and procedure.

Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors are responsible for ensuring that only qualified employees are assigned or permitted to perform work directly on energized parts of equipment.
Supervisors are also responsible for ensuring that employees in their charge will comply with the requirements and responsibilities of this safety policy and procedure.

Supervisors are responsible for ensuring areas around electrical equipment, such as circuit breaker panels, disconnects, and fixed power tools, are kept free from stored items, debris, and any liquids or material that would create slippery floors or obstruct access to the equipment for maintenance or emergencies.

Supervisors are responsible for ensuring that a list of all energized equipment including isolation points and procedures for safe operation are developed for review by employees or regulating agencies.

6.3.3 Employees

Each employee will comply with this safety policy and procedure. It is the responsibility of each employee to identify potential hazards when required to work with or near sources of electrical energy.

Employees will not perform work involving exposure to potentially hazardous levels of electrical energy without instruction/training specific to the hazards of the tasks.

Employees shall practice good housekeeping and observe activities that could cause electrical shock hazards.

Good housekeeping will include but is not limited to:

- Not having water on floors near electrical equipment
- Not storing tools or other materials around electrical panels or equipment disconnects
- Not cleaning tools and electrical equipment with solvents

Employees will report suspected hazards to their supervisors immediately. Employees are also responsible for performing daily visual inspections of all portable electric equipment to be used during that work shift.

6.3.4 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Approach Distances for NCDOT Qualified Employees - AC

Voltage Range (phase to phase)	Minimum Approach Distance
300V and less	Avoid Contact
Over 300V, but less than 750V	1 ft. 0 in. (30.5 cm)
Over 750V, but less than 2kV	1 ft. 6 in. (46 cm)
Over 2kV	Not allowed for NCDOT

APPENDIX B: Specific Types of Work Practices

Conductive Materials and Equipment

Conductive materials and equipment (e.g., hand tools) will be handled to prevent contact with exposed energized conductors or circuit parts.

Conductive articles of jewelry and clothing (such as watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear) will not be worn.

De-energized Parts

All electrical parts exceeding 50 volts will be de-energized before an employee works on or near equipment unless:

- The de-energizing creates a more hazardous situation
- The equipment, by design, cannot be shut down

When any employee is exposed to direct or indirect contact with parts of fixed electrical equipment or circuits which have been de-energized, the electrical energy source will be locked out or tagged out or both.

Supervisors should refer to SPP# 1910.147 Control of Hazardous Energy (Lockout/Tagout), for guidance on these procedures.

Energized Parts

If work must be performed while equipment is energized, additional safety measures will be taken to ensure the safety of the employee.
Protection from energized parts will be suitable for the type of hazard involved. Supervisors should refer to SPP# 1910.137, Electrical Protective Devices, for additional detail.

Only Qualified Persons will be allowed to perform work directly on energized parts or equipment. Qualified Persons will be capable of working safely on energized circuits and will be familiar with special precautionary techniques, Personal Protective Equipment, insulating and shielding materials and insulated tools. Qualified Persons must also have received the training required in section 6.2.1 of this safety policy and procedure.

APPENDIX B: Specific Types of Work Practices (Continued) 2

Illumination

Employees will be provided with adequate light to work on energized equipment or equipment will be relocated to ensure adequate light is available. See SPP# 1926.56, Illumination, for additional details.

Portable Ladders

Portable ladders will have nonconductive surfaces if they are used where the employee or the ladder could be exposed to electrical shock hazards. See SPP# 1910.25, Ladders, for related information.

Reclosing Circuits

If circuits are tripped using a protective device such as ground fault circuit interrupter (GFCI), power will not be restored until the reason for the interruption is determined and corrected. Fuses or breakers will not be replaced or reset until it is determined that the circuit is safe to operate.

Fuses will not be replaced with higher rated fuses or with makeshift devices to bypass circuit protection as designed. Problems will be identified and promptly repaired by a qualified person.

Vehicular and Mechanical Equipment Near Overhead Power Lines

Overhead power lines will be de-energized and grounded before any work is performed by any vehicle or mechanical equipment near the energized overhead power lines. If the overhead lines cannot be de-energized, then the vehicle or mechanical equipment will be operated so that a clearance of 10 feet is maintained.

If the voltage of the overhead line exceeds 50 kV, the distance will be increased 4 inches for every 10 kV increase in power. If lines are protected with properly rated insulating devices, the distance may be decreased.

If the equipment is an aerial lift insulated for the voltage involved and if the work is performed by a Qualified Person, the clearance may be reduced to a distance given in Appendix A. See SPP# 1910.67, Aerial Truck Operations, and SPP # 1910.179, Cranes, for related information.

If protective measures such as guarding or isolation are provided, these measures must protect the employee from contacting such lines directly with any part of the body or indirectly through conductive materials, tools, or equipment.

Employees on the ground or in the vicinity of overhead lines will be instructed to remain clear of the equipment or any other source of energized equipment unless using properly rated Personal Protective Equipment.

Electrical Safety Checklist

Facility: _____

Checked By: _____

Date: _____

ELECTRICAL EQUIPMENT/MACHINERY

All electrical equipment and machinery must be grounded effectively so that there is no potential difference between the metal enclosures. Use the voltage detector or other test equipment to find discrepancies to determine the corrective action required.

- ☐ All machine and equipment disconnects are properly and easily identifiable which the specific items they shut off.
- ☐ All machinery and equipment have been properly tested for adequate grounding.
- ☐ Disconnects are near their machines or equipment and easily accessible in an emergency.
- ☐ Disconnects have all been tested for operability and checked for damage.
- ☐ Insulation on all cord and cable electrical connections to equipment, machinery, tools, etc. have strain relief and are free of damage.
- ☐ Power cords to and from equipment, machines, and tools do not hang on pipes, nails, hooks, or other sharp edges.
- ☐ Power cords to and from equipment, machines, and tools have plugs with ground in good condition, and cords free from frays, damaged insulation, and/or manual electrical tape fixes.
- ☐ All electrical and service panels on equipment and machinery are free from damage and accessible for maintenance.
- ☐ All switches and breakers are labeled correctly for their respective machines.
- ☐ All non-working and broken equipment, machinery, and tools are properly locked out, tagged, and/or removed from service.

GROUND-FAULT CIRCUIT INTERUPTERS (GFCI)

Where there is an employee exposure to potential line to ground shock hazards, GFCI protection should be provided. Use your GFCI tester to be sure the GFCI is operable.

- ☐ GFCI's are in use in wet/damp places where portable electrical equipment is in use, and also in places that are frequented by the public.
- ☐ All electrical outlets with GFCI protection are labeled as such.
- ☐ All GFCI's have been tested at least monthly to confirm working condition.

LIGHTING/RECEPTACLES

- ☐ Cord and plug connected lighting have been tested for proper grounding.
- ☐ All receptacles have been tested for proper wiring configuration using a receptacle tester.
- ☐ All cord strain relief have been checked for secure connections
- ☐ All electrical lighting with damaged/frayed cords and plugs have been replaced or removed
- ☐ All receptacle covers are in place and free from damage.
- ☐ Surface mounted receptacle boxes are properly protected from damage from mobile equipment.

APPENDIX C: Electrical Safety Checklist (Continued 2)

ALL OTHER ELECTRICAL & MISCELANEOUS

- ☐ All drop cords and surge protectors are grounded and the plug is in good condition.
- ☐ All drop cords and surge protectors are free from burn marks, frays, or other noticeable damage.
- ☐ All circuit panels and service entrance panels have 3 feet of clearance in the front that is free of any Items and/or storage.
- ☐ All unused holes on knockout boxes are sealed with knockout plugs.
- ☐ All electrical equipment is located and/or stored in dry temperate conditions.
- ☐ There are no broken or damaged conduit running to or from any electrical units.
- ☐ All circuits in the breaker cabinet are labeled legibly and correctly.
- ☐ Electrical rooms have clean floors and are free from flammable items.
- ☐ Electrical rooms are adequately ventilated to account for heat load.
- ☐ Emergency lighting is present and in proper working condition
- ☐ There are no surge protectors connected end to end in a “daisy chain” manner.
- ☐ There are no flexible cords or drop cords being used in place of fixed wiring
- ☐ Conductors are free of abrasion at point of entry on all knockout boxes and electrical cabinets.

.

- ☐ Electrical rooms are restricted access only and labeled as such.
- ☐ Lockout/tagout hardware is available to employees for isolating machines, equipment, and tools from their energy sources.
- ☐ All metal pipes are electrically grounded, and the grounding electrode to the cold-water pipe has been checked for grounding.
- ☐ High voltage signs are hung where applicable.
- ☐ Extensions cords are in good condition.
- ☐ Extensions cords do not run through doors or wall openings.

APPENDIX D: Classified Locations

Class I Locations

Those locations in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures. Class I locations include the following:

Class I, Division 1

Those locations in which hazardous concentrations of flammable gases or vapors may exist under normal operating conditions; or in which hazardous concentrations of such gases and vapors may exist frequently because of repair or maintenance operations or because of leakage; or in which breakdown or faulty operation of equipment or processes might release hazardous concentrations of flammable gases or vapors, and might also cause simultaneous failure of electric equipment.

Class I, Division 2

Those locations in which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the hazardous liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment.

Class II Locations

Those locations that are hazardous because of the presence of combustible dusts. Class II locations include the following:

Class II, Division 1

Those locations in which combustible dust is or may be in suspension in the air under normal operating conditions in quantities sufficient to produce explosive or ignitable mixtures; or where mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electric equipment, operation of protection devices, or from other causes; or in which combustible dusts of an electrically conductive nature may be present.

Class II, Division 2

Those locations in which combustible dust will not normally be in suspension in the air in quantities sufficient to produce explosive or ignitable mixtures, and dust accumulations are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus.

Class III Locations

Those locations that are hazardous because of the presence of easily ignitable fibers or flyings but in which such fibers or flying's are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures. Class III locations include the following:

Class III, Division 1

Those locations in which easily ignitable fibers or materials producing combustible flying's are handled, manufactured, or used.

Class III, Division 2

Those locations in which easily ignitable fibers are stored or handled, except in process of manufacture.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Excavation, Trenching and Shoring SPP# 1926.650

Select this Link to view latest Revision changes

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to ensure that each North Carolina Department of Transportation (NCDOT) employee has the training and information needed to perform his or her job safely and effectively when working in or near trenches or other excavations.

2.0 Scope and Applicability

This safety policy and procedure affects any NCDOT employee whose job duties require entrance into trenches or excavation sites or inspections of such sites.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.650) Subpart P - Excavations.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards. This shall be accomplished through proper training and education of its workers and by eliminating as many hazards as possible from the jobsite. Employees working in or near trenches and excavations shall be provided training in recognizing and controlling unsafe conditions. All trenches and excavations shall be evaluated and monitored by a "competent" person prior to employees entering and continuously while employees work within. The *"Competent Person" must be at a minimum a Transportation Supervisor having the authority to take prompt measures to eliminate unsafe conditions.*

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure that all phases of this procedure are implemented as prescribed in section 6.

6.0 Procedure

This section provides definitions, establishes general provisions and identifies specific responsibilities required by NCDOT's safety policy and procedure on Excavations, Trenching and Shoring. (Reference Appendix A for Procedure Flow Diagram.)

6.1 Definitions

Bell Bottom Pier Hole
A type of shaft or footing excavation, the bottom of which is made larger than the cross section above, resulting in a bell shape.

Benching
A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal steps, usually with vertical surfaces between levels.

Competent Person
One who is capable of identifying existing and predictable hazards in the working area and who has authority to take prompt corrective action to eliminate them.

Cross Braces
The horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

Faces or Sides
The vertical or inclined earth surfaces formed as a result of excavation work.

Protective System
A method of protecting employees from trench collapse. This includes sloping, shoring, trench boxes or other systems of protection.

Ramp
An inclined walking or working surface that is used to gain access to one point from another and is constructed from earth or from structural materials such as steel or wood.

Shield System
A structure that is able to withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

Shoring
A structure such as a metal hydraulic, mechanical or timber shoring system that supports the side of an excavation and which is designed to prevent cave-ins.

Sloping
A method of protecting employees from cave-ins by excavating all sides of an excavation to a stable incline. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable Rock
Natural solid mineral material that can be excavated with vertical sides and shall remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against cave- in or movement by rock bolts or by another protective system that has been designed by a Registered Professional Engineer (RPE).

Support System
A structure such as underpinning, bracing, or shoring the sides of an excavation.

Tabulated Data
Tables and charts approved by a Registered Professional Engineer and used to design and construct a protective system.

Trench
A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench at the bottom is not greater than 15 feet.

Uprights
The vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with, or interconnected to each other are often called "sheeting."

Wales
Horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members or earth.

6.2 General Provisions

The general elements of this program are found in OSHA standard 29CFR 1926.650 (Excavations), 651 (Special Excavation Requirements), 652 (Requirements for Protective Systems), and associated appendices. These elements are adopted for use by NCDOT as follows:

6.2.1 Surface Encumbrances

All surface encumbrances, such as trees, boulders, adjacent structures, utility poles, large equipment, etc. that are located so as to create a hazard to employees shall be removed or supported as necessary to safeguard employees against cave-ins.

6.2.2 Underground Installations

The location of utility installations that may be encountered during excavation work shall be determined prior to opening an excavation. If underground installations are uncovered, they shall be properly supported to protect employees.

6.2.3 Access and Egress

A stairway, ladder, ramp or other means of egress shall be located in any trench that is 4 feet or more in depth so as to require no more than 25 feet of lateral travel for employees.

Structural ramps that are used solely by employees as a means of egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed person qualified in structural design and shall be constructed in accordance with the design.

6.2.4 Vehicular Traffic

Employees exposed to public vehicular traffic in a work area shall wear a safety vest or other high visibility clothing meeting ANSI 107-2004 or equivalent revision requirements for high visibility apparel.

6.2.5 Falling Loads

Employees are not permitted under any loads handled by lifting or digging equipment.

Employees shall stand away from any vehicle being loaded or unloaded.

6.2.6 Mobile Equipment

A warning system such as barricades, hand or mechanical signals or stop logs shall be used when mobile equipment is operated near the edge of an excavation and the operator does not have a clear and direct view of the edge.

6.2.7 Hazardous Atmospheres

Air quality tests shall be performed before employees enter any excavation where a hazardous atmosphere exists or could reasonably be expected to exist. Excavations or trenching in the vicinity of gasoline storage tanks, underground pipelines or sewer lines could reasonably be expected to cause a hazardous atmosphere.

Employees shall not enter any excavation that tests as having a hazardous atmosphere.

6.2.8 Water Accumulation

Employees shall not be allowed to enter excavations where water has accumulated unless precautions have been taken to protect employees against the water hazards.

6.2.9 Stability of Adjacent Structures

Support systems such as shoring, bracing or underpinning shall be used to provide stability whenever the stability of adjoining buildings, walls or other structures is endangered by excavation operations.

6.2.10 Employee Protection

Whenever loose rock or soil could pose a hazard to employees by falling or rolling into an excavation, an adequate means of protection shall be provided. Such protection shall consist of scaling to remove loose material, installation of protective barricades, or other means of equivalent protection.

Excavated material or equipment that could pose a hazard to employees by falling or rolling into an excavation shall be kept at least 2 feet from the edge or by the of

retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations..

Walkways or bridges with standard guard rails shall be provided whenever employees are required to cross over excavations. "Jump-overs" are prohibited.

6.2.11 Inspections

Prior to commencement of trenching and excavation, a job hazard assessment including a drawing of the planned slope of trench or excavation will be conducted. See Appendix C for examples of acceptable drawings which may be used. The job hazard assessment must be signed by a person ranking at least one level above the on-site supervisor.

Excavations and trenches shall be inspected by a competent person prior to the start of work and monitored continuously while employees are working within.

The competent person shall conduct an inspection whenever a hazard increasing event (such as a rainstorm) occurs.

Whenever a possible hazardous condition is detected, the competent person shall instruct exposed employees to immediately leave the excavation or trench until an adequate means of protection is provided.

6.2.12 Audits

Audits will be conducted by person one level above the on-site competent person. Feedback on number and results of these audits will be provided to Division Engineer at monthly safety meeting. The audit results will be utilized to fine tune future training and should be retained for 3 years. See Appendix E for Audit Form.

6.2.13 Training

Transportation Supervisors selected to be "competent" persons for NC DOT projects shall receive training on all sections of this procedure. Detailed training shall also be provided on:

- Hazards associated with trenching and excavation
- Class "C" soil
- Safe slopes for different soil types and conditions
- Proper installation of shielding and shoring
- Recognition of hazardous conditions caused by machinery, traffic, utilities and weather conditions

Annual competent person refresher training regarding updates or modifications of procedures, equipment, or policy shall be provided.

Trench hazard awareness training will be provided for all employees who encounter trenching and excavation. Refresher training on trenching and excavation will be provided on a periodic basis as needed. The training will be documented and retained for minimum period of 5 years.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for coordinating required training with Safety and Risk Management.

Sufficient employees shall be trained to provide a "competent" person at each excavation or trench covered by this standard.

Managers/Unit Heads shall ensure that the necessary testing equipment and shoring or shielding is budgeted for, acquired, and maintained as required by the level of excavation activity within their areas of responsibility.

6.3.2 Supervisors

Supervisors shall ensure that a "competent" person is in charge of each trench or excavation covered by this procedure. Specifically, each Bridge Crew, Maintenance Crew, Equipment Unit Crew, and Resident Engineer operation that involves a trench or excavation covered by this procedure shall have at least one competent person on site while work is being done.

6.3.3 Competent Persons

Each site covered in this procedure shall have a competent person who shall evaluate conditions and remain at the site as long as employees are working in the trench or excavation.

Competent persons shall be thoroughly familiar with this procedure.

The competent person shall evaluate the work site prior to excavation and determine what utilities shall be affected. Utility companies shall be notified at least 48 hours prior to starting work unless emergency conditions exist (811).

The competent person shall choose either sloping or shielding/shoring as the protective system. A slope of 1-1/2:1 or flatter shall be used if sloping is the protective system used. (Reference Appendices Table B-1)

The competent person shall inspect and document the condition of the trench or excavation and protective system prior to each work shift, throughout each work shift, and after a rainstorm or other hazard increasing event.

If a hazard is detected, the competent person shall not permit employees to enter or shall immediately remove employees from the trench or excavation until proper protective measures have been taken.

The competent person shall ensure that mobile equipment working near the edge of a trench or excavation has a positive warning system such as stop logs or hand signals.

The competent person shall ensure that testing with a multi-gas meter is conducted whenever the possibility of atmospheric hazards in the trench or excavation exists.

The competent person shall ensure that information on the site evaluation and protective system selected is available on-site.

6.3.4 Employees

Employees shall be responsible for reporting suspected unsafe conditions or equipment to the competent person.

Employees shall immediately evacuate any trench or excavation when they suspect a collapse is imminent or when directed to do so by the competent person.

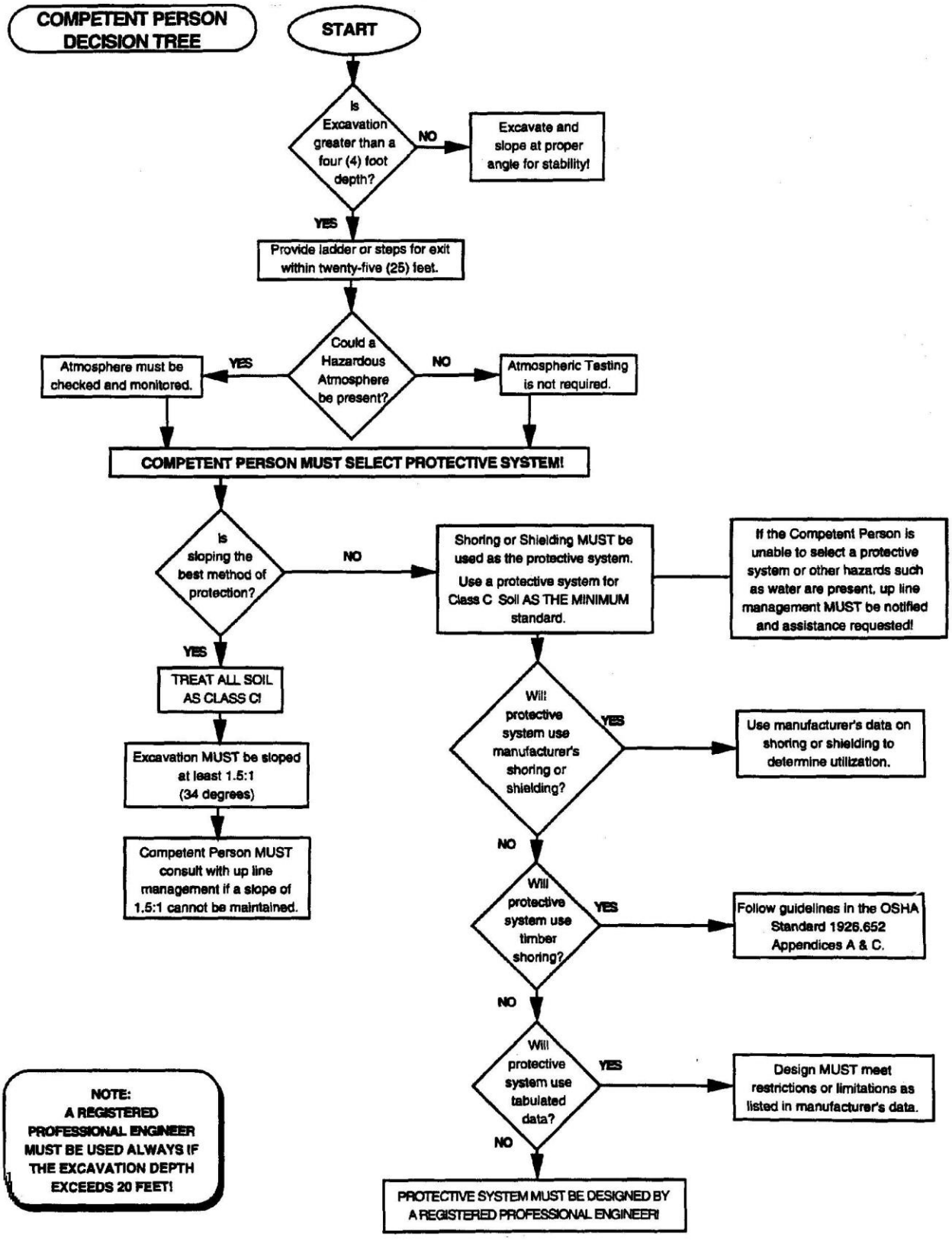
6.3.5 Safety and Risk Management

Safety and Risk Management shall conduct competent person training and coordinate related training.

Safety and Risk Management shall audit protective systems and atmospheric monitoring equipment.

Safety and Risk Management shall provide prompt assistance to managers/unit heads, supervisors, competent persons, the Central Equipment Unit, or others on any matter concerning this procedure.

APPENDIX A: Competent Person Decision Tree



APPENDIX B: Job Reminder Checklist

1. **Pre-Inspect Jobsite**
   What is the best protection method? (Sloping/shoring/shielding)
   How likely are utilities?
   What additional equipment is necessary?
   Water removal? Air Monitoring? Ladders? Soil testing? Stop logs?

2. **Employee and Equipment Access**
   Employee ramp designed by Competent Person
   Equipment ramp designed by person qualified in structural design
   Exit means located within 25' of employees

3. **Determine Soil Conditions**
   All soil is to be classified as type "C" and proper employee protection used based on "C"
   Inspect excavation for changing soil conditions

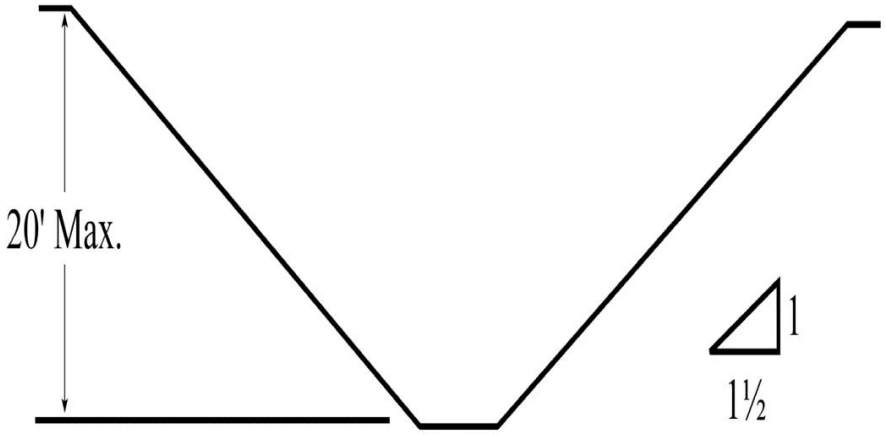
4. **Protection Systems**
   Appropriate protection system selected
   Installed according to manual or tabulated data
   Inspect equipment at start of shift
   Remove employee working outside protected area

5. **Monitor Environmental Conditions**
   Remove employees from trench where water is accumulating
   Monitor use of water removal equipment
   Monitor air quality levels if hazardous atmosphere is suspected

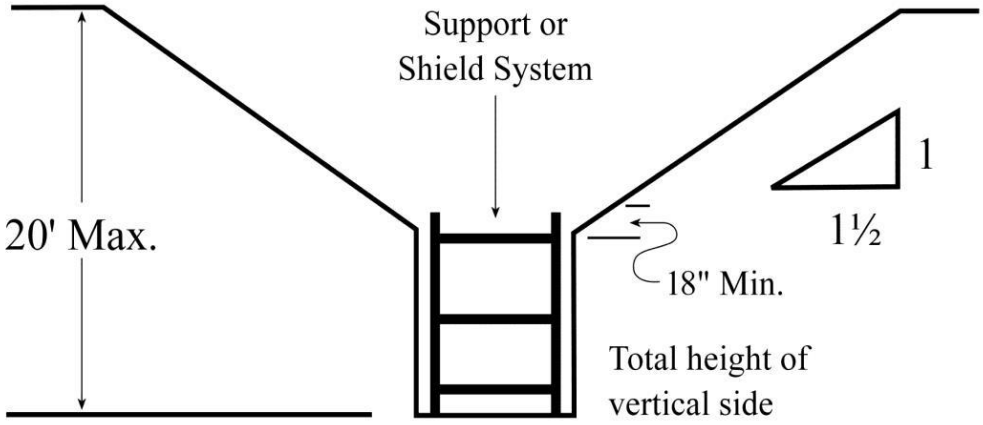
6. **Required to Consult with Registered Professional Engineer (RPE)**
   When:
   Trenches are over 20' deep
   Specifically designed shoring or bracing is required Excavation or trench endangers nearby structure Standard protection measures cannot be used

   May Consult with RPE When:
   Unusual or changing soil conditions exist or are anticipated
   Soil is unusually good and shoring reduction is required
   Soil is unusually poor and may require going to more protective system

APPENDIX C: Slope Configurations; OSHA Type "C" Soil



Simple Slope



Support or Shield System

APPENDIX D: Excavation Evaluation

Detailed Evaluation

1. All open trenches have been inspected?
2. All excavated soil was located at least 2 feet away from the edge of the trench?
3. Were any tension cracks observed along top of any slopes?
4. Were slopes cut at the proper angle for stability?
5. Was any water seepage noted in trench walls or trench bottom?
6. Was bracing system installed in accordance with design?
7. Was there evidence of shrinkage cracks in trench walls?
8. Was there any evidence of caving or sloughing of soil since the last field inspection?
9. Were there any zones of unusually weak soils or materials not anticipated?
10. Was there any evidence of significant fracture planes in soil or rock?
11. Were there any noted dramatic dips in bedrock?
12 All short-term trench(s) covered within 24 hours?
13. Trench box(s) certified?
    Shield Capacity in pounds per square foot?
14. Were hydraulic shores pumped to design pressure?
15. Type shoring being used_____secure?
16. Did shoring plan include adequate safety factor to allow for equipment actually being used?
17. Traffic in area adequately away from trenching operations with barricades?
18. Trees, boulders, or other hazards in area?
19. Vibrations from equipment or traffic too close to trenching operation?

APPENDIX E: Trenching/Excavation Audit Form

NCDOT TRENCHING/EXCAVATION AUDIT FORM					
Date:	**Time:**			**Auditor Name:**	
Division - County:	**Unit:**				
Worksite Location:	**Operation Being Audited:**				
Category	**Rating**			**Observations/Corrective Actions**	**Abatement Date**
	S	**U**	**N/A**	**S=Satisfactory, U=Unsatisfactory, N/A=Not Applicable**	**If corrective action required**
Excavation					
Inspected by Competent Person					
Excavated Soil 2' Away from Edge					
Slopes Cut Properly for Class C Soil (1 ½: 1)					
No Visible Tension Cracks @ top of Excavation					
No Evidence of Cracks in Trench Walls					
No Evidence of Caving or Sloughing of Soil					
Water Removal in Bottom of Trench Acceptable					
Hazards					
Vibration from Equipment, Pile Driving, or Traffic Too					
Traffic in Area adequately away from Excavation					
Overhead Hazards					
Trees, Boulders, or Loose Rock					
Water Removal in Bottom of Trench Acceptable					
Egress					
Means of Egress every 25'					
If Ladder used for Egress; extends 3' above surface					
Trench Box/Shoring					
Trench Box Certified					
Trench Box Shield Capacity Identified in Lbs./Sq. Ft.					
Trench Box extends 18" above vertical wall of trench					
Hydraulic Shores Pumped to Design Pressure					
ORM Tailgate Safety Meeting					
Identify Task					
Assess Hazards					
Identify Controls					
Perform Work w/ Controls					
Re-Assess					

Note: Send Completed Audit Forms to Safety & Risk Management **April, 2016**

APPENDIX F: Shoring Tables

TIMBER TRENCH SHORING — MINIMUM TIMBER REQUIREMENTS*

SOIL TYPE C P_a - 80 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **												
	CROSS BRACES						WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)				VERT. SPACING (FEET)	SIZE (IN.)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15			CLOSE				
4 TO 10	UP TO 6	6 X 8	6 X 8	6 X 8	8 X 8	8 X 8	5	8 X 10	5	2 X 6				
	UP TO 8	8 X 8	8 X 8	8 X 8	8 X 8	8 X 10	5	10 X 12	5	2 X 6				
	UP TO 10	8 X 10	8 X 10	8 X 10	8 X 10	10 X 10	5	12 X 12	5	2 X 6				
	See Note 1													
10 TO 15	UP TO 6	8 X 8	8 X 8	8 X 8	8 X 8	8 X 10	5	10 X 12	5	2 X 6				
	UP TO 8	8 X 10	8 X 10	8 X 10	8 X 10	10 X 10	5	12 X 12	5	2 X 6				
	See Note 1													
	See Note 1													
15 TO 20	UP TO 6	8 X 10	8 X 10	8 X 10	8 X 10	10 X 10	5	12 X 12	5	3 X 6				
	See Note 1													
	See Note 1													
	See Note 1													
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.

** Manufactured members of equivalent strength may be substituted for wood.

Note 1: Must be designed and approved by a Professional Engineer

APPENDIX F: Shoring Tables (Continued) 2

TABLE N-7

TIMBER TRENCH SHORING — MINIMUM TIMBER REQUIREMENTS*

SOIL TYPE C P_a - 80 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **													
	CROSS BRACES						WALES		UPRIGHTS					
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN.)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE				
4 TO 10	UP TO 6	6 X 6	6 X 6	6 X 6	6 X 6	8 X 8	5	8 X 8	5	3 X 6				
	UP TO 8	6 X 6	6 X 6	6 X 6	8 X 8	8 X 8	5	10 X 10	5	3 X 6				
	UP TO 10	6 X 6	6 X 6	8 X 8	8 X 8	8 X 8	5	10 X 12	5	3 X 6				
	See Note 1													
10 TO 15	UP TO 6	6 X 8	6 X 8	6 X 8	8 X 8	8 X 8	5	10 X 10	5	4 X 6				
	UP TO 8	8 X 8	8 X 8	8 X 8	8 X 8	8 X 8	5	12 X 12	5	4 X 6				
	See Note 1													
	See Note 1													
15 TO 20	UP TO 6	8 X 8	8 X 8	8 X 8	8 X 10	8 X 10	5	10 X 12	5	4 X 6				
	See Note 1													
	See Note 1													
	See Note 1													
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

Note 1: Must be designed and approved by a Professional Engineer

APPENDIX F: Shoring Tables (Continued) 3

ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS
FOR SOIL *TYPE C*

Depth of Trench (Feet)	Wales		Hydraulic Cylinders						Timber Uprights		
			Width of Trench (Feet)						Max. Horizontal Spacing (on Center)		
			Up to 8		Over 8 Up to 12		Over 12 Up to 15				
	Vertical Spacing (Feet)	Section Modulus (In^3)	Horiz. Spacing	Cylinder Diameter	Horiz. Spacing	Cylinder Diameter	Horiz. Spacing	Cylinder Diameter	Solid Sheet	2 Feet	3 Feet
Over 4 Up to 10	4	3.5	6.0	2 IN	6.0	2 IN Note (1)	6.0	3 IN	3 X 12	—	—
		7.0	6.5	2 IN	6.5	2 IN Note (1)	6.5	3 IN			
		14.0	10.0	3 IN	10.0	3 IN	10.0	3 IN			
Over 10 Up to 15	4	3.5	4.0	2 IN	4.0	2 IN Note (1)	4.0	3 IN	3 X 12	—	—
		7.0	5.5	3 IN	5.5	3 IN	5.5	3 IN			
		14.0	8.0	3 IN	8.0	3 IN	8.0	3 IN			
Over 15 Up to 20	4	3.5	3.5	2 IN	3.5	2 IN Note (1)	3.5	3 IN	3 X 12	—	—
		7.0	5.0	3 IN	5.0	3 IN	5.0	3 IN			
		14.0	6.0	3 IN	6.0	3 IN	6.0	3 IN			
Over 20	NOTE (1)										

Note 1: Must be designed and approved by a Professional Engineer

APPENDIX G: Competent Person Guide to an OSHA Inspection

As a Competent Person for a NCDOT excavation, you should be prepared to discuss the trench configuration and associated information with an OSHA Inspector should one visit your operation. The following information is provided as guidance. Feel free to refer to this document and any other documentation during your conversation with the Inspector.

1. The OSHA Inspector must show his credentials.

2. You shall be asked about your length of experience in this occupation.

3. You shall be asked about your training as a competent person.

   Be prepared to identify when your last Competent Person training was conducted.

4. You shall be asked about your expertise in soils analysis.

   You should inform the OSHA Inspector of NCDOT's position that all soils are treated as Class C soils unless determined by supervision trained in soils classification. Use Appendix A of this procedure to demonstrate the decision process used in determining how to make the excavation a safe working environment.

5. You may be questioned about the protective systems especially if you are working with a trench box or are utilizing shoring at the work site.

   Explain the configuration and how the type protection was chosen.

6. You may be asked specific questions regarding 29CFR 1926.650, the OSHA standard on Excavation, Trenching and Shoring.

   Utilize this procedure as your reference for any questions which might arise.

7. You shall be asked if you as the Competent Person have the authority to take immediate corrective measures to eliminate existing and predictable hazard as well as the authority to stop work.

   As the Competent Person, you have this authority and should so state.

8. You shall be asked about inspections of the excavation you have performed.

   It is recommended that you maintain a log of all inspections performed as well as of any actions you have taken to reduce hazards. Inspections should be not only of the excavation but also of the adjacent areas and protective systems if they are being used for the specific job. Utilize Appendices B and C for this inspections.to an OSHA Inspection (Continued) 2

APPENDIX G: Competent Person Guide to an OSHA Inspection (Continued) 2

9. If water is present, you shall be asked about it.

   Explain what precautions have been taken to preclude water from creating a hazard. This may consist of de-watering equipment, repetitive inspection of de-watering operations or, where de-watering equipment is not used, constant monitoring of water/soil conditions.

10. If a structural ramp is in place for employees, you shall be asked about it.

    Explain its function, who designed and installed it, and how it was determined where it would be located.

11. If an equipment ramp is in place, you shall be asked if it was designed by a person qualified in structural design.

    Explain who designed the ramp and their qualifications.

12. You may be asked about air monitoring for oxygen deficiency or toxic gases.

    If you are using air monitoring equipment, explain your rationale for doing so. If not, explain why air monitoring is not required.

There are a variety of other questions that may arise during a conversation with an OSHA Inspector. Be sure you understand his questions and answer them truthfully. If asked questions which you cannot answer, try to find the answer for him/her.

Always attempt to notify your supervisor immediately when you are visited by an OSHA Inspector. Make detailed notes about any conditions or potential hazards the Inspector identifies to you. The quality of your notes at this time plays an important part in our being able to address any hazards identified in a timely manner.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Fire Protection SPP# 1910.157

Select this Link to view latest Revision changes

Quick Reference

Select this Link to view latest Revision changes

1.0 PURPOSE

The purpose of this safety policy and procedure is to establish the methods and accountability for fire protection and safety at North Carolina Department of Transportation (NCDOT) facilities.

2.0 SCOPE AND APPLICABILITY

This safety policy and procedure provides guidelines for implementing fire protection in the workplace. It includes training requirements, discussion on fire hazards, portable fire extinguisher, automatic systems such as water sprinklers, and system alarms.

This document also details the areas of responsibility for managers/unit heads, supervisors, and employees within NCDOT.

This safety policy and procedure applies to all employees.

3.0 REFERENCE

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.157).

4.0 POLICY

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. When fire hazards cannot be eliminated, fire protection equipment, engineering practices, administrative practices, safe work practices, and proper training regarding fire protection will be used or implemented.

5.0 General Responsibilities

It is the responsibility of each employee to ensure this policy is implemented. Each NCDOT employee shall report immediately any unsafe act or condition to his or her supervisor and to become familiar with required fire prevention and protection measure including, as applicable, the use and location of fire-fighting equipment. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's policy on Fire Protection.

6.1 Definitions

Class A Fires
Fires involving ordinary combustible materials such as paper, wood, cloth, and some rubber and plastic materials.

Class B Fires
Fires involving flammable or combustible liquids, flammable gases, greases and similar materials, and some rubber and plastic materials.

Class C Fires
Fires involving energized electrical equipment where safety to the employee requires the use of electrically nonconductive extinguishing media

Class D Fires
Fires involving combustible metals such as magnesium, titanium, zirconium, sodium, lithium and potassium.

Class K Fires
Fires involving cooking oils, fats. and grease. Class K fires are typically a subclass of Class B fires and can be controlled by interrupting the fire's chemical reaction.

Fixed Extinguishing System
A permanently installed system that extinguishes or controls a fire by discharging a fire suppression agent, typically through a nozzle or spray head at or near the ceiling.

Halon
A colorless, odorless, or faintly sweet smelling, electrically nonconductive liquefied gas which inhibits a fire's chemical chain reaction. Halon extinguishers may be portable or may be part of a fixed extinguishing system

Hydrostatic Testing
Pressurized test performed on fire extinguisher cylinders to check the integrity of the cylinders.

Incipient Fires
Fires that are in the initial or beginning stage and which, typically, can be controlled or extinguished by portable fire extinguishers, or standpipe or small hose systems without the need for protective clothing or breathing apparatus.

Inspection
A visual check of fire protection systems and equipment to ensure that they are in place, charged, and ready for use in the event of fire.

Portable Fire Extinguisher
A hand-held cylindrical pressure vessel containing an agent which can be discharged to extinguish a fire. Portable fire extinguishers have a limited discharge distance and are only suitable against specific types of small incipient stage fires.

Sprinkler System
A system of piping designed in accordance with fire protection engineering standards and installed to control or extinguish fires. The system includes an adequate and reliable water supply, and a network of specially sized interconnected piping and sprinklers. The system also includes control valves and devices for actuating alarms when the system is in operation

6.2 General Provisions

This section details the provisions of this safety policy and procedure. The provisions adopted by NCDOT are: Training Requirements, Fire Hazards, Portable Fire Extinguishers, Fire Suppression Systems, and Fire Alarms and Alarm Systems

6.2.1 General Training Requirements

Employees will be trained on the general principles of fire protection upon initial employment and annually thereafter.

Training will consist of:

- The facility's Emergency Action Plan. Refer to SPP# 1910.38, Emergency Evacuation and Fire Prevention Plans.
- Types of Fire Hazards, recognition and control measures
- Classification and Performance of Portable Fire Extinguishers
- Requirements for the use of Fire Extinguishers
- Fire suppression systems
- Purpose and Typical Operations of Alarm Systems

In NCDOT facilities without portable fire extinguishers, employees will be trained on the facility's "Emergency Action Plan," and will evacuate without attempting to extinguish a fire.

In NCDOT facilities with portable fire extinguishers, employees may be trained on the use of portable fire extinguishers as specified by the Manager or Unit Head. Training is required for any employee authorized to use portable fire extinguishers.

6.2.2 Fire Hazards

Fire hazards include the five classes of fires defined above. Fire classifications are generally based on the types of fuel available. The exception is a Class C fire which is classified based on the ignition source. Once the power to live equipment is shut off a Class C fire becomes a Class A or B fire. Figure 1 depicts pictograms used to identify fire classes on fire extinguishers.

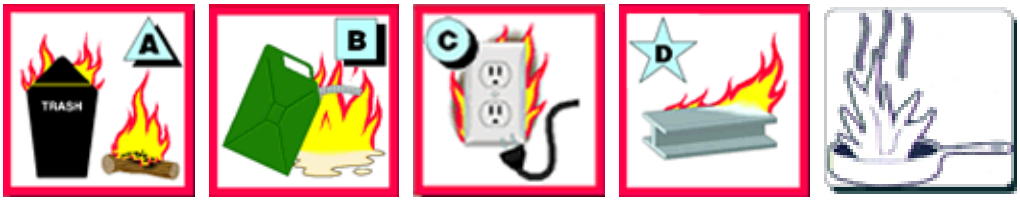


Figure 1 – pictograms used for identifying fire classes on fire extinguishers

Fuel sources: ordinary combustibles, combustible and flammable liquids, and combustible metals should be kept away from heat or ignition sources. Use good housekeeping to minimize the amount of combustible fuels and store them away from heat sources. Also, to prevent fire spread; do not store anything within 18 inches of sprinkler heads in the ceiling, or within 24 inches if the room doesn't have sprinklers.

Open flames from lighters, matches, welding, or soldering and hot metal filings from drilling or grinding are common ignition sources. Electrical appliances, particularly space heaters, heating pads, coffee makers, & toaster ovens, are common ignition sources in offices. Another common ignition source is the Daisy-Chaining or interconnecting power strips to each other because it can cause overheating of wiring.

To reduce heat loads, make sure electrical appliances do not overload cords and circuits. Never run electrical cords under doors, across hallways or thresholds, or through windows. If a power cord is hot to the touch, remove it from service. Keep electrical appliances in good repair and replace those with damaged or frayed cords or broken parts.

6.2.3 Portable Fire Extinguishers

NCDOT shall provide portable fire extinguishers that are:

- Appropriate for the hazard
- Properly mounted and located
- Inspected, maintained, and tested

Additionally, supervisors or designated employees will be trained in the selection, distribution, inspection, and maintenance of portable fire extinguishers.

Portable fire extinguishers will be selected and distributed based on the type and size of fire hazard. Below is a description of the different types of fire extinguishers.

- Water - pressurized canister with water and wetting agents. For use only on class A fires.
- Dry Chemical (various chemicals) for use on class A, B, or C fires. Note some Dry Chemical fire extinguishers are not effective against class A fires.
- Halogenated Agent halons and halocarbon agents sometimes called “clean agents” because they leave no residue. Decomposition products may be harmful. Effective against class A, B, & C fires
- CO2 (Carbon dioxide) for use on class B or C fires. CO2 is an asphyxiant
- AFFF or FFFP (Aqueous Film-Forming Foam or Film-Forming Fluoroprotein Foam). As the name suggests, these agents form an oxygen barrier on top of the liquid fuel. These are effective only against some Class B fires.
- Dry Powder (sodium chloride, granular graphite, “Met-L-X”) for combustible and reactive metals. Dry powder extinguishing agents are often distributed with a scoop from bulk containers. Dry powder is for use on Class D fires. Dry powder agents are only useful for specific metal fuels.
- K For oil and grease fires (Special liquid chemicals) which are effective on heated fuels in Class B fires.

Portable fire extinguishers will be mounted conspicuously, located and identified so they are readily accessible.

- Employees will be informed of the location of fire extinguishers. Extinguishers or wall markings indicating extinguisher locations will be visible from a distance of at least 25 feet and from all office travel aisles. Travel distance from any work location to a fire extinguisher may not exceed 75 ft. for class B fire hazards and 50 ft. for class A fire hazards.
- A clear unobstructed path to all fire extinguishers shall be maintained at all times. No materials shall be placed in front of or under any fire extinguisher. No storage of flammable or combustible materials is permitted within 3 ft. of a fire extinguisher.
- Fire extinguishers may not be used for any purpose other than firefighting and must be maintained in their mounted location.
- Portable fire extinguishers shall be visually inspected monthly to ensure they are present, charged, and operable. They are to be recharged after use or pressure leakage. Fire extinguishers will be equipped with an inspection tag, and the inspector must initial and date the tag each month to document the inspection. Tags will be replaced when all lines are used or when tags are lost or removed.
- Any extinguisher that shows excessive wear, damage or unserviceable condition, or loss of pressure will be removed from service and replaced.
- Fire extinguisher maintenance will be performed at least annually by an approved contractor or trained NCDOT personnel.
- During any period when an extinguisher is removed for testing or service, a similar extinguisher must replace the out of service extinguisher.
- Annual inspection records will be maintained for review by regulatory agencies and for internal audit purposes. Appendix A presents the portable fire extinguisher hydrostatic testing schedule for NCDOT. In lieu of hydrostatic testing of existing fire extinguishers, new replacement fire extinguishers may be acquired prior to the portable fire extinguisher hydrostatic testing schedule in Appendix A.

6.2.4 Fire Suppression Systems

Water Sprinkler Systems:
Water sprinkler systems are used in areas requiring a higher degree of fire protection than is provided by portable fire extinguishers. Sprinkler heads are heat-activated and discharge water over the fire area. Water extinguishing systems will be inspected annually by an approved outside contractor to ensure their operation is sufficient.

Halogenated and Inerting Agent Systems:
Halogenated agent extinguishing systems are used in areas with equipment sensitive to water damage. CO2 and other inerting agent systems have similar applications. All of these types of systems produce hazardous atmospheres that can be harmful to

employees. Halogenated and inerting agent systems will be inspected annually by an approved outside contractor to ensure their operation is sufficient.

6.2.5 Fire Alarms and Alarms for Sprinkler Systems

Fixed extinguishing systems such as water sprinklers, when activated, will trigger an audible alarm designed to alert employees to evacuate.

Halogenated agent systems may also have a pre-discharge alarm allowing employees to evacuate prior to discharge of the system.

Alarms can be activated by heat or smoke detectors. "Pre-action" sprinkler systems may sound an evacuation alarm before the water is released to the sprinkler heads. NCDOT Facilities in areas where municipal fire departments are available may have a fire alarm system that notifies the fire department. Managers should address fire department notification in the Emergency Action Plan.

Alarms can be activated by heat or smoke detectors. "Pre-action" sprinkler systems may sound an evacuation alarm before the water is released to the sprinkler heads.

6.3 Specific Responsibilities

6.3.1 Managers & Unit Heads

Managers/Unit Heads are responsible for budgeting and ensuring that adequate funds are available for the purchase of portable fire extinguishers for their facilities. For NCDOT facilities with water and/or halon discharge systems, managers/unit heads will ensure service contracts are in place for the annual servicing of all fire protection systems, including fire suppression systems, alarm and alert systems, audible evacuation alarms, and fire department notification systems.

They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will audit their fire protection program for compliance with this safety policy and procedure. Managers/Unit Heads should refer to SPP # 1910.38, Emergency Evacuation and Fire Prevention Plans, for related information on fire prevention.

6.3.2 Supervisors

Supervisors will ensure that employees are trained in the general principles of fire protection the function of, and if necessary, the use of various fire protection equipment. Additionally, they shall ensure that there are an adequate number of portable fire extinguishers for each work area. Supervisors should refer to SPP #1910.38, Emergency Evacuation and Fire Prevention Plans, for related information on fire prevention.

Supervisors will ensure that fire extinguishers are recharged or replaced after each use. They will also ensure that damaged or defective fire extinguishers are removed from service and replaced. Supervisors will ensure that monthly and annual testing and maintenance is performed on portable fire extinguishers. Records of inspections and testing shall be maintained by the supervisor.

6.3.3 Employees

Employees are responsible for reporting fire hazards to their supervisors.

Employees are responsible for activating emergency evacuation alarm systems in the event of a fire.

Employees are responsible to use fire extinguishers only if authorized and only according to the level of their training.

6.3.4 Safety & Risk Management

Safety and Risk Management will assist managers/unit heads, supervisors or others as necessary on any matter concerning this safety policy and procedure, including:

- developing or securing required training
- selecting proper types, placement, and signage for portable fire extinguishers
- auditing the implementation of the policy and procedure

Safety and Risk Management will assist Purchasing and Central Material Management Unit in the selection of appropriate fire protection equipment.

6.3.5 Central Material Management Unit

Central Material Management Unit will maintain a supply of replacement portable fire extinguishers including those rated for types A, B, and C hazards. Class D extinguishers will be made available only after consultation with Safety and Risk Management.

Appendix A:

NCDOT Portable Fire Extinguisher Hydrostatic Testing Schedule

Types of extinguishers	Test interval (years)
Soda acid (stainless steel shell)	5
Cartridge operated water and/or antifreeze	5
Stored pressure water and/or antifreeze	5
Wetting agent	5
Foam (stainless steel shell)	5
Aqueous Film Forming Foam (AFFF)	5
Loaded stream	5
Dry chemical with stainless steel	5
Carbon Dioxide	5
Dry chemical, stored pressure, with mild steel, brazed brass or aluminum shells	12
Dry chemical, cartridge or cylinder operated; with mild steel shells	12
Halon 1211	12
Halon 1301	12
Dry powder, cartridge or cylinder operated with mild steel shells	12

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Accident Prevention Signs and Tags SPP# 1910.145

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish a method for marking physical hazards.

2.0 Scope and Applicability

Color coding is a standard way of quickly transmitting information. North Carolina Department of Transportation (NCDOT) has adopted color codes based on OSHA and ANSI standards to convey safety information.

This safety policy and procedure provides a listing of color codes adopted by NCDOT and guidelines for accident prevention signs and tags specifications. It includes provisions for training and discussion on the design and messages contained on these accident prevention signs and tags.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects all NCDOT employees.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.145) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.200).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death and serious physical harm to employees or the public. Therefore, accident prevention signs and tags will be used to establish uniformity and promote a safe working environment throughout NCDOT. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, and proper training regarding Accident Prevention Signs and Tags will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Accident Prevention Signs and Tags. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Accident Prevention Signs and Tags.

6.1 Definitions

Major Message
The portion of a sign or tag that indicates the specific hazardous condition or instructions for the exposed person.

Sign
A surface prepared for warning or providing safety instructions for workers and the public that may be exposed to hazards. This category does not include highway signs or safety posters used for employee education.

Signal Word
The word(s) printed on a sign or tag intended to capture a person's immediate attention.

Tag
A device made of paper, pasteboard, plastic or other material used to identify a hazardous condition.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Color Codes
- Accident Prevention Signs
- Accident Prevention Tags

6.2.1 Training

Employees will be trained to recognize and understand the warning information conveyed on accident prevention signs and tags. Training will include:

- The purpose of color codes
- The purpose of accident prevention signs and tags
- The types of accident prevention signs and tags
- The use of accident prevention signs and tags
- The meanings of messages on accident prevention signs and tags
- The special precautions made necessary by messages on accident prevention signs and tags

6.2.2 Color Codes

The following color codes are adopted by NCDOT:

- **Red** is recommended for identifying fire protection equipment, danger, and emergency stops on machines.

- **Yellow** because of its high visibility is the standard color for marking hazards that may result in accidents from slipping, falling, striking against, etc.

- **Green** in combination with white, such as the green cross on a white background, designates the location of first aid and safety equipment.

- **Black and White** and combinations of the two in stripes or checks are used for housekeeping and traffic markings.

- **Orange** is the standard color to highlight hazardous parts of machines or electrical equipment, such as exposed edges of cutting devices, the inside of removed guards, and the doors and covers of switch boxes. Orange is also used for biological and similar types of hazards.

- **Reddish-Purple (magenta)** identifies radiation hazards, such as radioactive materials in rooms and containers.

6.2.3 Accident Prevention Signs

Accident prevention signs are not considered the final step to be taken against hazards. Whenever possible, the hazards are to be eliminated.

The designs of accident prevention signs will be uniform throughout NCDOT. These signs must be visible at all times when work is being performed. The messages on these signs will be removed or covered when the hazard no longer exists.

Each accident prevention sign will include a major message that indicates the risk level of the hazard present. The following accident prevention signs are recommended for NCDOT use:

- **Danger signs** will be red, black and white. They will be used when an immediate hazard exists or when special precautions are necessary. These signs will be conspicuously posted.

- **Caution signs** will have a black upper panel and yellow letters. The lower panel will have a yellow background and black letters. These signs will be used to warn of possible hazards or against unsafe practices.

- **Safety instruction signs** will be white with a green upper panel and white letters. Any additional wording on the sign will be black letters on a white background. These signs will be used where general instructions or guidelines for safety are required such as *Fasten Seat Belts, Look Before Backing,* etc.

- **Slow moving vehicle emblems** will be a yellow-orange triangle with a dark red reflective border. These signs will be used on any vehicle or equipment traveling at a speed of 25 miles per hour or less.

- **Biological hazard signs** will be florescent orange-red with lettering or symbols in a contrasting color. These signs will be used to inform

employees of the actual or possible presence of biological hazards.

- **Radiation hazard signs** will contain the conventional radiation caution colors (magenta or purple on yellow background) and the standard radiation symbol.

- **Directional signs**, other than automotive traffic signs, must be white with a black panel and white directional symbol. Any additional wording on the sign shall be black letters on the white background.

- **Exit signs**, when required, must be lettered in legible red letters not less than 6 inches high on a white field and the principal stroke of the letters must be at least three-fourths of an inch wide.

- **Traffic signs** shall be posted in construction areas with legible traffic signs at points of hazard. All traffic control signs or devices used for protection of State employees and the public shall conform to the latest version of the manual on Uniform Traffic Control Devices.

For asbestos areas, caution labels are to be affixed to all raw materials containing asbestos.

The label shall state:

CAUTION:
Contains Asbestos Fibers
Breathing Asbestos Dust May Cause
Serious Bodily Harm

Appendix A presents examples of accident prevention signs.

6.2.4 Accident Prevention Tags

Accident prevention tags are a temporary method of warning of a hazardous condition, defective equipment, radiation hazards, etc. However, accident prevention tags will not be used as a substitute for accident prevention signs. The designs of accident prevention tags will be the same as accident prevention signs. The messages on these tags will be removed or covered when the hazard no longer exists.

Accident prevention tags will contain a signal word or emblem (such as *Danger, Caution,* or *Biohazard*) and a major message. The signal word will be readable from a distance of at least five feet and will be understandable to all employees. The major message will indicate the particular hazard involved or instructions to the exposed person. Accident prevention tags will be located and secured as close as possible to the hazard.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of accident prevention signs and tags in their areas.

Managers/Unit Heads will obtain and coordinate the required training for affected employees. Managers/Unit Heads will also ensure compliance with accident prevention sign and tag specifications through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that an adequate supply and variety of accident prevention signs and tags are maintained in their inventory.

Supervisors will ensure that areas needing accident prevention signs and tags are so marked.

6.3.3 Employees

Employees shall comply with the warnings and instructions given on accident prevention signs and tags. Employees will immediately notify their supervisors about those work areas requiring accident prevention signs and tags.

6.3.4 Safety and Loss Control

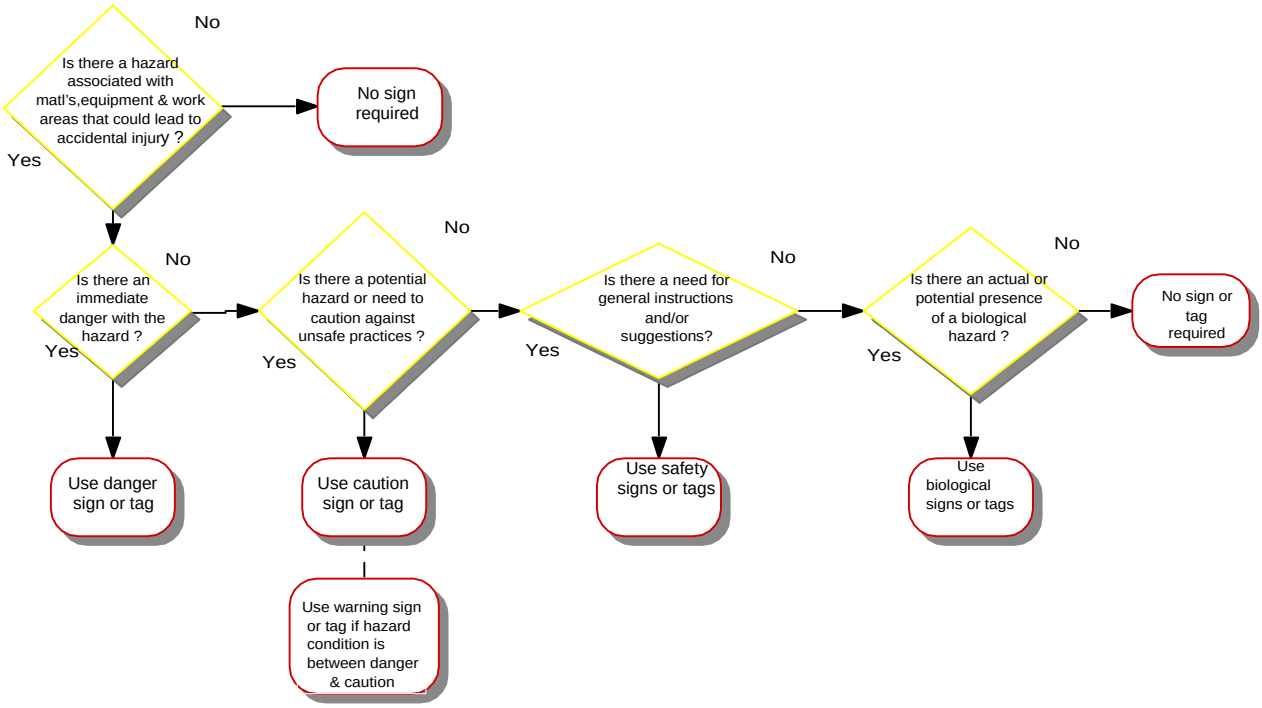
Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning accident prevention signs and tags. Safety and Loss Control will assist in developing or securing the required training. Safety and Loss Control will work with Purchasing and Central Equipment Unit to ensure that all newly purchased accident prevention signs and tags comply with this safety policy and procedure.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Equipment Unit

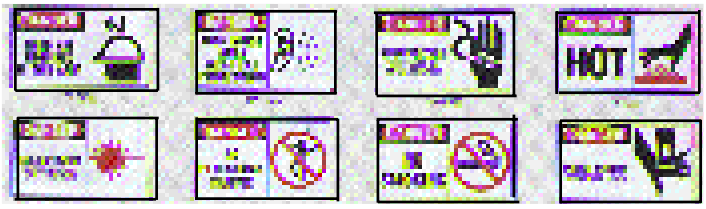
Central Equipment Unit will maintain an adequate stock of accident prevention signs and tags.

Accident Prevention Signs/Tags Flow Chart (Workplace Application)



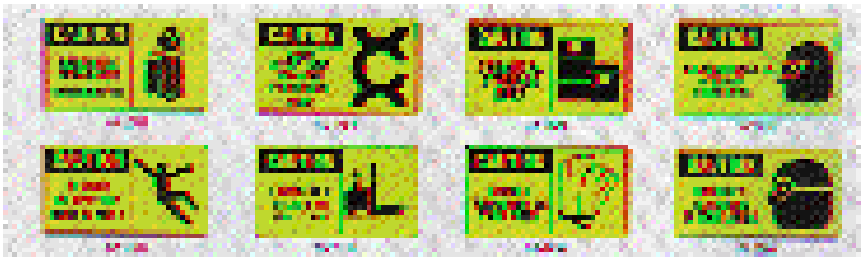
APPENDIX A: Sign Examples

Danger Sign Examples



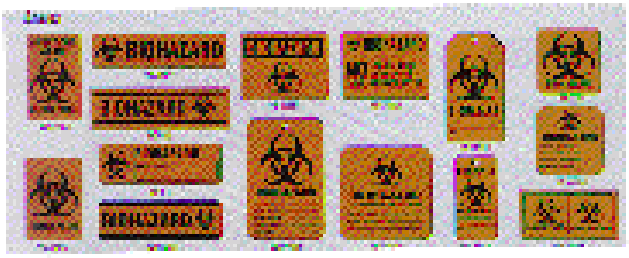
Slow Moving Vehicle Emblem

Caution Signs Examples



Safe Instructional Signs Examples

Biological Hazard Signs



Radiation Hazard Signs

Confined Space Entry SPP# 1910.146

Select this Link to view latest Revision changes

Quick Reference

Select this Link to view latest Revision changes

1.0 Purpose

The purpose of this safety policy and procedure is to protect North Carolina Department of Transportation (NCDOT) employees who enter confined spaces.

2.0 Scope and Applicability

A confined area or space is one which by design has limited openings for entry and exit, which has unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy. Confined spaces are located throughout NCDOT with different types of hazards associated with them. Confined spaces can present dangerous hazards to NCDOT employees who perform work activities in them.
This safety policy and procedure provides guidelines for entry into confined spaces to protect NCDOT employees who work in them. It includes provisions for training and discussion on what defines a confined space. This safety policy and procedure presents details on the hazards of confined spaces and on identifying confined spaces. Additionally, it presents discussion on evaluating confined spaces and the requirements for permit-required confined space entry. This document also provides recordkeeping requirements.
This safety policy and procedure details the areas of responsibility for managers/unit heads, supervisors, employees, entrants, attendants, entry supervisors, qualified persons, Safety and Risk Management, and Central Equipment Unit within NCDOT.
This document applies to any operation that requires NCDOT employees or contractors to enter or work inside any existing tank, tank car, tower, sewer, manhole, sump, vault, vat, process vessel, pit, tunnel, or similar confined spaces. This safety policy and procedure applies to but is not limited to the following NCDOT employees and operations:

- Employees who enter weigh station pits
- Employees who enter trenches
- Maintenance and Bridge employees who work in pipes and culverts
- Inspectors and Maintenance employees who work in specified bridge box beam areas
- Employees who work on sewage and water treatment facilities located at rest stops or welcome centers
- Maintenance employees who work in catch basin areas
- Maintenance employees who enter weigh scale pits for operational service
- Traffic Service employees who enter paint tanks
- Any employee who enters boilers
- Employees who use and/or maintain grease pits at equipment shops
- Bridge employees who enter caissons

3.0 Reference

This safety policy and procedure is established in accordance with OSHA Standards for General Industry (29 CFR 1910.146) and Construction (29CFR 1926.1200-1213).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, at each NCDOT facility and/or jobsite, confined spaces will be identified and, as applicable, permitted and posted with warning signs. When confined space hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Confined Space Entry will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Confined Space Entry It is also the responsibility of each NCDOT employee to report immediately unsafe conditions to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT's safety policy and procedure on Confined Space Entry.

6.1 Definitions

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

Confined Space
A confined space by design large enough and so configured that an employee can bodily enter and perform assigned work, has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.), and is not designed for continuous employee occupancy.

Controlling Contractor
The employer that has overall responsibility for construction at the worksite.

Entrant
An employee who is authorized and trained by the employer to enter a permit required confined space.

Entry Permit
A written document that is provided by the employer to allow and control entry into a permit required space.

Entry Supervisor
The person 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.

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 standard 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 an entry operation.

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

1. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent
2. Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL)
3. Airborne combustible dust at a concentration that meets or exceeds its LFL
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
5. Any other atmospheric condition that is immediately dangerous to life or health.

Host Employer
The employer that owns or manages the property where the construction work is taking place.

Hot Work Permits
A permit allowing employees to perform work involving welding, cutting, or any task that would deplete oxygen, create toxic fumes and vapors, or create the potential for fire or explosion.

IDLH (Immediately Dangerous to Life or Health)
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/flammable gas or vapor in air which will ignite if an ignition source is present.

Oxygen Deficient Atmosphere
An atmosphere containing oxygen at a concentration of less than 19.5% by volume as measured by an oxygen measuring device.

Oxygen Enriched Atmosphere
An atmosphere containing oxygen at a concentration of more than 23.5% by volume as measured by an oxygen measuring device.

Permit-Required Confined Space
A 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.

Qualified Person
A person who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated his ability to solve or resolve problems relating to the subject matter, the work, or the project.

Retrieval System
Equipment (including a retrieval line, full-body harness, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

Upper Explosive Limit (UEL)
The maximum concentration of a combustible/flammable gas or vapor in air before its saturation point which will ignite if an ignition source is present.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Confined Spaces
- Hazards of Confined Spaces
- Identifying Confined Spaces
- Evaluating Confined Spaces
- Permit-Required Confined Space Entry Requirements
- Recordkeeping
- Rescue
- Coordination w/ Contractors

6.2.1 Training

Confined space entry training is to provide employees with the necessary understanding, skills, and knowledge to safely perform their jobs. Components for confined space entry training include:

- Types of confined spaces
- Confined space hazards
- Atmospheric testing of confined spaces
- Cleaning and ventilation
- Lockout of confined spaces
- Personal Protective Equipment (PPE)
- Respirator use and care
- Buddy systems and emergency procedures
- Communication procedures
- Emergency rescue and procedures
- Hot work

Initial and refresher training are to be provided to the attendant, entrant, and entry supervisor. Refresher training must be conducted whenever an employee's duties change, or whenever an evaluation of the confined space entry program identifies inadequacies in the employee's knowledge.

Employees designated to enter confined space work areas will be trained in the following areas (this includes entrant, attendant, and rescue team):

- Emergency entry and exit procedures
- Applicable respirators
- First Aid and CPR
- Lockout barriers at worksites
- Safety equipment use
- Rescue equipment
- **Permit system**
- Work practices

Appendix A presents a training certification form to document employees' training on confined spaces.

6.2.2 Confine Spaces

In NCDOT, a confined space is one by design that meets all three of the following:

- Is large enough for a person to enter and perform assigned work
- Has entry and exit openings that may be limited in size and/or number
- Is not intended for continuous human occupancy

Confined spaces in NCDOT can include any existing tank, tank car, tower, sewer, manhole, sump, vault, vat, grease pit, pipe, or other similar confined spaces as shown in Figure 1.

6.2.3 Hazards in Confine Spaces

Confined spaces present many hazards to employees due to the nature of the space's shape, size, lack of ventilation, proximity to toxic gases, and other contributing substances. Potential confined space hazards include hazardous atmospheres, and general safety hazards.

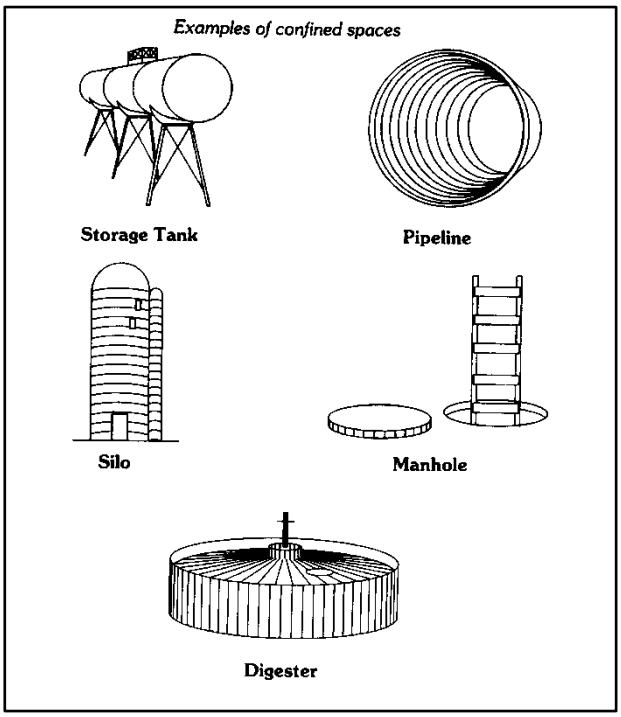


Figure 1

Hazardous atmospheres expose employees to risks of death, incapacitation, injury, or acute illness. These hazardous atmospheres include:

- A flammable gas, vapor, or mist in excess of ten percent of its lower flammable limit (LFL)
- An airborne combustible dust at a concentration that obscures vision at a distance of five feet or less
- An atmospheric oxygen concentration below 19.5 percent or above 23.5 percent
- An atmospheric concentration of any substance for which a permissible exposure limit is published in Subpart Z of 29 CFR Part 1910 and could result in employee exposure in excess of its permissible limit(s)
- Any atmospheric condition recognized as immediately dangerous to life or health (IDLH)

General safety hazards include but are not limited to:

- Physical hazards include non-chemical, physiologic stressors and include noise, vibration, slick/wet surfaces, falling objects, temperature extremes, employee fatigue, and engulfment
- Structural hazards include confined space areas that may contain converging or sloping/tapered walls
- Electrical hazards include shock, burns, and/or electrocution due to exposed or ungrounded electrical energy sources.
- Mechanical hazards include any inadvertent mechanical movement of or within a confined space that threatens the safety of the employee working in the confined space.
- Biological hazards include bacterial action that can consume oxygen to produce carbon monoxide or emit hydrogen sulfide or methane.

6.2.4 Identifying Confined Spaces at Your Facility

All confined spaces at your worksite/facility must be identified and located so the permit-required confined space permit program can be established. Visually survey your worksite/facility to identify confined spaces that are present and that will be included in the confined space inventory. List all suspected confined spaces.

If a work space meets the confined space criteria, note it for inclusion into your worksite/facility's confined space inventory. Appendix B provides a convenient format for inventorying your confined spaces.

6.2.5 Evaluating Confined Spaces

Once all the confined spaces have been identified, then those confined spaces must be evaluated to determine the hazards that may be present. Hazardous atmospheres and general safety hazards must be evaluated for all the confined spaces.

A hazardous atmospheric evaluation must be performed by conducting atmospheric testing to assess the conditions in the confined space. Appendix C presents atmospheric testing procedures that should be followed by a qualified person. Results of the atmospheric testing should be documented for later use.

General safety hazards should be assessed by physical observation. This physical observation should include a visual assessment of:

- The engulfment potential
- The internal configuration of the confined space
- Other safety hazards such as exposed live electrical components, mechanical moving parts, pressurized lines. thermal, etc.)

Additionally, assessment should be based on knowing the existing conditions and use of the confined space along with the actual and potential hazards posed by materials and substances in the confined space. Appendix D presents a Confined Space Evaluation Form.

If any of these hazards are present, then the confined space is a permit- required confined space. If none of these hazards is present, then it is not a permit-required confined space.

If a change in use or configuration of a non-permit-required confined space increases hazards to entrant, then the space must be reevaluated for possible reclassification to a permit-required confined space.

A permit-required confined space may be reclassified to a non-permit- required confined space if:

- The permit-required confined space poses no atmospheric hazards and all non-atmospheric hazards are eliminated without entry
- Entry is necessary to eliminate hazards and such entry is performed
- in accordance with the confined space entry program, and testing and inspection during entry indicate that hazards have been eliminated
- The basis for determining that all hazards are eliminated is documented and certified

  Reclassification is effective as long as the hazards remain eliminated.

6.2.6 Permit Required Confined Space Entry Requirements

Once all permit-required confined spaces have been identified, no employee can enter that space until several requirements are met. These requirements include:

- Establishing a permit system
- Conducting pre-entry atmospheric testing
- Isolating energy sources (lockout/tagout)
- Ventilating and cleaning the confined space
- Posting permit-required confined spaces with warning signs
- Having appropriate PPE
- Having appropriate tools in place
- Having attendants in place
- Having rescue teams in place
- Having provisions for contractor compliance with these requirements

The permit system for each worksite/facility shall include a listing of all permit-required confined spaces, a warning sign/label at each permit-required confined space, and permit issuance by a qualified supervisor or safety professional.

Once all permit-required confined spaces are identified, they will be marked with a sign (examples shown in Figure 2) advising personnel and the general public as to the dangers involved. Where practical, all permit-required confined spaces will be locked or blocked to prevent entry.

A qualified supervisor must authorize entry, prepare and sign written permits, order corrective measures if necessary, and cancel permits when work is completed.

Figure 2

Figure 2

The entry permit is completed and posted in a conspicuous location near the entrance.

Permits must be available to all permit space entrants at the time of entry and should extend only for the duration of the task. They must be retained for a year to facilitate review of the confined space program.

Appendix E presents a Confined Space Entry Permit. This permit must be completed prior to a permit-required confined space entrance. Appendix F presents a Confined Space Entry Program Element Contact List. These forms shall be maintained at each facility or operation by the individual charged with administering the Confined Space Permit Program.

If welding, cutting, burning, riveting, heating, or any other tasks where a source of ignition is present are to be performed in the confined space (permit-required or non-permit-required), a hot work permit must also be obtained. See Welding, SPP # 1910.252 for additional information.

Pre-entry atmospheric testing for the confined space shall be performed prior to employee entrance. See Appendix C for atmospheric testing procedures.

Energy sources will be completely isolated by physical disconnection, double blocking, bleeding, or by lockout/tagout procedures. Figure 3 presents some typical lock/tagout devices. Also, see SPP# 1910.147, Lockout/Tagout, for additional details.

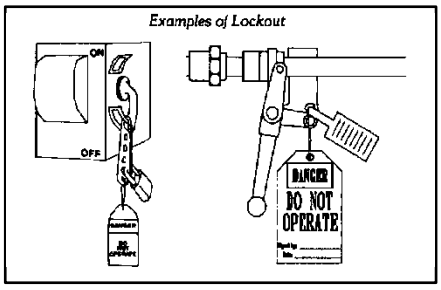


Figure 3

Ventilation and cleaning shall be performed to empty, flush, or purge spaces from the outside if feasible. Figure 4 presents a typical ventilation configuration to empty, flush, or purge a confined space.

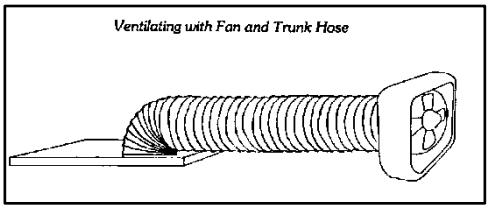


Figure 4

During pre-entry ventilation, the blowing duct outlet should be positioned for uniform dilution and elimination of any hazardous atmospheres pockets as shown in Figure 5.

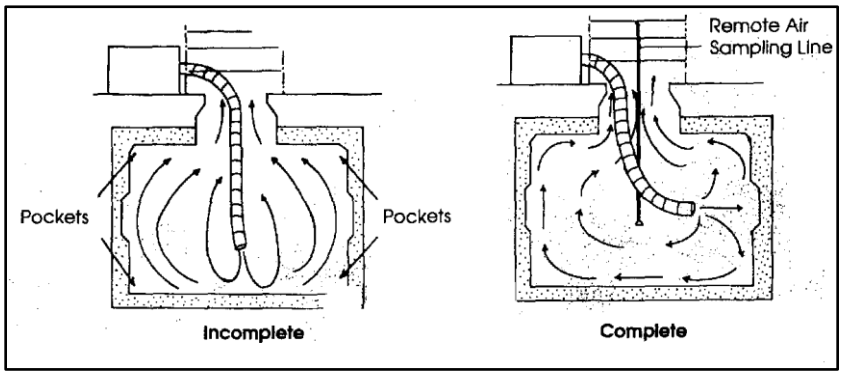


Figure 5

When a hazardous atmosphere is detected, ventilation will continue until:

- The space has no harmful concentration of toxic gases or vapors and acceptable oxygen concentrations
- The space shall be tested 3 times until safe levels are maintained.
- Upon entry, the atmosphere will be continually monitored by the entrant to ensure safe levels are maintained. The gas monitor will have audible alarms to signal when unsafe conditions are detected signaling that space should be immediately evacuated.

The appropriate PPE should be worn based on the hazard(s) and include:

- Eye and face protection
- Head protection
- Foot and leg protection
- Body protection
- Hearing protection
- Respiratory protection
- Hand and arm protection
- Harness, safety belts, and lifelines

See SPP# 1910.331, Personal Protective Equipment, for details on matching PPE to the hazard.

Appropriate equipment and tools must be in place and in good condition. See SPP# 1910.241, Hand and Portable Power Tools, for additional details.

The attendant shall be stationed immediately outside permit-required confined spaces and shall:

- Be trained in non-entry rescue
- Not enter the permit-required confined space
- Be within sight or call of the entrant
- Have means to summon assistance
- Have tripod set-up w/ life line attached to entrant for non-entry rescue

The attendant shall be physically capable of assisting any employee inside the confined space in the event of an emergency. This individual will be responsible for alerting others that a rescue is in progress and for taking appropriate measures to ensure the safety of all co-workers in the area. No employee is to enter a confined space if another employee goes down! The attendant shall always seek assistance.

Appropriate communications shall be established such as radios or walkie- talkies if the employee gets out of sight or earshot.

Non NCDOT Rescue teams must be available and on-call for permit-required confined space entry. The Rescue team must be able to respond in a timely matter, be properly trained, and equipped with rescue equipment including SCBAs.

Contractors who perform permit-required confined space entry must comply with all the OSHA requirements.

- If NCDOT owns the property on which the construction activity occurs and has contracted with an entity for the general management of that property, and has transferred to that entity the information specified in § 1926.1203(h)(1), OSHA will treat the contracted management entity as the host employer for as long as that entity manages the property. Otherwise, OSHA will treat NCDOT as the host employer. In no case will there be more than one host employer.
- Permit space entry communication and coordination with Contractors before entry operations begin, NCDOT must provide the following information, if it has it, to the controlling contractor:
    1. The location of each known permit space;
    2. The hazards or potential hazards in each space or the reason it is a permit space; and
    3. Any precautions that the host employer or any previous controlling contractor or entry employer implemented for the protection of employees in the permit space.

6.2.7 Recordkeeping

Recordkeeping requirements include:

- Retaining each cancelled permit for at least one year to facilitate review of Permit-Required Confined Spaces program
- Noting problems encountered during entry on permit to facilitate revisions to program

- Certification of training with name, identity of trainers and training dates
- Reclassification from permit to non-permit space certification with date, location, and signature of person making determination.

6.3 Specific Responsibilities

6.3.1 Managers & Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of confined space equipment in their areas. They will also be responsible for identifying the employees affected by this safety policy and procedure

Managers/Unit Heads shall be responsible for having Safety Engineers or Safety Officers identifying confined spaces at their worksite/facility. Additionally, they will be responsible for ensuring all confined spaces are evaluated to determine if a permit is required prior to entry.

Managers/Unit Heads shall also designate entry supervisors and qualified persons. Managers/Unit Heads will obtain and coordinate the required training for affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities associated with this safety policy and procedure.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will be responsible for knowing where confined and permit- required confined spaces are located at their worksite/facility. They will also be responsible for ensuring permit-required confined spaces are posted with warning signs.

Supervisors will ensure employees are provided with PPE as necessary for their job.

Supervisors are responsible for ensuring that only employees trained and qualified will operate material handling equipment

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

It is the responsibility of the employee to follow all instructions pertaining to confined spaces. Employees are never to enter confined spaces unless authorized by training and job duties.

6.3.4 Entrant

The attendant is responsible for maintaining communication with the entrant at all times. Appendix G presents additional details on the attendant's responsibilities.

6.3.5 Attendant

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing required training. Safety and Risk Management will work with Purchasing and Central Equipment Unit to ensure that all newly purchased Locks and Tags comply with this safety policy and procedure.

Safety and Risk Management shall be responsible for monitoring the Lockout/Tagout Program and any changes in the machinery and equipment that may require modification of the Program.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.6 Entry Supervisor

Entry supervisor is responsible for ensuring that only employees who are trained are allowed to enter confined spaces. The entry supervisor is responsible for ensuring proper permits and safety procedures are followed closely at the jobsite.

The entry supervisor must also be familiar with all hazards associated with the entry operation. He is responsible for all safety precautions, rescue procedures, and safety equipment needed for the operation. Appendix G presents additional details on the entry supervisor's responsibilities.

6.3.7 Qualified Person

Qualified person is responsible for checking the atmosphere of a confined space and correctly reading and using the gas detection instruments. Qualified Person is also responsible for documenting all confined space measurements

6.3.8 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training. Safety and Risk Management will provide guidelines for using air monitoring and gas detection equipment.

Safety and Risk Management will provide guidance to the qualified person on atmospheric testing. As applicable, the air monitoring data will be evaluated for completeness, accuracy, and precision.

Additionally, the Safety & Risk Management and the Safety Engineer will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Certification Training Form for Authorized Employees

Location: _____

Instructor: _____

Employee Name: **Employee #** _____

Has the OSHA required training been completed in the following categories?

Topic	Completion Date	Instructor's Initial	Employee's Initial
Types of Confined Spaces			
Confined Space Hazards			
Atmospheric Testing of Confined Spaces			
Evaluating Confined Spaces			
Cleaning and Ventilation			
Lockout of Confined Spaces			
PPE			
Respirator Use and Care			
Buddy Systems and Emergency Procedures			
Communication Procedures			
Emergency Rescue			
Employees designated to enter confined spaces (includes entrant, attendant, and rescue team) shall also be trained in the following topics	Completion Date	Instructor's Signature	Employee's Initial
Emergency Entry and Exit Procedures			
Applicable Respirators			
First Aid and CPR			
Lockout Barriers at Worksites			
Safety Equipment at Worksites			
Rescue Equipment			
Permit System			
Work Practices			

Attach Course Roster to this Form

APPENDIX B: Confined Spaces Inventory

Facility:
Location:
Inventory Date:

All permit-required confined spaces shall be posted with signs stating "Confine Space-Do Not Enter" or "Unauthorized Entry Prohibited

Confined Space	Purpose	Hazards	Work Done	Permit Required

This inventory must be kept up to date. All operational changes should always be evaluated for its impact on this facility's confined spaces.

APPENDIX C: Atmospheric Testing Procedure

A qualified person shall test spaces a minimum of 3 times at all stratified levels prior to permit required confined space entry. Figure 5 illustrates the common gases found at each of these (3) stratified levels. Using a direct reading instrument with remote sampling capacity, the qualified person shall test the atmosphere for in the following order:

1. Oxygen level (19.5 percent minimum/maximum 23.5 percent)
2. Potential flammable hazard, not to exceed (10 percent LEL Max.) or Lower Flammable Limit (LFL)
3. Toxic materials which potentially could be present: Carbon Monoxide – 35 ppm Max., Hydrogen Sulfide 10ppm Max. & other gases must be less than the known TLV for that gas.

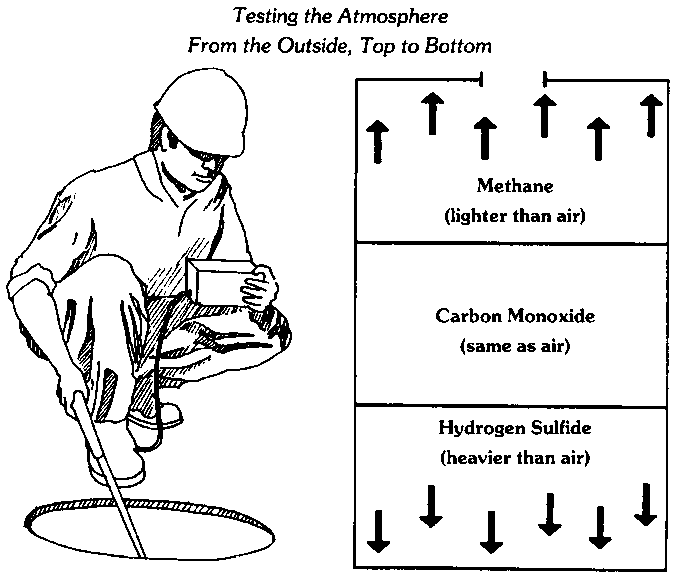


Figure 5

The qualified person shall record all atmospheric test results on the permit prior to entry. A qualified person shall perform atmospheric testing during occupancy; if the entrant wears the four gas monitor with audible alarms for continuous monitoring, this will fulfill the requirement for periodic testing.

Each testing instrument shall be:

- Calibrated per manufacturer's instructions (instruments out of calibration or that fail field checks cannot be used until calibrated).
- At least annually calibrated by the manufacturer.
- Field checked immediately prior to use. This field check shall include checking with a test gas at least monthly.

APPENDIX D: Confined Space Evaluation Form

Confined Space Evaluation

Confined Space Identification number: _____
Confined Space Description: _____
Location of space: _____
Is a Permit Required? _____
List the typical tasks performed: _____

Potential Hazards:	Required Work Procedures
☐ Flammable or Explosive atmosphere	☐ Atmospheric Testing Prior to Entry (see acceptable limits below)
☐ Oxygen deficient atmosphere	☐ Continuous Atmospheric Testing (see acceptable limits below)
☐ Toxic atmosphere / Specify:_____	☐ Standby attendant required
☐ Eye contact	☐ Lock/Tag equipment*
☐ Skin contact	☐ Blank or Disconnect lines*
☐ Electrocution	☐ Double block and bleed*
☐ Moving mechanical equipment	☐ Ventilation/Purge (continuous forced air)
☐ Slip or fall	☐ Inert/Purge space prior to Ventilation
☐ Heat stress or thermal contact	☐ Decon/Clean space prior to work
☐ Engulfment	☐ Barricade area
☐ Entrapment	☐ Communications equipment
☐ Drowning	☐ Attach MSDS to permit
☐ Other / Specify:___	☐* Attach Job specific hazardous work permit
☐ Other / Specify:_____	

Atmospheric testing acceptable limits: Oxygen 19.5% - 23.5%, Combustibles <10% LFL / LEL, Toxics See SDS

Elimination of Hazards §(c)(7) applicable? ___(note: if §(c)(7) used, this hazard assessment may not apply)
Alternate Procedures §(c)(5) applicable? ___(note: if §(c)(5) used, this hazard assessment may not apply)

Required Equipment for entry

☐ Survey atmosphere monitor	☐ Tripod with hoist (gantry hoist)
☐ Personal monitor, continuous	☐ Harness with retrieval line
☐ Respirator:_____	☐ Ladder
☐ Gloves:_____	☐ Spark/Explosion proof or Intrinsically safe equipment required
☐ Boots:_____	☐ GFCI Protected equipment
☐ Eye/Face protection	☐ Additional illumination
☐ Chemical protective clothing (CPC):_____	☐ Personal fall arrest system (PFAS)
☐ Hearing protection	☐ Fire extinguisher _____
☐ Other equipment / Specify:_____	

Emergency Plan

☐ Non-entry retrieval rescue attempted after notification
☐ Non-entry notification rescue only

Rescue team must be on On Call Standby:

Initial assessment reviewed by: _____ Date:_____
Annual review by: _____ Date:_____
Annual review by: _____ Date:_____

APPENDIX E: Confined Space Entry Permit

(Valid for one 8-hour shift only)
All copies of permit will remain at jobsite until job is completed

Entry Supervisor Approval Signature:_____

Location and Description of Confined Space:	**Date:**		
Scheduled Work to be Done:	**Time Started:**		
Division / Unit:	**Time Completed:**		
Persons Authorized to Enter:	**Continuous Monitoring By Entrant w/ 4 Gas Monitor**	**Yes**	**No**
Entry Supervisor:	**Attendant:**		

Check Yes or No for Each Potential Hazard Present

Potential Physical Hazards Present	**Yes**	**No**	**Potential Hazard Atmosphere Present**	**Yes**	**No**
Engulfment			Low Oxygen (<19.5%)		
Moving Machinery			High Oxygen Enriched (>23.5%)		
Hazardous Materials			Flammable (>10% LEL)		
Converging Walls			Carbon Monoxide (>35 ppm)		
Exposed Electricity			Sulfur Dioxide (>10 ppm)		
Slips/Falls			Other (list):		
Other (list):					

Check Yes / No or Enter N/A for Each Special Requirement

SPECIAL REQUIREMENTS	**Yes**	**No**		**Yes**	**No**
Lockout/Tagout - Denergize			Tripod for Non-entry Rescue		
Lines Broken - Capped or Blanked			Body Harness		
Ventilation			Life Line		
Purge - Flush and Vent			Fire Extinguisher		
Secure Area			Alternate Procedure		
Hot Work Permit			Respirator		
Communication Equipment			Rescue Procedure		

Record Gas Monitor Readings & Enter Time for Initial Check. If the entrant is wearing a four gas meter w/ audible alarms, periodic checks do not have to be entered. If continuous monitoring is not feasible, Periodic Checks must be completed w/ readings and time documented.

Atmospheric Checks	**Permissible Entry Level**	**Initial Check (Enter Time)**	**Periodic Checks (Enter Time)**		
% Oxygen	19.5% to 23.5%				
%of Lower Explosive Limit	Less than 10%				
Carbon Monoxide	35 ppm				
Hydrogen Sulfide	10 ppm				
Other					

Continuous Monitoring shall be performed during the job unless not feasible.
State Reason for not feasible: _____

Name of Qualified Person - Gas Tester(s):					
Monitor Name & Model		S/N		Date Calibrated	

Never Enter a Confined Space to Attempt Rescue; Tripod for Non-Entry Rescue Must Be Set-up Prior to Entry w/ Entrant Wearing Body Harness &Life Line Attached to Tripod.
Arrangements Must Be Made for Nearest Entry Rescue Team to be On Call Stand-By:
List: _____
Rescue team must be on On Call Standby. If not available reschedule confined space entry.

APPENDIX F: Confined Space Entry Program Elements

Facility:_____

Program Element	Contact Person
Hazard Identification	
Hazard Control	
Written Permit System	
Posting Confined Spaces	
Confined Space Training	
Special Safety Equipment (i.e. Four Gas Direct Reading Monitor w/ Audible Alarms & Remote Sampling Capabilities, Tripod, Life Line)	
Written Rescue Plan & Procedures	
External Hazard Protection	
Communication Equipment	
Contractor Notification	

Notes: _____

_____

_____

_____

_____

_____

_____

APPENDIX G: Confined Space Entry Team Responsibilities

A permit-required confined space team performs four functions:

- The attendant (observer) who remains outside while the work is being done
- The entry supervisor who authorizes permits
- The rescue team who performs rescue

The entrant:

- Does the assigned task
- Reviews the permit before entry
- Wears appropriate personal protective clothing, as required
- Uses appropriate PPE, as required
- Uses and attends to area and personal monitoring equipment
- Pays attention to own physical reactions that could signal an unsafe condition
- Maintains contact with the attendant and responds to evacuation orders
- If the entrant senses any reaction to the environment, he or she should signal the attendant for help, if necessary, and leave the confined space immediately

The attendant:

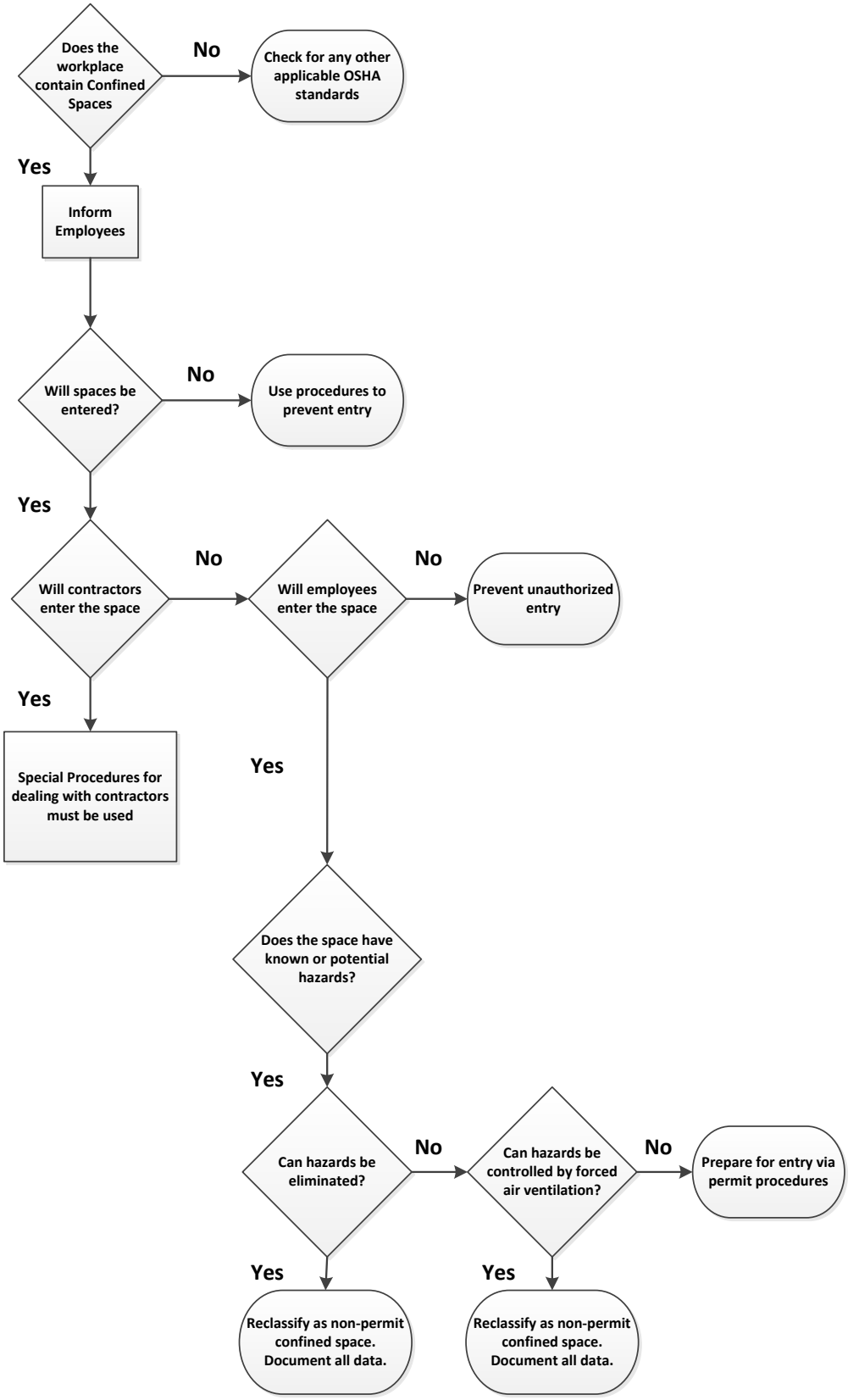
- Reviews the permit before entry
- Keeps track of who is in the space at all times
- Keeps unauthorized people out of the area
- Maintains continuous communication, visual or voice, with the entrant during the entry
- Makes sure the ventilation equipment, if used, is working
- Monitors the atmospheric testing equipment
- Attends to the lifeline, if worn by the entrant
- Attends to the airline, if used, to prevent tangles and kinks
- Remains alert for early symptoms of danger within the space
- Watches for hazards outside and inside the space
- Maintains clear access to and from the space
- Notifies the entrant and orders evacuation if conditions warrant or if the permit limits expire
- Is prepared to call for emergency help, if needed

APPENDIX G: Confined Space Entry Team Responsibilities (Continued) 2

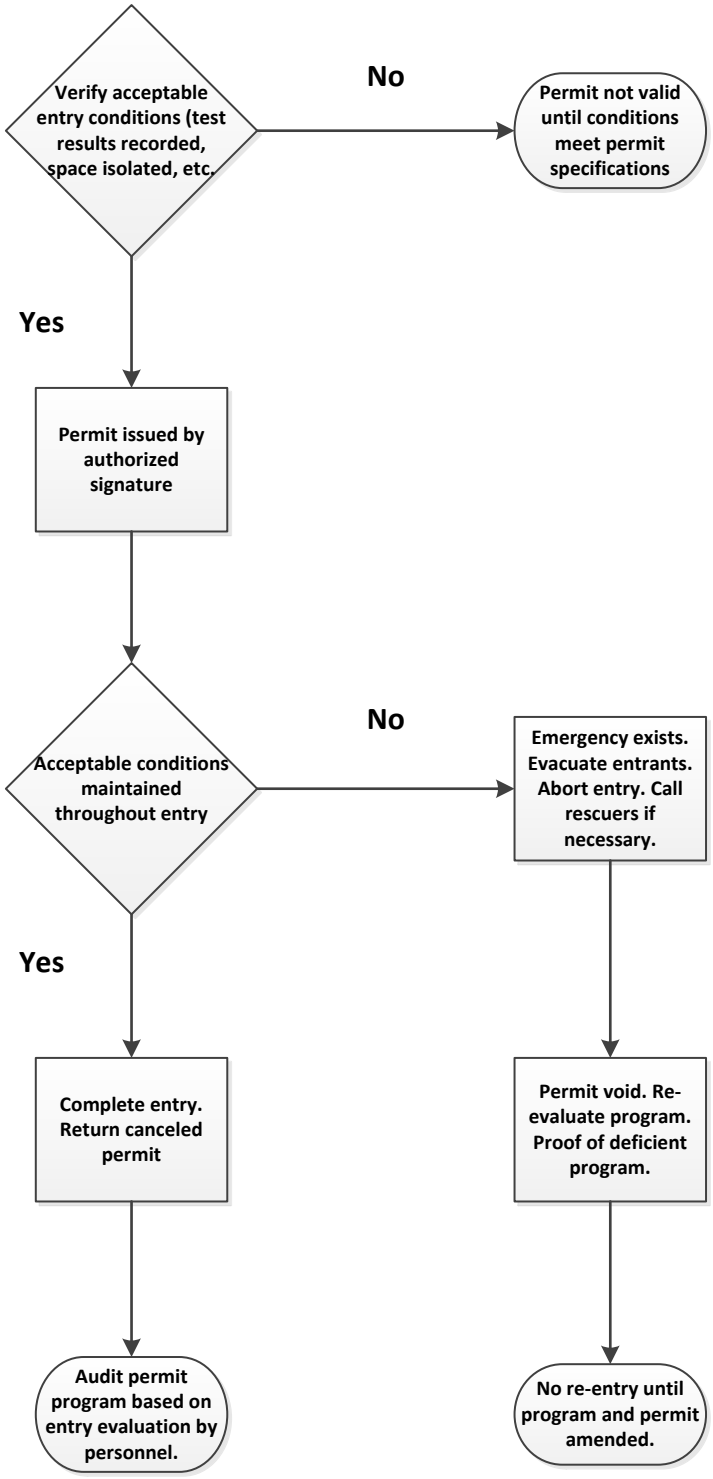
The Entry Supervisor (person authorizing permits) :

- Plans each entry. Planning means to:
  - Describe the work to be done
  - Identify the workers involved
  - Evaluate the hazards of the space
  - Perform (or arrange for) atmospheric testing and monitoring
  - Develop rescue plans
- Ensures that the permit is complete, dated, and signed
- Determines the need for certain equipment
- Ensures atmospheric testing
- Ensures that all necessary procedures, and equipment for safe entry are in effect
- Determines, at "appropriate" intervals, that operations remain acceptable
- Cancels the permit and terminates the work if the conditions are not acceptable
- Trains (or provides training for) all workers on the Confined Space Entry Team
- Keeps records on training, safety drills, test results, equipment inspections, and equipment maintenance.
- Cancels the permit and secures the space when the work is done
- Determines if a written rescue plan is necessary for a particular confined space entry
- Verifies that emergency help is available and that the method of summoning help is operable

APPENDIX H: Confined Space Decision Tree Flowchart



APPENDIX I: Confined Space Entry Decision Tree Flowchart



Author:	Paul Roberts	Revision #:	2
Approved By:	Ricky Greene	Date Revised:	April 2015

SAFETY POLICY & PROCEDURE

Lockout/Tagout

SPP# 1910.147

Select this Link to view latest Revision changes

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish methods for isolating machines or equipment from hazardous energy sources before routine maintenance and servicing of those machines and equipment by North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Uncontrolled energy is a hazard to operators and other employees in the area of the machinery, equipment, or processes. Those who service and maintain machinery or equipment are especially vulnerable because the machinery or equipment might become energized while being serviced or stored energy might be unexpectedly released. A lockout/tagout device is used to keep equipment from being set in motion and endangering employees.

This safety policy and procedure provides guidelines for isolating machines or equipment from energy sources. It emphasizes two major components of the lockout/tagout requirements in the form of training and the procedure to be followed. The training component is organized into:

- General training requirements
- Authorized employee training
- Affected employee training
- Supervisor training

The training component addresses all the procedural details of an effective lockout/tagout program. The equipment survey component addresses the identifications of energy sources and the assignment of lockout/tagout devices for those energy sources. This document also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Risk Management. This safety policy and procedure affects employees who service, maintain, and operate stationery equipment and machines.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.147).

4.0 Policy

It is the policy of the North Carolina Department of Transportation (NCDOT) to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, all energized machines and equipment must be locked out and/or tagged out before any maintenance or servicing is performed. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Lockout/Tagout will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on Lockout/Tagout. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's Lockout/Tagout Program. NCDOT requires that Lockout/Tagout be used. If the equipment does not have provisions for accepting a lock, a Tagout system may be used.

1. The purpose of the tagout device is to indicate that the energy source isolating device and the equipment being controlled may not be operated until the tagout device is removed.
2. Tags must achieve a level of safety that is equivalent to that which would be achieved through a lockout system. In other words, the employer must implement additional safety measures that "bridge the gap" between the degree of safety achieved through lockout and the degree of safety achieved through tagout. An example would be to lockout the energy source that feeds the equipment you cannot apply a lock, but can only implement tagout.

6.1 Definitions

Affected Employee
An employee whose job duties require operation or use of a machine or piece of equipment in a location in which servicing or maintenance is being performed under Lockout/Tagout Procedures.

Authorized Employee
An employee who lockouts or tagouts a machine or piece of equipment in order to perform servicing or maintenance on that machine or piece of equipment. An affected employee becomes the authorized employee when that employee's duties require him or her to perform the service or maintenance covered under this policy.

Capable of Being Locked Out
An energy isolating device capable of being locked out if it has a hasp or other means of attachment through which a lock can be affixed to the equipment or machine.

Energy Isolating Device
A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and additionally by which no pole can be operated independently; a line valve; a blind; or any similar device used to block or isolate energy. Push buttons, selector switches, and other control circuit-type devices are not energy isolating devices.

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

Hasp
Lockout tagout device which can accept multiple locks and tags. (See Figure 1.)

Figure 1

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

Lockout Device
A lock and/or device capable of accepting a lock that utilizes a positive means to hold an energy isolating device in a safe position to prevent the energizing of a machine or piece of equipment. (See Figure 2) Included are blank flanges and bolted slip blinds.

Figure 2

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

Setting Up
Any work performed to prepare a machine or equipment to perform its normal production operation.

Tagout
The placement of a tagout device or 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.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- General Training Requirements
- Authorized Employee Training
- Affected Employee Training
- Supervisor Training
- Equipment Survey

6.2.1 General Training Requirements

General training requirements for the Lockout/Tagout program shall consist of:

- Basic lockout/tagout training
- Training on the limitations of tags
- Authorized and affected employee retraining
- Certification of lockout/tagout training

Basic lockout/tagout training shall communicate a basic awareness of the procedures and skills that employees are required to possess. This training shall ensure that:

- Each authorized employee receives training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control
- Each affected employee be instructed in the purpose and use of the energy control procedure
- All other employees be instructed when work operations are in an area where energy control procedures are used

Training on the limitations of tags must be provided to the identified employees. Tagout systems are not completely foolproof. Instructions should include, among others, the following examples of tag limitations:

- Tags are essentially warning devices affixed to energy isolating devices and do not provide the physical restraint on those devices that is provided by a lock
- When a tag is attached to an energy isolating means, it is not to be removed without authorization and it is never to be bypassed, ignored, or otherwise defeated
- In order to be effective, tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area
- Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace
- Tags may evoke a false sense of security and their meaning needs to be understood as parts of the overall energy control program

- Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use

Authorized and affected employee retraining is required when:

- There is a change in their job assignments, a change in machines, equipment, or processes that presents a new hazard, or when there is a change in the energy control procedure.
- A NCDOT supervisor has reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

This retraining shall establish employee proficiency and introduce new or revised control, methods and procedures, as necessary.

Certification of lockout/tagout training must be accomplished and updated when such training has taken place. The certification shall contain each employee's name, job title, division/unit, and dates of training. Appendices A and B contain Lockout/Tagout training certification forms for authorized and affected employees respectively.

6.2.2 Authorized Employee Training

Authorized employees are those who use lockout/tagout devices. This training will be the responsibility of the supervisor.

Training requirements for authorized employees will include the following:

- Purpose of the standard and hazards controlled
- When the standard applies
- Definitions of terms used
- Equipment used for lockout/tagout:
  - standardized appearance
  - personal identification procedures
- Procedures, including:
  - preparation for shutdown
  - shutdown, isolation, blocking, and securing
  - placement, removal, and transfer of devices
  - release of stored energy
  - testing to verify effectiveness of energy control
  - release from lockout/tagout:
  - procedural requirements
  - release if employee who applied device is no longer at facility
- Special procedures and rules for tagout systems
- Special procedures for changes of shifts and personnel changes
- Special procedures and practices for group lockout/tagout:
  - procedure
  - authority for lockout/tagout in group situations
- Inspection program
- Communication and reporting of problems

Appendix C presents NCDOT's lockout/tagout procedure for authorized employees.

6.2.3 Affected Employee Training

Affected employees are those who operate equipment locked or tagged, or employees who work in the area where the devices are in use. Affected employee training may cover:

- Introduction to procedures outlined above for authorized employees
- Prohibition against energizing any machine or piece of equipment that is locked or tagged out

6.2.4 Supervisor Training

In addition to the employee training mentioned above, supervisors will receive additional training which includes the following elements:

- Determination of machinery and equipment to be included in the Lockout/Tagout Program
- Energy isolation points of each piece or class of machinery and equipment
- Training requirements, scheduling, responsibility
- Annual retraining circumstances and requirements for employees
- Inspection requirements and responsibilities
- Outside contractor personnel requirements

6.2.5 Equipment Survey

A survey is required to identify all isolating devices prior to a lockout/tagout event. The purpose of the survey is to determine which switch(s), valve(s), or other energy isolating devices applies to the equipment in order to establish lockout/tagout procedures for each type of equipment. Appendix D contains forms for performing an equipment survey for a facility.

6.3 Specific Responsibilities

6.3.1 Managers & Unit Heads

Managers/Unit Heads shall be responsible for the completion of a survey of machinery and equipment within their area to determine which machinery and equipment should be included in the Lockout/Tagout Program.

Managers/Unit Heads shall be responsible for identifying all affected and authorized employees.

Manager/Unit Heads shall ensure that the necessary funding is available for purchase of the required lockout/tagout safety equipment. Managers/Unit Heads will also ensure annual compliance with this safety policy and procedure through their inspection and auditing processes.

Managers/Unit Heads are responsible for coordinating required training with Safety and Risk Management.

6.3.2 Supervisors

Supervisors shall be responsible for ensuring that this safety policy and procedure is implemented in their areas.

Supervisors shall be responsible for ensuring that an adequate supply of locks, tags, and other safety equipment is available and is utilized in accordance with this safety policy and procedure.

Supervisors shall be responsible for the training of the employees and for ensuring that the training meets the requirements of this safety policy and procedure.

Supervisors shall be responsible for conducting a periodic inspection of LOTO procedures at least annually to ensure this safety policy and procedure is being followed. The inspection shall be conducted by observing each authorized employee performing LOTO to determine if the procedure is adequately being followed and to correct any deviations and inadequacies identified to ensure it is effective in protecting the authorized employee. This inspection shall be documented. Appendix E contains a form that may be used to document the inspection.

6.3.3 Authorized Employees

Authorized employees shall be responsible for following NCDOT's lockout/tagout procedures before any maintenance or servicing activities are begun.

Authorized employees will be responsible for notifying affected employees before beginning a lockout/tagout procedure on a piece of equipment or machinery.

Authorized employees shall report to their supervisors any changes in the machinery or equipment that would require a change in the lockout/tagout procedure.

6.3.4 Affected Employees

Affected employees shall attend the required training. This training will be given at least annually or when new employees or equipment are introduced into the work environment. Records for training will be maintained by the office in which the equipment and employees are located. This training will include electrical, hydraulic, chemical, thermal, and any other energy sources that have the ability to release without warning.

Affected employees shall ensure that all precautions required by this safety policy and procedure be observed.

Affected employees shall report to their supervisors any changes in the machinery or equipment that would require a change in the lockout/tagout procedure.

6.3.5 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing required training. Safety and Risk Management will work with Purchasing and Central Equipment Unit to ensure that all newly purchased Locks and Tags comply with this safety policy and procedure.

Safety and Risk Management shall be responsible for monitoring the Lockout/Tagout Program and any changes in the machinery and equipment that may require modification of the Program.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.6 Central Equipment Unit

Central Equipment Unit shall maintain an inventory of lockout tags and hasps that comply with this safety policy and procedure.

APPENDIX A: Certification Training Form for Authorized Employees

Facility:	**Location:**

AUTHORIZED EMPLOYEE TRAINING

Lockout/tagout for AUTHORIZED employees includes special instructions concerning scope, purpose, rules, and techniques for lockout/tagout of hazard energy sources including, but not limited to:

- Intended use of the procedure
- Steps for shutting down, isolating, holding, and securing
- Steps for placement, removal, and transfer of lockout/tagout devices
- Requirements for testing to determine and verify effectiveness of lockout/tagout devices
- Other measures_____

Employee's Name	**Job Title**	**Division/ Unit**	**Comments**	**AUTHORIZED**	
				Date	**Supervisor**
Training Conducted by:		**Date:**	**Reviewed by:**		**Date:**

APPENDIX B: Certification Training Form for Affected Employees

Facility:	**Location:**

AFFECTED EMPLOYEE TRAINING

Lockout/tagout for AUTHORIZED employees includes special instructions concerning scope, purpose, rules, and techniques for lockout/tagout of hazard energy sources including, but not limited to:

- Intended use of the procedure
- Steps for shutting down, isolating, holding, and securing
- Steps for placement, removal, and transfer of lockout/tagout devices
- Requirements for testing to determine and verify effectiveness of lockout/tagout devices
- Other measures_____

Employee's Name	**Job Title**	**Division/ Unit**	**Comments**	**AUTHORIZED**	
				Date	**Supervisor**
Training Conducted by:		**Date:**	**Reviewed by:**		**Date:**

APPENDIX C: Lockout/Tagout Procedure

Sequence of Lockout or Tagout

- Prepare for shutdown by locating all energy sources that power the equipment. Each energy source will be identified on the Lockout/Tagout Procedure. More than one energy source (electrical, mechanical, hydraulic, pneumatic, thermal, or others) may be involved.
- Notify all affected employees that a lockout or tagout system is being implemented and provide the reason why.
- Refer to the LOTO procedure for the specific type of equipment to determine type and magnitude of energy present.
- Shut down machine or equipment by normal stopping procedure.
- Shut off the electrical power supply disconnect switch, valve(s), or other energy isolating devices(s) so that the equipment is isolated from all its energy source(s). Stored energy (such as that in springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as repositioning, blocking, bleeding down, etc.
- Lockout and tagout the energy isolating devices with assigned individual lock(s) and tag(s).
- Verify the energy isolating sources are disconnected by operating the ON switch or normal operating controls. Ensure that no personnel are exposed before operating the controls. (Return operating control to neutral or off position after test.)
- The equipment is now locked out and can safely be worked on.
- After servicing is complete and the equipment is ready for normal operations, check the area around the equipment to ensure that all tools, parts, etc. have been removed and guards have been reinstalled.
- Ensure that all employees are in the clear and remove all lockout/tagout devices. Operate the energy isolating devices to restore energy to the machine or equipment.
- Notify affected employees that servicing is complete, and the equipment is ready for use.

Procedure Involving More Than One Person

In the preceding steps, if more than one individual is required to lockout/tagout equipment, each person shall place his or her own personal lockout/tagout device on the energy isolating device(s). When an energy isolating device cannot accept multiple locks or tags, a multiple lockout/tagout hasp shall be used

Equipment Specific LOTO Procedures

For the authorized employee to identify the type and magnitude of the energy available, equipment specific LOTO procedures should be available. Appendix D: Lockout/Tagout Equipment and Energy Source Survey Form may be used to establish those equipment specific LOTO procedures.

APPENDIX D: LOTO Equipment and Energy Source Survey Form

TYPES OF HAZARDOUS ENERGY AT THIS FACILITY

Facility Name _____

	General Description	Location
Electrical		
Pneumatic		
Hydraulic		
Other		
(Steam, Hot Water, Water Pressure, etc.)		

APPENDIX D: LOTO Equipment and Energy Source Survey Form (cont.) 2

ELECTRICAL EQUIPMENT				
Equipment Name	**Primary Isolating Device (Type)**	**ID Number**	**Location**	**Magnitude (Volts)**

APPENDIX D: LOTO Equipment and Energy Source Survey Form (cont.) 3

HYDRAULIC EQUIPMENT				
Equipment Name	**Primary Isolating Device (Type)**	**ID Number**	**Location**	**Magnitude (psi)**

APPENDIX D: LOTO Equipment and Energy Source Survey Form (cont.) 4

PNEUMATIC EQUIPMENT				
Equipment Name	**Primary Isolating Device (Type)**	**ID Number**	**Location**	**Magnitude (psi)**

APPENDIX D: LOTO Equipment and Energy Source Survey Form (cont.) 5

OTHER EQUIPMENT				
Equipment Name	**Primary Isolating Device (Type)**	**ID Number**	**Location**	**Magnitude (psi, temp.)**

APPENDIX E: LOTO Periodic Inspection Form

Facility:	**Location:**

Periodic Inspection of LOTO Procedures & Program

Inspection of LOTO Procedures shall consist of observing all Authorized Employees performing a LOTO procedure on a piece of equipment to determine if procedures are being followed and to correct any deviations or inadequacies identified to ensure it is effective in protecting the authorized employee. Results shall be documented including any deficiencies found. Inspection shall include these items.

- Proper lockout devices and tags are being used.
- Procedure being followed.
- Deviations and inadequacies in procedure to effectively protect the Authorized Employee.

Inspection of LOTO Program shall consist of verifying and documenting the following items:

- All employees performing LOTO have been trained as authorized employee and this training is documented.
- Lockout devices and tags are readily available for performing LOTO.

Authorized Employee Audited	Equipment/Procedure Audited	Comments	Inspection Conducted By	
			Date	Supervisor

Safety Color Markings for Hazards SPP# 1910.144

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the use of safety color markings to identify hazards.

2.0 Scope and Applicability

Color coding is a standard way of quickly transmitting information. The North Carolina Department of Transportation (NCDOT) has adopted color codes based on OSHA and ANSI standards to convey safety information.

This safety policy and procedure provides guidelines for identifying hazards through safety color markings. It includes provisions for training, detailed discussion of color requirements for identifying hazards, and brief discussion of safety color compliance audits.

This document also details the areas of responsibility for managers/unit heads, supervisors, and employees within NCDOT.

This safety policy and procedure affects employees in Traffic Services, Bridge Maintenance, and Central Equipment Unit. It also affects other employees who apply safety colors on equipment and materials for identification of hazards associated with the relevant equipment and materials.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.145) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.200).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, standard color coding will be used throughout NCDOT to minimize these hazards. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Safety Color Markings will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's policy on Safety Color Markings for Hazards. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition that is not safety color marked to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities.

6.1 Definitions

Color Codes
Coloring scheme that associates colors with different types of hazards.

6.2 General Provisions

This section details the provisions of this policy with each provision discussed in a separate subsection. These provisions are:

- Training
- Marking
- Audits

6.2.1 Training

Training will be provided to affected employees. This training should include the following subject areas:

- Why hazards and dangers should be marked
- Color codes
- What equipment and materials should be marked

6.2.2 Marking

Safety color marking shall be uniform throughout NCDOT. Hazards within NCDOT shall be marked according to the following:

- **Red** is recommended for identifying fire protection equipment, danger, and emergency stops on machines.
- **Yellow** because of its high visibility is the standard color for marking hazards that may result in accidents from slipping, falling, striking against, etc.
- **Green** in combination with white, such as the green cross on a white background, designates the location of first aid and safety equipment.
- **Black and White** and combinations of the two in strips or checks are used for housekeeping and traffic markings.
- **Orange** is the standard color to highlight hazardous parts of machines or electrical equipment, such as exposed edges of cutting devices, the inside of removed guards, and the doors and covers of switch boxes. Also, orange is used for biological and similar types of hazards.
- **Reddish-Purple (magenta)** identifies radiation hazards, such as radioactive materials in rooms and containers.

For lettering, text, and background colors on equipment and materials, other colors are used but not limited to the following:

- White
- Black
- Yellow

For details and guidelines for marking accident prevention signs and tags, see SPP# 1910.145, Accident Prevention Signs and Tags.

Some examples of equipment with safety color markings include:

- Containers of flammable liquids having a flash point at or below 80^{0}F painted red with either a yellow band around the can or the name of the contents painted on the can in yellow
- Red lights at barricades
- Emergency stop bars (stop buttons) on hazardous machines painted red

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that funding is available to effectively implement this safety policy and procedure. They will also ensure that the appropriate employees are identified for training and that training is made available.

Manager/Unit Heads will also be responsible for identifying the employees affected by this safety policy and procedure. They will obtain and coordinate the required training for the affected employees and will ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that hazardous conditions and locations are safety color marked. Additionally, supervisors will ensure that the appropriate employees receive training in recognizing safety color markings and hazards associated with these colors.

6.3.3 Employees

Employees are to report any unmarked hazardous conditions or locations to their supervisors. Employees shall recognize safety color markings and hazards associated with these colors.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will conduct random audits of facilities and hazards to assure that they are marked consistent with the hazard.

Additionally, Safety and Loss Control will assist in developing or securing required training.

6.3.5 Central Equipment Unit

Central Equipment Unit will support Divisions/Units with the selection and purchase of equipment, signs, and marking materials. Central Equipment Unit Specifications Committee will ensure that equipment purchases meet the requirements of this safety policy and procedure.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Access to Medical Records SPP# 1910.20

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish the guidelines and procedures through which employees will be able to obtain and gain access to North Carolina Department of Transportation (NCDOT) maintained exposure and medical records. These exposure and medical records are those resulting from employment related exposures, injuries, and/or illnesses.

2.0 Scope and Applicability

NCDOT workers may be exposed to toxic substances and harmful physical agents to an extent that may severely impair their health. Workers must be informed about the toxic exposures they face and their potential health effects.

This safety policy and procedure provides guidelines for employees to obtain their exposure and medical records. It includes provisions on training, retention requirements for employee exposure and medical records, and response time to employee requests for exposure and medical records. Additionally, guidelines are presented on physician review of employee medical records, OSHA access to medical records, and information that must be shared with new employees.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, and employees within NCDOT.

This document affects all NCDOT employees who have been exposed to toxic substances and harmful physical agents due to their job duties.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.20) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.33).

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards and to comply with applicable standards and regulations set forth by the Occupational Safety and Health Administration.

In accordance, NCDOT will provide all exposure and medical records when properly requested as outlined in this safety policy and procedure. NCDOT will ensure that those employees who request their exposure and medical records are provided with confidential, fair, and equal treatment.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Access to Medical Records.

It is the general responsibility of NCDOT to ensure that each employee has access to all exposure and medical records pertaining to their present or past employment with NCDOT. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides definitions, establishes general provisions, and identifies responsibilities regarding access to employee exposure and medical records.

6.1 Definitions

Access
The right and opportunity to examine, copy, or use any or all exposure and medical records.

Designated Representative
Any individual or organization to whom an employee gives written authorization to exercise a right of access to exposure or medical records.

Employee
An individual who is employed by NCDOT and who is being assigned or transferred to work where there will be exposure to toxic substances or harmful physical agents. In a case where the employee is deceased, the employee's legal representative may directly exercise all of the employee's rights under this policy.

Employee Exposure Record
A record containing information on the type of environment or hazards present in the workplace.

Employee Medical Record
A record concerning the health status of an employee which is made or maintained by a physician, nurse, or other health care personnel.

Exposure
A condition that occurs when an employee is subjected to toxic or hazardous environments as a result of his or her job duties.

Health Professional
A physician, occupational health nurse, industrial hygienist, toxicologist, or epidemiologist providing medical care or other occupational health services to exposed employees.

Record
Any item, collection, or grouping of information regardless of the form or process by which it is maintained.

Toxic Substance
Any chemical substance, biological agent (bacteria, virus, etc.), or physical stress (noise, heat, cold, vibration, etc.) to which employees could have been exposed as a result of performing their job function.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each element discussed in a separate subsection. These provisions are:

- Access to Records
- Employee Exposure and Medical Records
- NCDOT Representation by a Physician
- OSHA Access to Records
- Employee Information

6.2.1 Access to Records

Whenever an employee or a designated representative of an employee requests access to exposure and/or medical records, NCDOT will provide these documents within 15 working days. If records cannot be provided within this time period, the employee or representative must be informed and given a date on which the records will be provided along with a reason for the delay. These records will be provided to the employee or representative at no cost for reproduction or for the document search itself.

6.2.2 Employee Exposure and Medical Records

Upon request, NCDOT must provide the employee or employee's designated representative access to employee exposure records. If no records exist, the employer must provide records of other employees with job duties similar to those of the employee. Access to exposure records does not require the written consent of the other employees.

In addition, these exposure records must reasonably indicate the identity, amount, and nature of the toxic substances or harmful physical agents to which the employee has been exposed.

NCDOT also must provide employees and their designated representatives access to employee medical records. Access to the medical records of another employee may be provided only with the written consent of that employee. A request for medical records can be made by using the form (or one substantially similar) shown in Appendix A.

NCDOT is responsible for maintaining employee medical records for the duration of employment plus 30 years. This recordkeeping does not include health insurance claims, first aid records (not including medical histories) of one-time treatment, and medical records of employees who have worked less than a year for NCDOT. Employee exposure records and data analysis are to be maintained for 30 years.

It is the responsibility of the employee to initiate any request for access to his or her medical records as outlined in this safety policy and procedure. (See Appendix A.)

6.2.3 NCDOT Representation by a Physician

NCDOT may request that a physician be appointed to review medical records with the employee or employee's designated representative to ensure records are reviewed and properly interpreted. The physician may deny the employee access to records if the physician detects a situation which may be detrimental to the health of the employee such as the identification of terminal illness or a psychiatric condition.

In such cases, the employee's designated representative may request the records even if it is known that the representative may disclose the information to the employee.

6.2.4 OSHA Access to Records

Upon receiving a written request from OSHA, NCDOT will supply OSHA with any exposure or medical records for analysis. A copy of this request must be posted in a conspicuous place for at least 15 working days.

6.2.5 Employee Information

New NCDOT employees will be informed of the following information:

- The existence, location, and availability of any records covered by this safety policy and procedure
- The person responsible for maintaining and providing access to these records
- Employee's rights under this safety policy and procedure

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for maintaining employees' exposure and medical records and for ensuring compliance with this safety policy and procedure.

Managers/Unit Heads are also responsible for providing employees with copies of their exposure and medical records when properly requested.

Managers/Unit Heads will ensure the confidentiality of employees' medical records.

6.3.2 Supervisors

Supervisors will be responsible for educating and training employees about their rights under this safety policy and procedure.

6.3.3 Employees

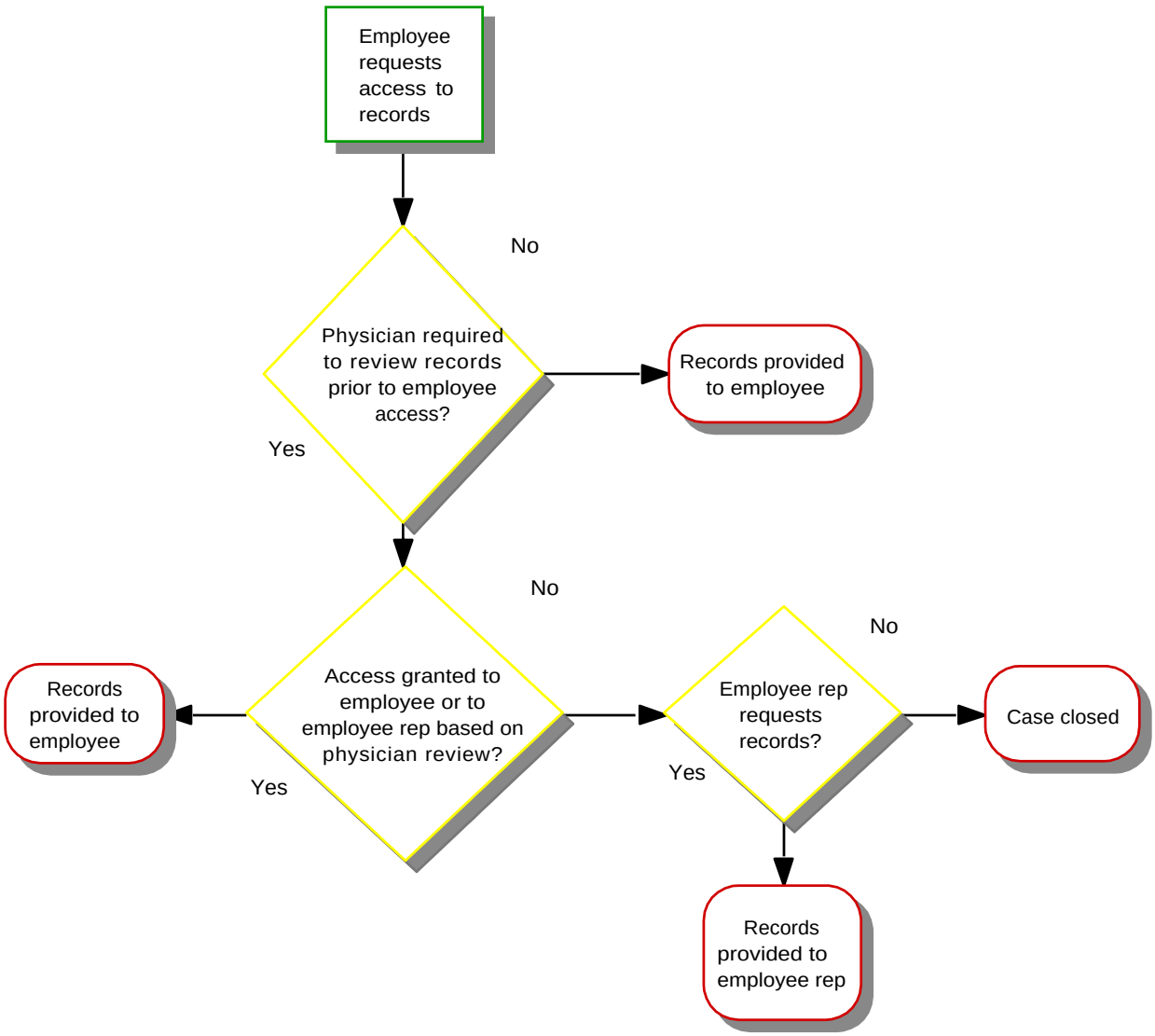
Exposure and medical records may be kept in an employee's personnel files, in a physician's office, or contained within claim files such as Workers' Compensation.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads or others on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training for the effective implementation of this safety policy and procedure.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Access to Medical Records Flow Chart



APPENDIX A: Employee Request for Access to Medical Records

I, _____, hereby request access to any and all employment-related medical records, maintained on my behalf, by NCDOT. This request, unless specifically noted below, includes all employment-related medical records maintained by NCDOT and/or any private health care provider for which NCDOT has knowledge. I acknowledge that this request pertains only to access of employment related medical records as detailed in NCDOT's Safety Policy and Procedure # 1910.20**.**

Specific Records Being Requested

_____	_____/_____/_____	_____-_____-_____
Employee Signature	Date	Social Security Number

DESIGNATED REPRESENTATIVE CERTIFICATION

I, _____, certify that I am the designated representative for the above named employee and that he/she has authorized me to obtain the medical records as indicated above. Please forward these records to my attention at the address below.

_____	_____
Name	Employee Signature
_____	_____
Address	Representative Signature
_____	_____/_____/_____
City State Zip Code	Date

SUBMIT COMPLETED FORM TO YOUR MANAGER OR UNIT HEAD

Aerial Truck Operations SPP# 1910.67

Select this Link to view latest Revision changes

Contents

Select this Link to view
latest Revision changes

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for aerial truck operations in the servicing of traffic signals or other maintenance activities within the North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

This safety policy and procedure provides guidelines for safe aerial truck operations to protect traffic control technicians and other NCDOT employees ~~and~~ to eliminate collisions between aerial buckets and large trucks or other structures. It includes provisions for training, brief discussion of general hazards of aerial truck operations, a listing of some of the common aerial truck operations, and recommended safe work practices.

This document also details the areas of responsibility for managers/unit heads, supervisors, aerial truck operators, aerial truck crew, and Safety and Risk Management within NCDOT.

This safety policy and procedure affects NCDOT employees in Traffic Services and Traffic Engineering and employees in any other operations who as a result of their job duties are exposed to aerial truck hazards.

3.0 Reference

This policy is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.67), Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.453), and NCDOT traffic control practices.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, when an aerial truck device is used, two or more individuals will always be on scene during the traffic signal servicing operation. When aerial truck hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Aerial Truck Operations will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Aerial Truck Operations. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined under Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Aerial Truck Operations.

6.1 Definitions

Aerial Truck
A truck that is designed to lift workers up in a bucket or platform by telescoping and/or articulating mechanisms.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Aerial Truck Hazards
- Aerial Truck Operations
- Aerial Truck Safe Work Practices

6.2.1 Training

Aerial truck operators and other employees as applicable shall be instructed in the recognition and avoidance of hazards associated with aerial truck hazards.

Special training is required employees who operate the aerial truck and must set up traffic control as applicable. Those employees must be properly trained in the procedures for the safe performance of their assigned duties.

This training shall be made available upon initial employment or job re- assignment. Refresher training shall be provided upon the discretion of the supervisor.

6.2.2 Aerial Truck Hazards

The major hazards associated with aerial truck devices when performing traffic signal servicing include:

- Aerial devices coming into contact with electrical wiring
- Vehicle traffic
- Inclement weather during emergency call outs
- Fall hazards
- Aerial equipment upset

This list is not all inclusive. There are many other various hazards that arise with each situation and that must be properly anticipated, recognized, avoided, and controlled.

6.2.3 Aerial Truck Operations

The servicing of traffic signals is several distinct operations. These operations are:

- Construction or new installation of a signal system
- Planned maintenance of a signal system
- Emergency repair of a signal system
- Emergency call out

Construction or new installation of a signal system involves setting poles, stringing span wire, hanging signal heads, running cable, cutting pavement, installing loop detectors, plowing loop wire in the shoulders, and installing the cabinet hardware.

Planned maintenance of a signal system involves replacing bulbs, cleaning the signal heads, adjusting the alignment of the heads and any other items that may apply during this type of operation.

Emergency repair of a signal system involves repairs due to accidents, storm damage, or electrical malfunction of the individual signal head.

Emergency call out involves emergency operations after normal working hours either at night or on holidays and weekends.

Any other maintenance tasks requiring the use of aerial truck.

6.2.4 Aerial Truck Safe Work Practices

The following safe work practices shall be followed when aerial truck devices are used in the servicing of traffic signals or other tasks:

- The brakes shall be set and when outriggers are used, they shall be positioned on pads or a solid surface. Wheel chocks shall be installed before using an aerial lift on an incline, provided they can be safely installed.
- Two or more individuals will be on scene during the traffic servicing operation

- The second individual (individual on the ground) shall be trained in first aid
- Aerial truck is not to be touched if it comes into contact with electrical wiring
- The aerial truck operator shall not tie off to an adjacent pole, structure, or equipment while working from the aerial bucket
- The aerial truck operator shall wear a **full body harness** with a lanyard or fall restraint device attached to the aerial bucket when working in the aerial lift
- Fall restraint device (restraint or retractable lanyard) will protect the operator from fall or being ejected out of the bucket in event of aerial lift malfunction causing sudden unplanned movement of the bucket
- Sufficient signs, racks, and traffic cones shall be available for the appropriate traffic control
- The ground person shall be instructed in the operation of the aerial device Emergency phone numbers and location of cellular phones shall be readily known and accessible
- Technicians or other operators should also refer to the aerial lift manufacturer's safe operating practices for additional information.
- Traffic Service Technicians can respond to trouble calls alone if the trouble is known to be cabinet work, where all the work is off the road and not involving traffic control or aerial work. Otherwise, two or more individuals should always be on the scene of traffic signal servicing.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure that the necessary traffic servicing, traffic control and aerial lift equipment along with PPE including full body harnesses, fall restraints or fall protection lanyards and other supplies are budgeted for and acquired. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance through their auditing process.

Managers/Unit Heads will ensure that supervisors are capable of recognizing and taking steps to avoid the exposure of any employee to aerial truck hazards due to traffic signal servicing.

6.3.2 Supervisors

Supervisors will ensure that all traffic control technicians and other personnel working out of an aerial lift have received the required training prior to performing any duties. They shall also ensure that the traffic control technicians and other personnel working out of an aerial lift have been instructed in the recognition and avoidance of hazards due to aerial truck operations.
Supervisors will ensure that the ground employees (helpers, additional technicians) have been instructed in the operation and hazards of aerial truck devices

6.3.3 Aerial Truck Operators

Aerial Truck operators shall be responsible for knowing the potential hazards associated with aerial truck operations. They will also be responsible for refraining from work if the hazards due to the operation have not been addressed. Additionally, they will be responsible for instructing the ground personnel of any hazards during operation.

6.3.4 Aerial Truck Crew

Aerial truck crew shall be responsible for assisting the Aerial truck operator in the aerial bucket. At least one of the crew shall be trained in first aid and be familiar in flagging and directing traffic as the situation warrants.

Employees in the work crew will report suspected hazards to their immediate supervisor and are required to follow instructions by the trained responsible party in all matters of work with or near aerial truck devices.

6.3.5 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to manager/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure

Back Protection SPP# 1910.001

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures for implementing the North Carolina Department of Transportation (NCDOT) Back Protection Program.

2.0 Scope and Applicability

Back injuries represent the most common type of workers' compensation claim in NCDOT. Jobs within NCDOT with high rates of back injuries tend to be those requiring a great amount of manual load handling. Eliminating and/or minimizing back injuries can result in lower workers' compensation costs and promote the well-being of employees.

This safety policy and procedure emphasizes the program management aspects of NCDOT's Back Protection Program. NCDOT's ***Back at Work*** Program, designed to emphasize proper lifting techniques, is a component of NCDOT's Back Protection Program.

This safety policy and procedure provides guidelines to implement an effective Back Protection Program in the workplace. It includes provisions for employee lifting training entitled, ***Back at Work***, and discussion on work related risk factors for back pain. Additionally, to assist managers/unit heads, techniques are presented in

identifying jobs with those risk factors and tools are provided to help analyze lifting tasks.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects any NCDOT employee who as a result of his or her job duties performs manual lifting.

3.0 Reference

This safety policy and procedure is established in accordance with NCDOT's ***Back to Work*** Program as well as with recognized general industry safe work practices that have effectively minimized back injuries.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT management will administer a back protection program and at risk employees will receive the required training. When lifting hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and additional training regarding Back Protection will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Back Protection. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT.

6.1 Definitions

Behavior Modification
Changing an employee's action or motions from a negative, accident/injury prone behavior to a positive, safe action or motion.

Mechanical Equipment
Any device designed to aid in moving material including cranes, hand trucks, pallet jacks, forklifts, etc.

Lifting Belt
A support designed for the lumbar area of the lower back to provide additional support when lifting.

Risk Factors
Exposures and personal characteristics that affect an individual's chances of experiencing pain associated with lifting related injuries to the back.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Risk Factors
- Identifying Jobs with Risk Factors
- Minimizing Lifting Related Back Injuries

6.2.1 Training

NCDOT employees who perform manual lifting shall attend ***Back at Work*** training on proper lifting techniques.

Back belts are not to be used or assigned to employees until they complete the ***Back at Work*** training. Figure 1 presents how a lifting belt is typically worn.

Figure 1

Training shall be provided upon initial employment and/or new job assignment. Periodic refresher training shall be conducted at the discretion of the supervisor.

Training will include, but is not limited to, proper lifting techniques, proper use of the back belt, injury prevention, and behavior modification.

6.2.2 Risk Factors

There are major differences in the ability of individuals to withstand lifting and other demanding physical labor. Because back pain results from different circumstances, an individual's exposure and personal characteristics affect his or her chances of experiencing lifting related back injuries. Work related risk factors have been identified from various studies and include:

- Heavy lifting and heavy work
- Frequent lifting
- Lifting loads near one's strength capacity
- Occasional very stressful load handling
- Sudden unforeseen events (accidents)
- Prolonged standing or sitting
- Other suspected risk factors, including whole body vibration, pushing, pulling, carrying, twisting, and bending
- Employee's physical condition

Other personal factors that make certain individuals more suspectible to back injury are not included in the above list. Those jobs and tasks that have several or many of the above risk factors should receive a higher priority in assessing your operation's back injury risks.

6.2.3 Identifying Jobs with Risk Factors

Focusing on the more significant problem areas of back injury potential is the most cost-effective approach in examining the jobs and tasks in your operation. A two-stage prioritizing scheme is recommended when examining your manual lifting operations. First, identify those jobs that involve many of the risk factors. Second, for those identified jobs, specific lifting tasks should be singled out for further analysis.

Appendix A presents forms to identify jobs and specific lifting tasks at higher risk levels of lifting related back injuries. Once these specific lifting tasks are identified, Appendix B should be used to quantitatively assess those lifting tasks.

6.2.4 Minimizing Lifting Related Back Injuries

Once specific lifting tasks are identified and assessed, if required, examine options to eliminate or minimize those lifting related back injuries. Look at:

- Elimination of the lifting
- Substitution of the nature of task, if elimination is not possible
- Control stress level imposed on the back when lifting if the two previous approaches do not work

Appendix C presents a checklist to assist the user in exploring ways to eliminate, substitute, or control the lifting tasks that could cause back injuries.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of equipment and supplies to aid in minimizing lifting related back injuries. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance through their auditing process.

6.3.2 Supervisors

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will ensure that employees are properly trained before using lifting belts and that they are being worn properly. Supervisors will ensure that no employee is required to lift beyond his or her capabilities. Upon request, employees are to receive assistance in lifting.

6.3.3 Employees

Employees are to report any unsafe act associated with this policy to their supervisors. Employees are to report any injury to their immediate supervisors.

Employees that are assigned lifting belts are to maintain them and have them replaced when torn or frayed. Employees must attend NCDOT's ***Back at Work*** program before being authorized to use lifting belts.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training and will provide ***Back at Work*** training at the request of managers/unit heads.

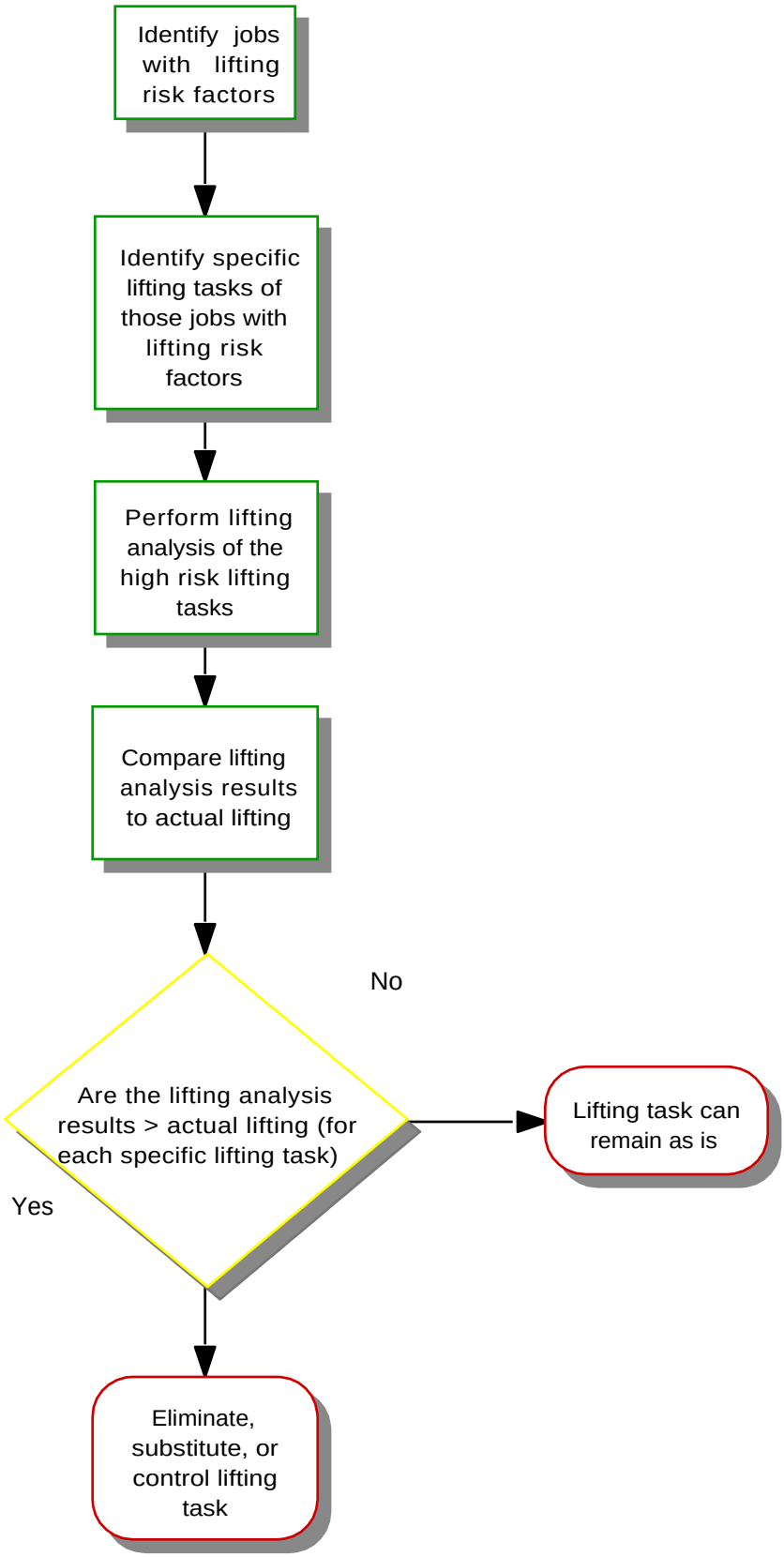
Safety and Loss Control will also work with Purchasing and the Central Equipment Unit to ensure that all newly purchased lifting related equipment and supplies comply with current safety regulations.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Equipment Unit

Central Equipment Unit will support Division/Units with the selection and purchase of lifting equipment and supplies.

Back Protection Flow chart



APPENDIX A: Back Injury Risk Factor Assessment

Facility/Jobsite:_____ Location:_____
Person Performing Assessment_____ Date:_____

Instructions

The following sequence is recommended to perform the Back Injury Risk Factor Assessment:

- Identify and list all the jobs in your facility or operation with frequent reports of back injuries (examine accident/injury data as needed).
- Indicate the risk factors that are present for each of those previously identified and listed jobs.
- Note the jobs that require frequent lifting and occasional very stressful lifting. Jobs with frequent lifting and occasional very stressful lifting should be ranked high.
- Make comparative assessments as to which jobs are the most physically stressful to the least physically stressful. (Obtain input as needed from employees experienced in performing several of the jobs.)
- Note the jobs which are the most physically stressful for further examination.
- List the lifting tasks for the highest priority jobs.
- Rank each lifting task, with input from employees, against each other in how stressful the task is to their backs. For example, if there are three lifting tasks, rank them as the most stressful, second most stressful, and least stressful.

Job	Heavy Lifting and Heavy Work	Frequent Lifting	Lifting Loads Near One's Strength Capacity	Occasional Very Stressful Load Handling	Sudden Unforeseen Events (Accidents)	Prolonged Standing or Sitting	Other Risk Factors

*Includes whole body vibration, pushing, pulling, carrying, twisting, and bending
A check mark indicates a confirmatory condition.

APPENDIX A: Back Injury Risk Factor Assessment (Continued) 2

Job:_____

Lifting Tasks Associated with Job	Stress Rank

Job:_____

Lifting Tasks Associated with Job	Stress Rank

Job:_____

Lifting Tasks Associated with Job	Stress Rank

Once the lifting tasks are identified, perform a lifting task analysis as listed in Appendix B for each task.

APPENDIX B: Lifting Task Analysis

General

The lifting tasks that were identified as being the most stressful from the back injury risk factor assessment in Appendix A probably are exceeding the safe lifting weight for that particular situation. The most stressful lifting tasks should be evaluated to determine if the recommended weight for that particular lifting situation is being exceeded.

Lifting Analysis

A lifting task is considered to be the act of manually grasping and raising an object of definable size without mechanical aids.

The National Institute of Occupational Health (NIOSH) developed a lifting equation which quantifies the variables involved in lifting. This equation is:

$$AL = 90\ (6/H)\ (1-0.01|\ V-30|)\ (0.7+3/D)\ (1-F/F_{max}\ )$$

Where:

- AL = Action level, in lbs, that over 75 percent of women and 99 percent of men can safely lift
- H = Horizontal location forward of the ankles at origin of lift (inches)
- V = Vertical location at origin of lift (inches)
- D = Vertical travel distance, either up or down, between origin and destination of lift
- F = Average frequency of lifts (lifts/minute)
- F_{max} = Maximum frequency which can be sustained (See Table B-1)

These variables are assumed to have the following limits:

- H is between 6 inches and 32 inches.
- V is assumed between 0 inch and 70 inches representing the range of vertical reach for most people.
- D is assumed between 10 inches and (80-V) inches. For travel less than 10 inches, set D = 10.
- F is assumed between 0.2 (one lift every five minutes) and F_{max} (see Table B-1). For lifting less frequently than once per five minutes, set F = 0.

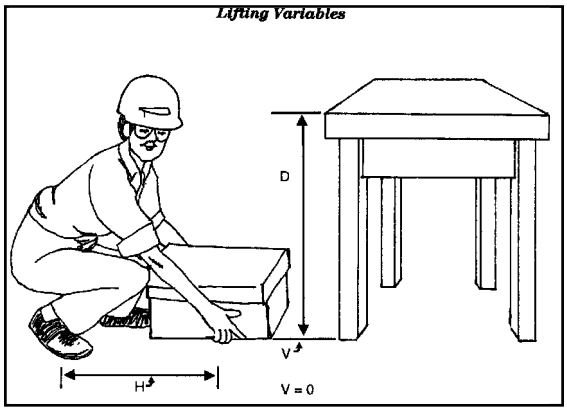


Figure 2

Figure 2 illustrates these lifting variables.

APPENDIX B: Lifting Task Analysis (Continued) 2

Table B-1 presents the maximum frequency (F_{max}) which can be sustained for either a standing or stooped position for a 1 hour (occasional) or 8 hour (continuous) period. Select the appropriate F_{max} value for the particular lifting task being analyzed.

Table B-1: F_{max} Table (lifts/minute)

	Average Vertical Location (inches)	
Period	V>30 Standing	V< 30 Stooped
1 hour	18	15
8 hours	15	12

Example: Given a continuous stooped lifting situation for an 8 hour period with:

H = 8 inches
V = 16 inches
D = 40 inches (average distance)
F = 6 lifts/minute

F_{max} = 12; From 8 hours for V < 30 in a stooped position

Then:

AL = 90 (6/8) (1-0.01|16-30|) (0.7+3/40) (1-6/12)
= 90 (0.75) (0.86) (0.78) (0.5) = 22.5 lbs

Comparison of Lifting Analysis to Actual Lifting

If the actual weight for the lifting task exceeds the calculated action level for that task, then that lifting task either needs to be eliminated, substituted, or controlled.

See Appendix C for additional guidance for addressing these circumstances.

APPENDIX C: Lifting Task Redesign Checklist

Lifting Task: _____

Yes	No		
			Elimination Questions
☐	☐	•	Is there really a need for the lifting task?
☐	☐	•	Can the need for lifting the load be eliminated?
			Substitution Questions
☐	☐	•	Could lifting equipment be used instead of the worker's arm and back muscles?
☐	☐	•	Could the weight of the load be reduced?
			Control Questions
☐	☐	•	Could the load be packaged differently so that the natural way to grasp it would place it closer to the body?
☐	☐	•	Could the load be stored differently to reduce the horizontal distance from the body at both pickup and set down points?
☐	☐	•	Could the load be packaged differently so that the vertical distance above the floor during both pickup and set down is above knee height and below shoulder height?
☐	☐	•	Could the load be stored differently so that the vertical distance above the floor during both pickup and set down is above knee height and below shoulder height?
☐	☐	•	Could the vertical distance between the pickup point and set down point be reduced?
☐	☐	•	Could the frequency rate of lifting be reduced?
☐	☐	•	Could the duration of a lifting session be shortened?
☐	☐	•	Could handles or another type of grasping point be made available to improve comfort and control during the lift?
☐	☐	•	Could the need to rotate from left to right, or right to left, be reduced?

Housekeeping at Construction Sites SPP# 1926.25

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the protection and safety of North Carolina Department of Transportation (NCDOT) employees at construction sites.

2.0 Scope and Applicability

NCDOT construction sites can present many hazards to employees when they are performing construction-related activities. Keeping a construction site relatively clean of debris can further reduce hazards. The benefits of good housekeeping far exceeds the small additional effort required to establish good housekeeping practices at a construction site.

This safety policy and procedure provides information on activities to implement a housekeeping program at a construction site. It also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT. This document affects all NCDOT employees at NCDOT construction sites.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.25).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death and serious physical harm to employees or the public. Therefore, all employees on NCDOT construction sites will practice good housekeeping to further reduce hazards to employees. When construction hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Housekeeping will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Housekeeping. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Housekeeping.

6.1 Definitions

Debris
Unusable or unwanted construction waste material.

Form Lumber
Lumber that is used to contain liquid concrete into defined shapes until the concrete hardens.

Hazardous Waste
Waste that is either toxic to humans or to the environment.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Construction Scrap and Debris
- Construction Waste Disposal

6.2.1 Training

Employees will be trained to work safely on construction sites by following good housekeeping practices. Employees will be trained in:

- The importance of housekeeping
- The benefits of housekeeping

Employees will be trained at time of initial employment or assignment.

6.2.2 Construction Scrap and Debris

Scrap material and debris generated during construction usually consist of:

- Non-combustible scrap material and debris
- Combustible scrap material and debris

Non-combustible scrap material and debris that consist of form and scrap lumber with protruding nails, and all other debris, must be kept cleared from work areas, passageways, and stairs, and from around buildings or other structures.

Nails should be removed from used lumber before stacking. Combustible scrap and debris must be removed at regular intervals during the course of construction without increasing the hazard exposure to employees who remove such debris. See SPP# 1910.141, Sanitation, for related information on construction sites.

6.2 .3 Construction Waste Disposal

All construction waste must first be collected into containers before disposal. The categories of construction waste generated at a construction site include:

- General waste and trash (non-toxic, non-hazardous)
- Hazardous waste

Separate containers must be provided for the collection and separation of waste, trash, and other refuse.

Additional separate containers must be provided with lids for hazardous wastes to prevent sparks or other ignition sources from coming into contact with hazardous waste. Hazardous wastes can include used oil, used oil filters, oily rags and flammable wastes as well as caustics, acids, harmful dusts, etc.

Absorbent that is used to collect incidental used oil spills and oily rags can be disposed of in waste collection dumpsters. Used oil filters must be drained of oil before they can be disposed into separate waste containers.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of containers and other related supplies to maintain effective housekeeping practices at construction sites. Managers/Unit Heads will obtain and coordinate the required training for employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that employees are instructed on good housekeeping practices when performing their job duties.

6.3.3 Employees

Employees are responsible for following good housekeeping practices in the performance of their job duties.

Employees shall report any hazardous conditions to their immediate supervisor.

6.3.5 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Construction Housekeeping Checklist

Construction Site:_____
Location:_____
Division/Unit:_____
Date:_____

Yes	No	
☐	☐	Are protruding nails, form and scrap lumber, and other debris kept clear from work areas, passageways, and stairs, in and around buildings or other structures?
☐	☐	Are combustible scrap and debris being removed at regular intervals during the course of construction?
☐	☐	Are containers being provided for the collection and separation of waste and trash?
☐	☐	Do the containers for the hazardous wastes (oily rags and flammable wastes such as caustics, acids, harmful dusts, etc.) have lids?

Author:	Paul Roberts	Revision #:	2
Approved By:	Bobby Lewis	Date Revised:	March 2019

SAFETY POLICY & PROCEDURE

Select this Link to view latest Revision changes

Right of Inspection SPP# 1926.03

Table of Contents

Select this Link to view
latest Revision changes

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for North Carolina Department of Transportation (NCDOT) employees to cooperate effectively with Occupational Safety and Health Administration (OSHA) compliance inspections and to ensure that OSHA compliance inspections are conducted in a professional and structured manner.

2.0 Scope and Applicability

The North Carolina Department of Labor, Division of Occupational Safety and Health, is designated to administer and enforce OSHA within both the private and public sectors in North Carolina. The enforcement of OSHA is accomplished in part by work site inspections conducted by compliance officers.

This safety policy and procedure provides guidelines to be followed when an OSHA inspection occurs. It includes provisions for informing employees about typical OSHA inspections and discussion on the components of an OSHA inspection.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Risk Management within NCDOT.

This safety policy and procedure affects every NCDOT employee.

3.0 Reference

This safety policy and procedure is established in accordance with the Occupational Safety and Health Act of 1970 which authorizes OSHA to conduct workplace inspections.

4.0 Policy

It is the policy of NCDOT to provide the right of entry to any regulatory agency official or its representative to any work site or facility owned or operated by NCDOT upon presentation of appropriate credentials**.**

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on OSHA Inspections. It is also the responsibility of each NCDOT employee to report immediately any OSHA inspection activity to his or her supervisor.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on OSHA Inspections.

6.1 Definitions

Compliance Officer
A representative of OSHA who has been trained and has been authorized to conduct work place safety inspections.

OSHA
Occupational Safety and Health Act. In North Carolina, the OSHA Act is administered by the North Carolina Department of Labor (NCDOL).

Types of Inspections (Defined)

1. **Employee Complaint Inspection –** Employee or former employee files a complaint alleging a violation of OSHA standard in their workplace.
2. **Programmed Inspection –** OSHA schedules their Program Inspections of workplaces based on historical DART (Days Away from Work and Restricted Work or Job Transfer) rates. This is the most common type of Inspection.
3. **Follow-Up Inspection –** To determine if violation cited by prior Inspection has been corrected.
4. **Investigation Inspection –** To determine if violation of OSHA standards resulted in event of workplace fatality or hospitalization of employee.
5. **Imminent Danger Inspection –** If an OSHA compliance officer observes situation at worksite where a danger of serious harm or fatality may be present.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Validating OSHA Officers' Credentials
- NCDOT Notification Process
- Opening Conference
- OSHA Inspection Process
- Closing Conference

6.2.1 Training

No formal training is to be provided to employees. However, employees and supervisors should be informed about the typical inspection process that may be performed by North Carolina Occupational Safety and Health Administration (NCOSHA). This information should be provided upon initial employment or on a one-time basis and should contain:

- How a typical OSHA compliance inspection is conducted
- Employees' responsibilities when an OSHA compliance officer arrives on a job site

6.2.2 Validating OSHA Compliance Officer's Credentials

OSHA compliance officers should present their credentials once they arrive on site for an inspection. Employees should ask to see their identification if it is not presented. As needed, NCDOL can be called to verify the identity of the compliance officer.

The OSHA compliance officers should be asked to wait for the assigned qualified safety professional who has been notified prior to the start of inspection process. Let the OSHA compliance officer know what the estimated response time by the safety professional may be.

6.2.3 NCDOT Notification Process

Your site NCDOT management and assigned safety professional as well as the Safety and Risk Management's office should be contacted immediately in the event of an OSHA inspection. All employees should inform the compliance officer that they are required to notify their supervisor and NCDOT's safety personnel. All employees should make every effort to contact their supervisor and NCDOT's assigned safety professional, so they can be present during the inspection.
In the event your local safety professional is not available, Safety and Risk Management will provide onsite assistance.

6.2.4 Opening Conference

The OSHA compliance officer will conduct an initial meeting in which he or she will explain how the site was selected, the purpose and type of inspection for the visit, the scope of the inspection, and the standards that apply.

NCDOT will be asked to select a representative(s) to accompany the officer during the inspection. This representative(s) should be NCDOT managers/unit heads and qualified safety professional or supervisors and a qualified safety professional or a Safety and Risk Management representative, if possible.

6.2.4 OSHA Inspection Process

The inspection process typically begins with a walk through of the work site or facility. The compliance officer will take statements, photographs, videos, measurements, and talk with employees. The compliance officer will examine safety and health conditions and practices, examine records, collect air samples, measure noise levels, and monitor employee exposure to toxic fumes, gases, and dusts. The compliance officer will interview employees and take statements from selected individuals. By regulatory mandate, NCOSHA can conduct private interviews without management's presence.

All employees should truthfully respond to all questions from the compliance officer. If a response is not known to a question, employees should simply state, "I do not know. You will need to speak with my supervisor."

If possible, NCDOT should take the same photographs and videos of the same items as the compliance officer. This will allow NCDOT to document the conditions at the time of the inspection.

6.2.4 Closing Conference

At the end of the inspection, the compliance officer will conduct a closing conference. The compliance officer will discuss all unsafe or unhealthful conditions observed during the inspection and will indicate all apparent violations for which a citation and a penalty may be issued or recommended. The compliance officer will apprise NCDOT of its rights under the OSHA Act.

If the compliance officer deems that a second closing conference or follow-up is necessary by phone or in person, the DOT Safety Professional will schedule for suitable date when they can be present. The OSHA compliance officer should not just show up unannounced for second closing conference or follow-up.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available for the purchase of proper equipment and training for compliance with applicable safety policy and procedures. Managers/Unit Heads will ensure they maintain on site Workplace Safety and Safety Policy and Procedure Manuals. Compliance with applicable standard operating procedures and safety policy and procedures will help ensure compliance with applicable OSHA regulations.

Managers/Unit Heads will obtain and coordinate the required training for affected employees. Managers/Unit Heads will also ensure compliance with all applicable safety policy and procedures through their auditing process.

Managers/Unit Heads will contact Safety and Risk Management or their assigned safety engineer as soon as possible when OSHA compliance officers arrive on site.

6.3.2 Supervisors

Supervisors are responsible for ensuring that their employees are aware of what they should do if an OSHA compliance officer arrives for an Inspection.

Speaking to a compliance officer is not a requirement, it is a right. Therefore, supervisors are NOT compelled to answer questions during a private interview with a compliance officer.

6.3.3 Employees

Employees are responsible for informing their supervisors when OSHA compliance officers arrive on site.

Employees should truthfully respond to all questions posed by the compliance officer. Guesses or speculation is not acceptable.

6.3.4 Division or Unit Safety Staff

Division and Unit Safety Staff are qualified Safety Professionals that shall make every effort to attend OSHA Compliance Inspections upon notification of Unit being inspected.

Communications that occur with NCDOL after a walkthrough should make every effort to protect Personal Health Information. If 300 Logs are to be transmitted they should be transmitted utilizing fax, encrypted email, or certified mail.

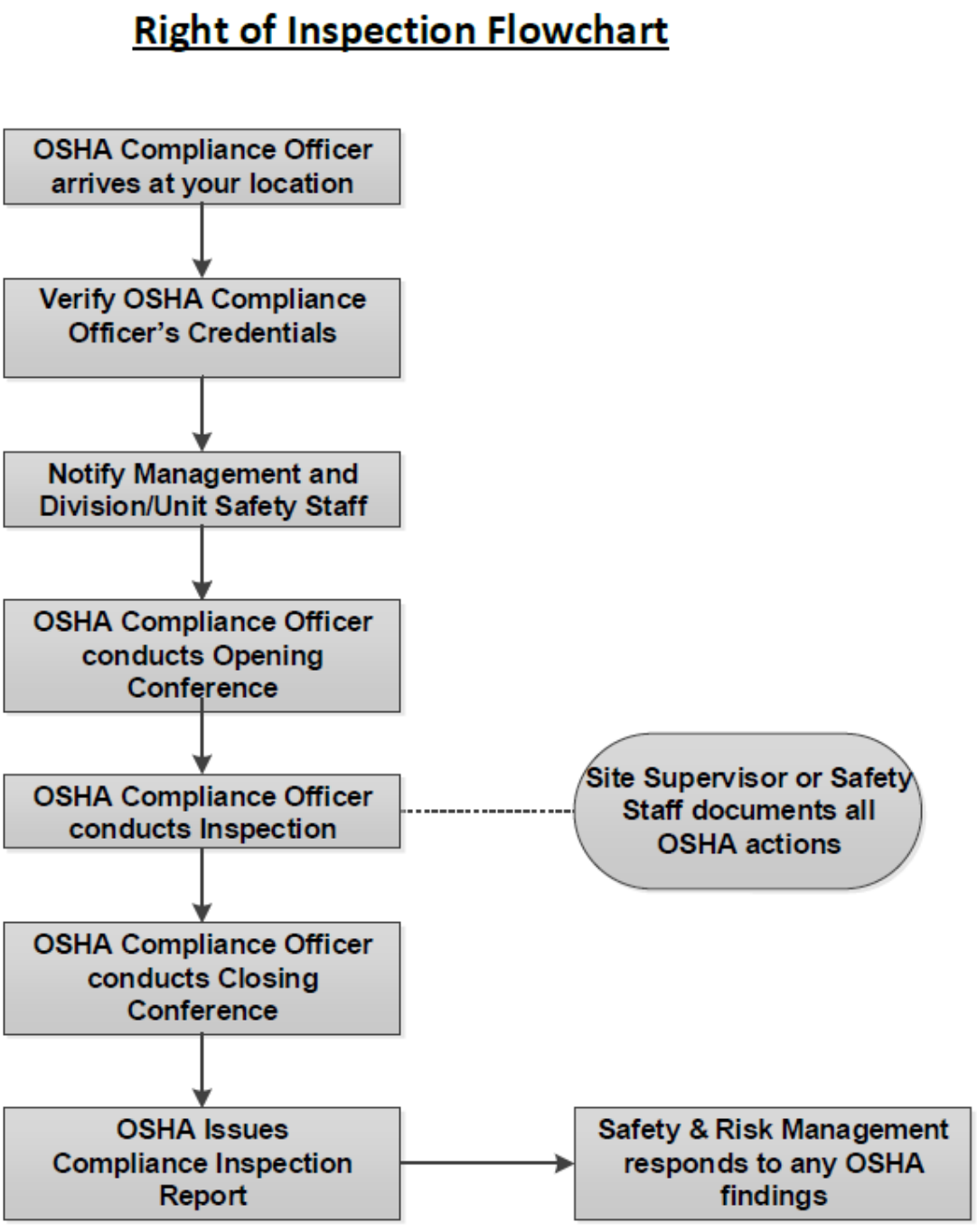
The designated safety professional shall be the primary point of contact while the inspection is being conducted.

6.3.5 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary when notified of an OSHA compliance inspection or on any matter concerning an OSHA inspection. Safety and Risk Management will assist in developing or securing the required training. Safety and Risk Management will take a lead role in assessing any outcome of an OSHA inspection and in determining the appropriate follow up action to an OSHA inspection.

Additionally, safety engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Appendix A: Right of Inspection Flowchart



Appendix B: NCDOT OSHA Inspection Checklist Form

Yes No

❑ ❑ Did the OSHA Compliance Officer show identification?

General

OSHA Compliance Officer's Name _____

Date of Inspection _____

Location of Inspection _____

Time Inspection Began _____

Time Inspection Ended _____

What safety and health conditions and practices were examined? _____

_____

_____

What records were examined? _____

_____

_____

Air Samples

Yes No

❑ ❑ Were any air samples taken? If yes, indicate below

Air Sample Log					
Air Sample #	Date	Time	Type of Sample	Location	Work Conditions

Noise Measurements

Yes ❑ No ❑ Were any noise measurements taken? If yes, indicate below.

Noise Measurements Log						
Noise Sample #	Date	Time	Type of Instrument Used	Location	Work Conditions	dB Reading

Exposure Measurements

Yes ❑ No ❑ Were any other exposure measurements taken? If so, describe.

Exposure Measurements Log							
Contaminant	Sample ID	Date	Start Time	End Time	Media Measurement Instrument	Location	Work Conditions

Safety Assessment of Leased Property SPP# A-3

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to provide guidelines and checklists for the evaluation of leased property within North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

Currently leased facilities and proposed leased space must be evaluated for fire protection and life safety. These evaluations are part of the leasing procedures coordinated by the State Property Office.

This safety policy and procedure provides guidelines and a checklist to assist NCDOT safety personnel in leased property assessments.

This document applies to those employees who perform leased property assessments for NCDOT.

3.0 Reference

This safety policy and procedure is established in accordance with State Property Office and Department of Insurance guidelines.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, all NCDOT leased properties will be assessed for life and fire safety.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Safety Assessment of Leased Property. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Safety Assessment of Leased Property.

6.1 Definitions

Leased Property
Property that is rented from another property owner and used for NCDOT purposes.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Leasing Authority
- Fire and Safety Checklist

6.2.1 Leasing Authority

The State Property Office delegates leasing authority to NCDOT in a two-tier system. This two-tiered system is:

- Property leases with annual rental not exceeding $5,000
- Property leases with annual rental between $5,000 and $12,000 and lease term not exceeding 3 years

NCDOT executes property leases with annual rental not exceeding $5,000. NCDOT also executes leases for properties with annual rental between $5,000 and $12,000 and lease terms not exceeding 3 years by submitting a proposal to lease form to the State Property Office.

The State Property office executes those leases with annual rentals exceeding $12,000 and/or terms exceeding 3 years.

6.2.2 Fire and Safety Checklist

Appendix A presents a fire and safety checklist developed by the Department of Insurance which is to be used in leased facilities evaluations. This checklist can be used to:

- Evaluate existing fire and safety conditions on leased properties (existing and proposed)
- Evaluate and compare competitive proposals for leased spaces

This checklist is to be used by NCDOT safety personnel (Division Safety Officers and Safety and Loss Control Safety Engineers) to evaluate existing and proposed leased spaces under NCDOT's leasing authority.

This checklist should be completed far enough in advance of the lease renewal or potential new lease to permit effective negotiations for building safety improvements. This list is not all-inclusive and a building which looks good may still have conditions detrimental to life safety or loss prevention.

For existing or proposed leases with annual rentals between $5,000 and $12,000 and the lease term not exceeding 3 years, a "*Proposal to Lease*" (State Property Office Form PO-28) must be attached. The Department of Insurance inspects proposed or existing leased locations that exceed $12,000 in annual rental or the lease term exceeds three years.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for identifying the leased buildings and/or facilities in their organizations. They will also identify which of these buildings and/or facilities are under NCDOT's direct leasing authority and which ones are not. They will coordinate and obtain fire and safety inspections as required by this safety policy and procedure.

Managers/Unit Heads are also responsible for communicating building and/or facility life and fire safety deficiencies to the State Property Office and the building owner.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will assist as requested in the life and fire safety inspections of buildings and/or facilities. They will also note any life and fire safety deficiencies during their facility and jobsite audits.

6.3.3 Employees

Employees shall report any life and fire safety deficiencies in buildings and/or facilities to their immediate supervisor.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure.

Safety and Loss Control Safety Engineers will perform life and fire safety assessments of buildings and/or facilities and provide technical guidance to other safety personnel performing such inspections.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Leased Property Fire and Life Safety Checklist

DATE:_____

EVALUATION BY: _____
MAIL ADDRESS: _____
TELEPHONE#/FAX#: _____
BUILDING CHECKED: _____
STREET ADDRESS: _____
CITY,STATE, ZIP: _____
OWNER'S REP: _____
TELEPHONE#/FAX #: _____
TYPE OF LEASE: o RENEWAL o PROPOSED

RESULTS and COMMENTS:_____
_____
_____
_____
_____

YES	NO	EXITS, EXIT ACCESS, AND SEPARATION
o	o	1. Does building have at least two remote exits? If NO, answer Item (2). If YES, skip to Item (3).
o	o	2. Answer (2) ONLY if Item (1) was NO: Does building contain less than 3500 square feet per floor, not exceed two stories, have not over 40 occupants, and travel distance to proper exit not exceed 75 feet? If NO, see Note (A).
o	o	3. Is travel distance to exit or to an enclosed exit stair less than 200 feet (250 feet if sprinklered) and any dead end in exit access corridors less than 20 feet (50 feet if pre-1991 building)? If NO, a Code deficiency exists.

APPENDIX A: Leased Property Fire and Life Safety Checklist (Continued) 2

YES	NO	EXITS, EXIT ACCESS, AND SEPARATION
o	o	4. Are all the exit stairs fully enclosed with at least one-hour fire rated construction, with "B"-labeled doors having closers and latching hardware? (The label is found on door edge, hinge side or top.) If NO, a Code deficiency exists.
o	o	5. Are all vision panels in stair doors wired glass in steel frames, not exceeding 100 square inches? If NO, a Code deficiency exists.
o	o	6. Do all exit stairs terminate outside the building, with direct access to a public space, and do not require re-entering the building? If NO, answer Item (7). If YES, skip to Item (8).
o	o	7. Answer (7) ONLY if Item (6) was NO: If upstairs occupants must re-enter the building at the exit level, is this area or vestibule separated from the remainder of the exit level floor by at least one-hour fire rated construction? If NO, see Note (A).
o	o	8. Are tenant spaces separated by one-hour fire rated construction? (This typically means at least gypsum board walls on steel studs.) If NO, answer (9). If YES, skip to (10).
o	o	9. Answer (9) ONLY if Item (8) was NO: Are the combined areas of multiple tenant spaces divided by walls of at least one-hour fire rated construction into spaces not exceeding 3000 square feet? If NO, a Code deficiency exists.
o	o	10. Is a copy of the Emergency Evacuation and Fire Prevention Plan required under SPP # 1910.38 on hand? Are all elements completed and up to date?

NOTE (A): The exit system may be deficient. The building will have to be evaluated by a building code professional.

APPENDIX A: Leased Property Fire and Life Safety Checklist (Continued) 3

YES	NO	FIRE PROTECTION AND EMERGENCY EQUIPMENT
o	o	11. Does the building have a complete sprinkler system? If NO, see Note B.
o	o	12. Does the building have an automatic fire detection system, with alarms transmitted off-premises? If NO, see Note B.
o	o	13. Are fire extinguishers rated at least 2A on every level and within 75 feet? If NO, a Code deficiency exists.
o	o	14. Do fire extinguishers have tags indicating they have been inspected annually and given a visual check monthly? If NO, a Code deficiency exists.
o	o	15. Is emergency egress lighting having a separate and independent source of power (battery or generator) provided? If NO, a Code deficiency may exist.
o	o	16. Where the location of or the direction to exits is not obvious, are exit signs and directional exit signs provided? If NO, a Code deficiency exists.

NOTE (B): Sprinklers and/or fire alarm may not be required by Code but are highly desirable for life safety and property protection. Because the State is self-insured, it gives preference to sprinklered lease facilities.

APPENDIX A: Leased Property Fire and Life Safety Checklist (Continued) 4

YES	NO	GENERAL ITEMS AND ACCESSIBILITY
o	o	17. Is the building accessible to the handicapped, including parking spaces? If NO, a Code deficiency and/or non-compliance with ADA exists.
o	o	18. Does the building have sufficient, accessible restroom facilities? If NO, a Code deficiency and/or non-compliance with ADA exists.
o	o	19. Are corridors maintained clear and unobstructed at all times? If NO, a Code deficiency exists.
o	o	20. Are all of the electrical panelboards provided with at least three feet clearance, for maintenance purposes and to allow rapid access to the disconnects in an emergency? If NO, a Code deficiency exists.
o	o	21. Are electrical and mechanical equipment rooms kept relatively clear and free of combustible material If NO, a Code deficiency exists.
o	o	22. Is building security acceptable? This includes street lighting, parking arrangements, the surrounding environment, and how well the building is secured against unauthorized entry. You may want to question previous tenants about any crime problems.

Occupational Safety Training SPP# 1926.21

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the North Carolina Department of Transportation (NCDOT) employees to receive occupational safety training related to their assigned jobs.

2.0 Scope and Applicability

A direct relationship exists between the increase in accidents and/or severity of injuries and illnesses and a lack of attention to appropriate safety training. It can be shown through injury/illness statistics, medical and Workers' Compensation costs, and the intangibles of morale and human suffering that NCDOT must make training a vital element in its safety program.

Therefore, this safety policy and procedure provides guidelines to ensure NCDOT employees receive the appropriate safety and health training applicable to their jobs. This document lists the applicable OSHA regulations for NCDOT operations, presents the safety training matrix, and provides discussion on methodologies for

estimating implementation resources. It outlines the minimum components of NCDOT's training program, provides training guidelines, and discusses the importance of matching training to employees. This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and the Division Safety Officer.

This safety policy and procedure affects all NCDOT employees.

Specific applicability to a training requirement will be determined by:

- Job classification
- Incidents of accidents and injuries
- Use of hazardous substances
- New job assignments

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Act of 1970, the Occupational Safety and Health Standards for General Industry (29 CFR 1910), the Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926) and other applicable standards referenced in this safety policy and procedure manual.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT will make training a primary element of its workplace safety program. No employee will be allowed to perform any job related task until the individual has been properly instructed and trained in the safe and proper methods of performing the task. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and additional specialized training will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure NCDOT's safety policy and procedure on Occupational Safety Training is implemented in accordance with this safety policy and procedure. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Occupational Safety Training.

6.1 Definitions

Certified Internal Trainer (CIN)
A NCDOT employee/trainer who has been certified by Safety and Loss Control to teach a specific training course.

Community College (CC)
An educational institution that offers safety training courses and instruction.

Hazard Assessment
The process of reviewing job tasks prior to the operation and identifying any hazards associated with each particular tasks.

Hazard Recognition
Remembrance of the hazards identified in the assessment phase that are associated with a particular job task or operation.

Instructor Outline
A standardized outline, developed using the Instructional Systems Development model, for use by instructors who provide safety training. The outline includes information to be shared with the class as well as prompts for the instructor on when to use various audio-visual aids and other training activities.

Instructional Systems Development (ISD)
An international model used by corporate, government and military trainers to provide a systematic and consistent method of identifying and developing training solutions.

Internal Training (IN)
Safety training conducted by NCDOT employees/trainers.

Job Instructional Training (JIT)
On the job training that uses an informal method of training to instruct individuals on the procedures to follow for a particular operation, task, or procedure. JIT is primarily task related and usually involves one-on-one hands on training.

Lesson Plan
An organized plan containing information relevant to a course. Lesson plans include the purpose of the course, participant objectives, instructional method, the course length, references and other information used by the instructor to provide the appropriate instruction.

Participant Outline
A standardized outline for use by the attendees during safety training.

Safety Training Video
A commercially purchased, or in-house produced, standard VHS video that contains relevant safety training material.

Third Party
An outside provider of safety training to NCDOT employees.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- OSHA Training Requirements Applicable to NCDOT Operations
- Safety Training Matrix
- Estimating Resources to Implement a Safety Requirement
- Training Guidelines
- Minimum Components of Training
- Matching Training to Employees

The general elements of this program are found in the Occupational Safety and Health Act of North Carolina. More than 100 of the current standards contain training requirements. However, the goal of NCDOT is to provide all necessary safety training to employees whether it is OSHA mandatory or non-mandatory safety related training.

6.2.1 OSHA Training Requirements Applicable to NCDOT

NCDOT will instruct each employee in the recognition and avoidance of unsafe conditions and the regulations applicable to his or her work environment to control or eliminate any hazards or other exposure to illness or injury.

The following OSHA training requirements, as contained in the following General Industry (29 CFR Part 1910) and Construction (29 CFR Part 1926) Standards, are applicable to NCDOT operations:

- Arc Welding Equipment (1910.254 and 1926.351)
- Asbestos (1910.1001)
- Compressed Air (1926.803)
- Cranes and Derricks (1926.550)
- Cranes, Crawler Crane, Equipment Operators, Locomotive Crane, Wheel Mounted Crane (1910.180)
- Diving Operations (1910.410)
- Electrical Safety Related Work Practices (1910.331-335 and 1926.416-418)
- Employee Emergency Plans (1910.38)
- Excavation, Trenching, and Shoring (1926.650)

- Explosives and Blasting Agents (1910.109 and 1926.900)
- Fire Detection Systems (1910.164)
- Fire Prevention and Protection for Welding, Cutting, and Brazing (1910.252 and 1926.352)
- Fire Prevention Plans (1910.38)
- Fixed Extinguishing System (1910.160)
- Flammable and Combustible Liquids (1910.106)
- Forklifts, Tractors, and Other Powered Industrial Trucks (1910.178 and 1916.602)
- Ground Fault Protection (1926.404)
- Ionizing Radiation (1910.96 and 1926.53)
- Lead in Construction (1926.62)
- Lockout/Tagout (1910.147)
- Machine Guarding for Mechanical Power Presses (1910.217)
- Machine Guarding for Woodworking Machinery (1910.213 and 1926.304)
- Medical and First Aid (1910.151 and 1926.50)
- Nonionizing Radiation (1926.54)
- Occupational Noise Exposure (1910.95)
- Overhead and Gantry Cranes (1910.179)
- Oxygen-Fuel Gas Welding and Cutting (1910.253 and 1926.350)
- Personal Protective Equipment (1910.135-138)
- Portable Fire Extinguishers (1910.157 and 1926.150)
- Power Operated Hand Tools (1926.302)
- Powered Platforms, Manlifts, and Vehicle Mounted Work Platforms Operations (1910.66)
- Resistance Welding (1910.255)
- Respiratory Protection (1910.134 and 1926.103)
- Roll-Over Protective Structures for Tractors Used in Agricultural Operations (1928.51)
- Safety Training and Education (1926.21)
- Scaffolding (1926.451)
- Servicing of Single Piece and Multi-Piece Rim Wheels (1910.177)
- Signaling (1926.201)
- Spill Response (1910.120)
- Stairways and Ladders (1910.25 - 27 and 1926.1060)
- Underground Construction (1926.800)
- Ventilation (1910.94)
- Woodworking Tools (1926.304)

Additional safety related training that is necessary but not currently listed in the OSHA regulations include:

- Back Belt Training
- Ergonomics

- Fleet Safety
- New Employee Safety Orientation
- OSHA Inspection Training for Supervisor
- Safety Related Legal Issues for Managers
- Supervisor Safety Responsibilities
- Violence in the Workplace
- Workers' Compensation for Supervisors
- Workzone Safety

This safety policy and procedure manual consolidates many of the previously listed standards and related safety training into single safety policies and procedures. Refer to the indices contained in the back of this manual for a complete cross reference of the safety policies and procedures to the applicable OSHA standards.

6.2.2 Safety Training Matrix

Appendix A presents NCDOT's Safety Training matrix which outlines:

- The course name
- Applicable Safety Policy and Procedure
- Training frequency
- Affected employees
- Length of initial training
- Length of renewal training
- Minimum resources required for training
- Training method
- List of reference materials and sources

NCDOT's safety training matrix reflects all the applicable training requirements reflected in this Safety Policy and Procedure Manual. See the applicable safety policy and procedure for further details for a specific training requirement.

6.2.3 Estimating Resources to Implement a Safety Requirement

NCDOT managers can estimate total resources required for a particular safety requirement by evaluating mathematical expressions found in Appendix B. These expressions allow managers to calculate (in dollars) the resources required in training and implementation of any safety training requirement.

6.2.4 Minimum Components of Training

NCDOT is responsible for establishing training programs that will ensure that each employee is instructed regarding job hazards and the methods by which these hazards are controlled.

The minimum components of NCDOT's training shall include:

- Orientation of New Employees to NCDOT's Safety Program
- Issuance of Employee Handbook
- Specialized Training
- Training Records

Orientation of new employees to NCDOT's Safety Program shall include training in:

- Employee responsibilities
- Employee rights under OSHA
- OSHA regulations applicable to their job
- Applicable requirements in NCDOT's Workplace Safety Manual and the Safety Policy and Procedure Manual

Orientation will include introduction to the NCDOT safety program, information about any known hazards in the workplace, a review of hazard recognition, the use of PPE, how to safely perform assigned job tasks, and the safe operating procedures for each task and piece of equipment to which the employee will be exposed.

Additional material to be covered during orientation includes all chapters applicable to the employee in both the NCDOT Safety Policy and Procedure Manual and the Workplace Safety Manual (WSM).

The issuance of employee handbook, titled *North Carolina State Employee's Safety and Health Handbook*, will occur to all NCDOT employees during their initial orientation. The contents of this handbook are to be reviewed with each employee. The employee must sign and date of the last page of the handbook and return this page to his or her supervisor. Figure 1 presents the contents of this handbook's last page. This page from the employee will be filed in the employee's personnel file.

(Please sign, detach, and return to your supervisor.)

I hereby acknowledge receipt of a copy of the

North Carolina State Government Safety and Health Handbook

I understand that it is my responsibility to become familiar with and abide by these instructions, insofar as they apply to the duties which I shall perform for State Government. (A copy of this certification will be filed with the employee's personnel records.)

Employee's Signature:

_____

Department:

_____

Date:

Figure 1

Specialized training must be established in safety requirements for employees based on job function, job classification, and exposures to hazards.

Training records will be maintained of all training received by employees. As a minimum, training records shall consist of:

- Training course name of training and course outline and/or lesson plan
- Location, date and time the training was conducted
- Names, job title and unit of all employees in attendance
- The instructor(s) name, title and unit
- Copies of any certificates of training issued for the course

Training records shall be stored at the Division/unit office in a file folder (or via computer records) labeled with the corresponding course title for each course provided to employees.

Appendix C contains a training records form for use by NCDOT personnel.

6.2.5 Training Guidelines

NCDOT's safety training program uses the instructional systems development (ISD) process as a means to establish an ongoing training program. The components of the ISD model should be used as a process guideline when an individual within the department begins development or assessment of training products. The components of this process are:

- Analysis - recognition of a flaw that can be corrected through training
- Design - what needs to be taught and how and by whom
- Development - production or procurement of the training materials
- Implementation - provide the training
- Evaluation - measuring the results and making any necessary corrections to the course

Appendix D details the specifics of this training model.

6.2.6 Matching Training to Employees

Training appropriate to the assigned job task is crucial to the effectiveness of safety training. Therefore, it is recommended that NCDOT managers/unit heads:

- Identify the employees at risk
- Train the employees at risk

Identifying the employees at risk can be accomplished by pinpointing hazardous job classifications, examining the incidents of accidents and injuries, and identifying certain variables that disproportionately contribute to accidents and injuries.

Pinpointing hazardous job classifications identifies employees at high levels of risk. In some cases, hazards of a job classification are influenced by the conditions under which the job is performed, such as noise, heat or cold, or safety or health hazards. In these situations, employees should be trained not only on how to perform their jobs safely, but also on how to operate within a hazardous environment.

Examining the incidents of accidents and injuries both within NCDOT and within transportation departments of other states is another good tool. If employees in certain job classifications are experiencing higher accident and injury rates than other employees, training may be one way to reduce that rate. In addition, thorough accident investigation can identify not only specific employees who could benefit from training but also identify NCDOT-wide training needs.

Identifying certain variables that disproportionately contribute to accidents and injuries can also be used to identify employees at risk. The following variables have been identified as contributing to a disproportionate share of injuries and illnesses at the worksite:

- The age of the employee (younger employees have higher incident rates)
- The length of time on the job (new employees have higher incident rates)
- The type of work performed
- The use of hazardous substances

These variables should be considered when identifying employees' safety training needs.

Training the employees at risk is the next step once the at risk employees are identified. Managers/Unit Heads should then consult the Safety Training Matrix (Appendix A) to match the appropriate training to the employee.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for training in their areas. They will also be responsible for identifying the appropriate safety training for employees in their organization. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee to perform hazardous tasks or activities without proper training.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors are responsible for ensuring that only trained and qualified employees are assigned or permitted to perform duties that may be hazardous.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

It is the responsibility of each employee to identify potential hazards associated with required work assignments and report those suspected hazards to his or his supervisor immediately.

It is also the responsibility of each employee to refrain from work involving exposure to potential hazards without instruction/training specific to the hazards of the tasks involved and/or close guidance by a responsible party trained in the recognition and avoidance of hazards.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning safety and health training. Additionally, the Safety Training Manager will coordinate the development of required safety training.

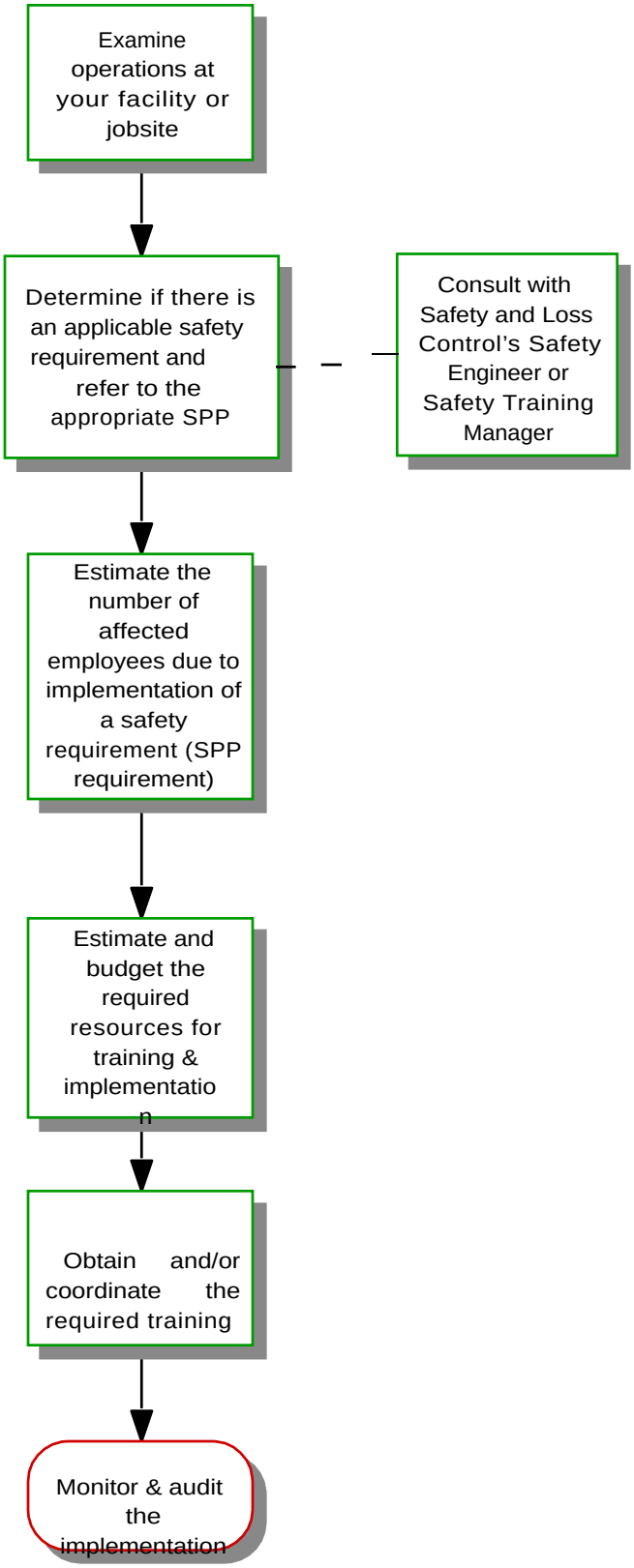
The Safety Training Program Standards Committee will have the general responsibility of reviewing new safety training courses prior to their implementation and also for reviewing modifications to any existing safety training courses.

The Safety Training Manager and Safety Engineers will provide consultative and audit assistance to ensure the effective implementation of this safety policy and procedure.

6.3.5 Division Safety Officers

Division Safety Officers will maintain training records in their divisions in accordance with the requirements in Section 6.2.2.

Safety Training Flowchart



APPENDIX A: NCDOT's Safety and Health Training Matrix

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Hazard Communication [(1910.1200(h))* & (1926.59(h)*) [SAF# 130]	1910.12	Orientation; Pre-assignment / Post-incident & as new hazards are introduced	All DOT Employees	2	1.5	Placarding signs, MSDS sheets, HAZCOM posters, OSHA standards, TV/VCR, PPE info, eyewash & shower instructions, overhead projector	IN/CC
Occupational Exposure to Hazardous Chemicals in the Laboratory(1910.1450 (f)(l))	TBD	Pre-assign, periodic	M&T lab	1.5	1	Laboratory, Placarding signs, booklets, VCR/TV	JIT
Personal Protective Equipment & PPE Hazard Assessment (1910.134-138)*	1910.132	pre-assign & annual	At risk DOT employees identified through hazard assessment	(varies) 3 max.	(varies) 3 max.	Classroom, appropriate PPE, Hazard assessment for each attendee, VCR/TV, booklets	IN/TP
Asbestos-Level III (1910.1001)*	1910.1001A 1910.1001A	TBD	Operations & ferry maintenance, facilities management & their supervisors	16	16	Haz Assessment, PPE, TV/VCR; hand-outs/brochures	CIN
Asbestos-Level IV-Awareness (vehicle brakes)(1910.1001)*	1910.1001	TBD	Equipment shop (Brake installation/repair) & their supervisors	3	3	Haz Assessment, PPE, TV/VCR; hand-outs/brochures	CIN
Asbestos-Level IV-Awareness(1910.1001)*	1910.1001	TBD	Custodial, equipment & maintenance shop	2	2	Haz Assessment, PPE, TV/VCR; hand-outs/brochures	CIN
Bloodborne Pathogens (1910.1030)*	1910.1030	Orientation, pre-assign, annual	Custodial, construction, Safety Officers, M&T lab, Divers, maintenance, ferry crew & operations; DMV enforcement, supervisors, Designated First Aid responders	2.5	1.5	TV/VCR; PPE; Overhead projector, booklets. Trainee must be familiar with Hazard Assessment concepts or have successfully completed the Hazard Assessment/PPE course	IN (Personnel)

APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 2

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Ergonomic Awareness for Employees(Proposed 1910 Appendix D)	TBD (Chapter 14)	Orientation, Pre-assignment, post hazard assessment	All clerical positions,warehouse, maintenance, equipment, BW, HMW, DMV enforcement	1-3 (varies by job class)	1.5	Ergo standards, VCR/TV,booklet, manual	IN
Ergonomics-Risk Assessment (Proposed 1910 Appendix D)	TBD (Chapter 14)	Promotion & annual	Supervisors,SE's & others involved in Ergo risk assessment	24	10	Ergo standards, calculator,anthropometry tables, VCR/TV,booklets, manual, other	TP/CIN
Ionizing Radiation (1910.96(i)(2)* and 1926.53(k)(2)*)[SAF 100 & 200]	1910.96	pre-assign & periodic	Maintenance, Construction	6	2	Haz assessment, NRC info,PPE,TV/VCR	IN&TP
Lead (1910.1025)*(1926.62)*	1910.1025	Pre-assignment, annual	BW,SI,DMV enforcement officer,equipment shop, Ferry maintenance	2.5	2.5(includes proficiency exam)	Initial HAZ Assessment & PPE training, TV/VCR handouts, substance data sheet, Employee standard summary, other handouts	CIN
Medical and First Aid (1910.151(b)* ; 1926.50(c)* ; 1915.98*)*	1910.151	Pre-assigned, annual for CPR ; every 3 years for First Aid (Pre-assigned & annual for Divers, Ferry Crew, DMV & Rest Area Custodians)	Two volunteer employees per crew/site or office (All divers, Ferry Crew, DMV enforcement, & Rest Area Custodians)	8	4 hrs. for First Aid; 8hrs for First Aid & CPR	CPR/First aid manuals,first aid kits,overhead, TV/VCR, bloodborne pathogens & hazard assessment, PPE training	TP/CC
Nonionizing Radiation (1910.97 & 1926.54)	1910.97	Pre-assign & annually	M&T,welders, Ferry, DMV Enforcement, Traffic Engineering, Highway Maintenance, Construction,Aviation, L&S,Geotech	1	1	Haz assessment, PPE,hand-outs/brochures, TV/VCR , M&T course's 250; 360; 375	IN
Nonionizing Radiation [(1910.97 & (1926.54 Laser*)]*	1910.97	Pre-assign & annually	M&T lab	1.5	1	Haz Assessment, PPE,hand-outs/brochures, TV/VCR	IN

APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 3

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Occupational Noise Exposure [SAF 245](1910.95)*	1910.95	Orientation, Pre-assignment,post hearing loss-diagnosis	Determined by TWA exposure & through the HCP	2	2	VCR/TV,handouts,hearing protectors,OSHA standards poster	IN/TP
Employee Emergency Plan [1910.38 (a)(5)]*	1910.38	Orientation,new location assignment,periodic	All	1	1	Emergency plan, floor plan with emergency exits and routes marked, location of emergency showers (where applicable) & location of fire extinguishers, portable fire extinguisher	IN (This course should be taught in conjunction with the Fire Prevention course)
Fire Prevention Plans [1910.38(b)(4)]*	1910.38	Orientation, new location assignment, periodic	All	1.5	1.5	Emergency plan,VCR/TV,handouts,ab-light disposal cans,general housekeeping plan	IN (This course should be taught in conjunction with the Employee Emergency Plan course)
Employee Emergency Evacuation Team [1910.38 (Appendix (b)]	1910.38	Pre-assignment, periodic	All team members	3.5 (with demo)	3(with demo)	Emergency plan, floor plan with refuge zones, emergency exits and routes marked, location of fire extinguishers, portable fire extinguisher, safety vests & hats,general housekeeping plans,floor plans,wheelchair,TV VCR,handouts	IN

APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 4

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Portable Fire Extinguishers [SAF160](1910.157(g) & 1926.150 & 1910.179(0)(3))*	1910.157	Initial assignment & annual	MO, equipment operator, ferry crew, HMW, equipment shop, crane operator, welders, evacuation team	2	1	Type ABC Portable fire extinguisher, fireproof bucket & materials, outdoor area for burning, VCR/TV, overhead	IN
Fire Prevention and Protection for Welding,Cutting, and Brazing (SAF 165)(1926.352(e) &1910.252(a))	1910.252	Pre-assign, periodic	Welders, watch personnel & their supervisors	1	1	Booklets; VCR/TV;PPE; Portable fire extinguisher	IN/JIT
Arc Welding Equipment (SAF155) (1910.254 and 1926.351)*	1910.252	Pre-assign, periodic	Welders	1.5	1	Welding equipment, PPE,booklets	IN/JIT or CC
Oxygen-Fuel Gas Welding and Cutting (EQP 105)(1910.253 and 1926.350)	1910.252 & 1910.101	Pre-assign, periodic	Welders	2	1	Welding equipment, PPE,booklets	IN/JIT or CC
Resistance Welding SAF 155(1910.255 (e)(3))	1910.252	Pre-assign, periodic	Welders	1.5	1	Welding equipment, PPE,booklets	IN/JIT or CC
Electrical Safety Related Work Practices (1910.331-335)*	1910.301	Orientation,Pre-assign,annual	Any employee exposed to a non-protected energized source,electricians,welders, riggers,maintenance,general services,custodians,MO, aerial truck operators, mechanics,SI, SW,warehouse ,carpenter,HMW, ferry & their supervisors	1-4 (varies by job class)	2	Mock electrical outlets, cords, lockout/tagout info,PPE,	IN:JIT
Ground Fault Protection-competent person (1926.404(b)(iii)) and 1916.502)	1910.331	Orientation,pre-assign for electricians,annual	Construction, maintenance, warehouse, ferry, SW,M&T lab	2.5	1.5	Mock electrical outlets, cords, lockout/tagout info,PPE	IN

APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 5

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Lockout/Tagout (1910.147(c)(7))*	1910.147	Pre-assign,annual, periodic (general employees)	Electricians,maintenance,equipment,repair crews, construction,Safety	0.5/3	2 (w/proffic.)	Mock electrical outlets, cords, pipe stem valves,lockout/tagout info & logs,PPE	IN
Compressed Air Equipment [(1910.169)(1926.306)]	1910.169	Pre-assign,annual	Compressed air Equipment operators; maintenance,non-electrician, Safety, equipment	2	1.5	Equipment, power source,PPE,VCR/TV,manufacturer's info,	JIT
Cranes (BRG 150;SAF 210)[(Crawler; Locomotive; Truck & Wheel Mounted) (1910.180(b)(3)]	1910.178	Pre-assign,annual & post incident	All employees designated to serve as crane operators and crane competent persons	16	8	Crane, VCR/TV, manual, books & handouts	CIN
Overhead & Gantry Cranes (BRG 150;SAF 210) (1910.179)	1910.179	Pre-assign; annual & post incident	Any employee designated to serve as a crane operator	8	4	Facilities overhead crane,VCR/TV, booklet	IN:JIT
Forklifts, Tractors, and Other Powered Industrial Trucks [SAF 240] (1910.178)*	1910.178	Pre-assign, post-incident & annual	All employees authorized to operate the equipment; Warehouse, depot maintenance, construction, ferry, equipment yard	3.5	1	TV/VCR, manufactur booklets	IN:JIT
Excavation, Trenching, and Shoring-Competent Person Training(1926.650*) [SAF 250]	1926.650	Pre-assign & annual	Construction, DM,	8	8	VCR/TV, overhead, manuals & course guides,OSHA standard	CIN OR TP(WCB)
Shoring & Trenching Workshop-Train the Trainer (1926.650)	1926.650	NCDOT Construction Inspectors for Contract projects		32	32	Funding	TP(WCB)
Explosives and Blasting Agents-Blaster (SAF 150)[(1910.109 and 1926.901)]*	1910.109	Pre-assign, annual	Designated blasters	32(inc. proficiency exam)	8(inc. review & proficiency exam)	VCR/TV, overhead, slides, course material, BATF info,blasting materials,signs, and outdoor facilities	CIN

APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 6

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Explosives and Blasting Agents-Supervisors (1910.109 and 1926.900)	1910.109	Post designation of blaster	Supervisors of blasters	6	n/a	VCR/TV, overhead, slides, course material,BATF info,blasting materials,signs, and outdoor facilities	CIN
Chain Saw Safe Operations [SAF# 153]	TBD (Chapter 10)	Pre-assign,annual,post incident	All employees operating a chain saw	2	1.5	Chainsaws, saw guard & file,chaps,PPE,Hazard assessment,sample logs	IN
Wood Chipper Safety Training (EQP 250)	TBD	Pre-assign, periodic	Any employee assigned to use the wood chipper	2	1.5	Wood chipper & small limbs, fuel,PPE, Hazard assessment sheets	JIT
Flammable and Combustible Liquids (1910.106)	1910.106	Pre-assign,periodic	MAP drivers, Pavement Management, construction,L&S,Hydraulics, Geotech, H&W, SW,Gas house attendants,spray paint operations	2	n/a	VCR/TV, overhead,fire extinguisher, approved fuel cans,location of emergency cut off switches at pumps,first aid kit	IN:JIT
Confined Space-Entry & Observer Personnel (SAF 275)(1910.146(g))*	1910.146	Pre-assignment & annual	TBD but anyone having to enter a confined space as defined by 1910.146(b) (Maintenance, equipment, ferry,BI,construction,Design Services, Geotech)	4-6 hrs inc. proficiency exam	4 inc. proficiency exam	Placarding signs,HAZCOM posters,OSHA standards,TV/VCR, PPE info,overhead projector	CIN
Confined Space-Entry Supervisor(1910.146(g))*	1910.145	Prior to being placed on site as a confined space entry supervisor & annual	Any employee designated & trained as a confined space entry supervisor	8	6	Placarding signs,HAZCOM posters,OSHA standards,TV/VCR, PPE info,overhead projector	CIN/TP
Confined Space-Train the Trainer	1910.146	Pre-assignment	Any employee selected to provide Confined Space Training (inc. SE's)	8	4	Placarding signs,HAZCOM posters,OSHA standards,TV/VCR, PPE info,overhead projector	CIN/TP

APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 7

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Ventilation (1910.94)(1926.57 & .353)	TBD (Chapter 14)	Orientation, pre-assignment	BW,HMW,welders,equipment shop,maintenance shop,M&T lab,photogrammetry,reproduction	1-3 (varies by job class & ex-exposure)	As determined by periodic hazard analysis or post incident	Classroom,VCR/TV,handout	IN
Demolition (mechanical)-competent person(1926.856(g))	TBD	Pre-assign,periodic	Construction, facilities management	2	2	Standard, VCR/TV, overhead,handouts,Asbestos standard,PPE, Hazard communication info	IN
Respiratory Protection [(1910.134(b)(3) & 1926.103(e)(3)]*	1910.134	pre-assign and where applicable, after passing physical	Bridge inspectors & certain BW, construction,equipment shop, landscape	6	3	Various respirators, overhead projector,VCR/TV	IN/TP
Power Operated Hand Tools & Power Lawn Mowers[(1926.302)(1910.241)]	1910.241	Pre-assign, post-incident & periodic	Bridge worker, construction, shop,maintenance,HMW,landscape	2 (Profic. exam)	2(demo exam/ discussion)	VCR/TV, various power hand tools,handouts, overhead	JIT
Machine Guarding for Mechanical Power Presses (1910.217(e)(3);(f)(2);(h)(13)*	1910.212	Pre-assign & annual	Equipment shop, mechanics	2.5	1.5	OSHA Standard, manufacturers info,ANSI B11.1-1971	IN
Machine Guarding for Woodworking Machinery (1910.211-216) (1926.300& 304)*	1910.212	Pre-assign & annual	Carpenter, HMW,equipment shop,BW	1.5	1(less if pass a competency exam)	Classroom, OSHA standards, posters, handouts, prior Hazard assessment training	IN
Scaffolding-Competent person (1910.28)(1926.451(a))	1910.28	Pre-assign,periodic, post incident	Construction,BW,maintenance,Ferry shipyard, competent person	3	2 (exam & on-site)	lanyard,VCR/TV, Photos of scaffolding (Good & bad);Handouts	IN

APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 8

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Ladders (1910.25-27 & 1926.1060(a)(b))*	1910.25 & 1910.27	Pre-assign & post incident	construction, maintenance, custodial,general services,facilities management	1.5	1	various ladders,lanyard, VCR/TV, booklets, training material	IN;JIT(w/ certification)
Aerial Truck Operations(1910.67(c)(ii))*	1910.67	pre-assign & annual	Traffic services,bridge inspectors	4	2.5	Aerial truck,VCR/TV, overhead, portable fire extinguisher,safety belts,lanyard,etc	IN/TP
Fall Protection [(Competent person)(1926.503)]*	TBD	Pre-assign, periodic	Designated competent persons in construction, bridge, aerial truck & HMV	2.5	2	Various fall protection devices, VCR/TV, booklets, training material	IN
Diving Operations [[1910.410(a)](1926.1076(a))]*	1910.410	Pre-assign & annual	Bridge Diver	16	12	SCUBA gear, charts,books,VCR/TV,HEP B,Hazard assessment & PPE training	IN & TP(CPR)
Safety Training and Education (1926.21)*	1926.21	Orientation,pre-assign (pre-assign & annual for supervisors)	All DOT employees	3.5	3	VCR/TV,Supervisor Safety Manual	IN
Servicing of Single Piece and Multi-Piece Rim Wheels [SAF 158](1910.177(c))*	1910.177	Pre-assign,annual	Road maintenance, mechanics, MAP & bridge maintenance, others	6(proficiency)	4 [(varies) (inc.proficiency)]	Shop,tires,VCR/TV,books/pamphlets, equipment	JIT/IN/TP
Signaling & Traffic Control [SAF 238] (1926.201(a)) Flagger Training [ITRE]	1926.201	Pre-assign & annual	Construction, maintenance, HMW,BW, flaggers	4	4	classroom, TV/VCR,Outdoor training facilities	CIN
Work Zone Safety Traffic Control (Basic) [SAF 230](1926.201) [ITRE]	1926.201	Pre-assign & annual	Field work zone supervisors of all flaggers	8	4	classroom, TV/VCR,Outdoor training facilities	TP(ITRE)
Work Zone Traffic Control (1926.201) (Intermediate) [ITRE]	1926.201	Pre-assign & annual	Division & Resident Engineers; Supervisors of: Construction, maintenance,HMW, & BW flaggers	8	8	classroom, TV/VCR,Outdoor training facilities	TP(ITRE)

APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 9

Course Name and Number w/ Standard	SPP1	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Work Zone Traffic Control (1926.201) (Advanced) [ITRE]	1926.201	Pre-assign & annual	Division & Resident Engineers; Supervisors of: Construction, maintenance, HMW, & BW Seagoers	12	8	classroom, TV/VCR,Outdoor training facilities	TP(ITRE)
Spill Response (1910.120 (q)(6)(ii) (First Responder-Awareness & Operations)[SAF 315]*	TBD (Chapter 9)	Orientation,pre-assign	HMW,Construction, BW,GUW, Divers, Ferry crew,maintenance & shipyard; construction, maintenance & equipment supervisors; General Services,MAP, DMV Enforcement	8	8	classroom, TV/VCR,Outdoor training facilities, equipment	IN/TP
Spill Response (1910.120 (q)(6)(ii) (First Responder-Awareness Plus for MAP Drivers)[SAF]*	TBD	Before assignment & annual	MAP Drivers	8	8	VCR/TV, Outdoor training facilities, equipment, manual,overhead, booklets	CIN
Spill Response [SAF 320] (1910.120 (q)(6)(iii)) (First Responder-Operations & Technical Operations)*	TBD (Chapter 9)	Pre-assign & annual	Selected Ferry Division employees	32	32	TV/VCR,Outdoor training facilities, equipment	CIN
Spill Response (1910.120 (q)(7) [TRAINERS]*	TBD (Chapter 9)	Pre-assign & annual	Any DOT employee selected to provide the Spill response Awareness &/or Operations level training	11	8 (inc. competency exam)	VCR/TV, Outdoor training facilities, equipment, manual,overhead, booklets	CIN
Hazardous Waste Management Training for Small Quantity Generators-[SAF 316](40CFR262)*	TBD	Pre-assign & annual	Equipment,traffic services, road oil, landscape,divisional, ferry,bridge	8	4	classroom, TV/VCR,Outdoor training facilities, equipment	TP(DEHNR)

APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 10

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
Back Belt Training	1910.001	Pre-assignment to manual lifting positions & upon request for others.	Warehouse; maintenance; equipment;construction,general services	2	1 (exam) & lift techniques	Training material; backbelt; TV/VCR	IN
Fleet Safety (Instructor)[SAF #111]	TBD (Chapter 8)	Annually	Designated employees who will provide Fleet Safety training; S.O.	32	32	Two Lead Instructors; classroom; Overhead transparency projector; TV & Video Player, writing utensils, paper,Outdoor Vehicle Driving range	IN
Fleet Safety Course [SAF #110]	TBD (Chapter 6)	Pre-employment/pre-assign/tri-annually	All DOT Employees who operate fleet vehicles	16	8	Certified Fleet Safety Instructor and same as above	CIN
Vehicle Backing Safety [SAF 420]	TBD	Pre-assign, annual	All DOT Employees who operate fleet vehicles	4	4	Certified Fleet Safety Instructor, Overhead transparency projector, TV & Video Player, writing utensils, paper,Outdoor Vehicle Driving range,appropriate vehicles	CIN
Motor Vehicles, Excavating and Material Handling Equipment (1926.602)	TBD	Pre-assign,annual,post-incident	MO,maintenance,construction,landscape	3	3	Booklets,VCR/TV,vehicle driving range	IN:JIT &TP
Motorist Assistance Patrol Safety Related Training	TBD (Chapter 6)	Pre-assignment	IMAP drivers	TBD		VCR/TV, PPE, IMAP truck, passed the DOT Fleet safety course, driving course, Hazard Assessment & Hazard Communication (First Responder Awareness) trained	CIN
Roll-over Protective Structures for Tractors (Industrial) (1926.1001 & 1002)	TBD	pre-assign,periodic & post incident	MO,Landscape,construction,warehouse,equipment	1	n/a	Construction material,VCR/TV Overhead	JIT

APPENDIX A: NCDOT's Safety and Health Training Matrix (Continued) 11

Course Name and Number w/ Standard	SPP	Frequency	Examples of Job Class	Initial Length (Hrs)	Renew Length (Hrs)	Minimum Resources for Training	Training Method
OSHA 200 Log	TBD (Chapter 1)	Pre-assignment	All employees involved with the recording & maintaining of the OSHA 200 Log	1.5	n/a	TWIGR player, Recordkeeping Guide for Occupational Injuries & Illnesses	IN
Workers' Compensation Seminar for Supervisors[SAF #425]	TBD (Chapter 1)	Within 2 months of promotion & an annual refresher	All Supervisors & managers & key District Support staff involved with the administration of the DOT WC program	3.5	2	TWIGR player; handouts; videos; workers' compensation	IN
Supervisor Safety Responsibilities [SAF 010]	TBD (Chapter 6)	At initial promotion & an annual refresher	All supervisors & managers	4(inc. review)	2	Safety's official safety handbook,Accident Prevention Manual,NSC Supervisors Safety Manual	IN
Beyond Compliance- For Upper Level & Mid Level Managers & First Tier Supervisors	N/A	Periodic	All supervisors & managers	4	n/a	Classroom, TWIGR;TP-Hanks, Solomon & Associates	TP: First Time assessment of only
Violence in the Workplace	TBD	Orientation & periodic	All DOT employees	4	2	Classroom,TWIGR,overhead, handouts,pamphlets	IN

Keys: *OSHA mandated and non-mandated training

Although not listed, all courses require an indoor classroom, Workplace Safety Manual, writing board or flip chart, markers, and restroom facilities. Some courses also require an computer classroom.

* All applicable references are not listed in this matrix. Consult the "Reference" section of the Lesson Plans for a more complete listing of the resources used for a particular course.

~ Codes for the method of training are: IN = Internal training by DOT employees/trainer; CI= NCDOT Certified Trainer; CC= Community College; TP= Third Party; JT= Job Instructional Training

APPENDIX B: Estimating Resources to Implement Safety Training

NCDOT managers can estimate total resources required for a particular safety requirement by evaluating the following mathematical expressions:

Equation (1) $R_T = E_A \times T_{TI} \times W_{EA}$

Where:

R_T = Training resources required ($)
E_A = Number of affected employees
T_{TI} = Initial length of training (hours)
W_{EA} = Average hourly wage of the affected employees ($/hour)

Equation (2) $R_I = (E_I \times T_I \times W_I) + P_C$

Where:

R_I = Implementation resources ($)
E_I = Number of implementation employees
T_I = Implementation time (hours)
W_I = Average hourly wage of the implementation employees ($/hour)
P_C = Cost of Physical Resources ($)

Equation (3) $S_R = R_T + R_I$

Where:

S_R = Total resources required for a safety requirement

Likewise, NCDOT managers can also calculate refresher training resources requirements from equation 1, except substitute the refresher length training for T_{TI}.

APPENDIX C: Training Records Form

Course Title and Number	Date(s)	Location	Instructor(s)

This course offers _____ *Professional Development Hours* (PDH) from the NC Board of Professional Engineers and Registered Land Surveyors.

Name	ID #	Div/Unit	NC Board Registration # (For PDHs)

APPENDIX D: NCDOT Training Model

Safety training shall be provided to employees during orientation, before doing any new job task and when a new procedure, process, or equipment is implemented before problems or accidents occur. Safety training will cover both general safety and health rules and work procedures, will cover how to safely perform the job task, recognition of hazards, the proper use of appropriate PPE, and safe operating procedures for each task and piece of equipment used for that task.

Analysis

The first step in the training process is to determine whether a problem can be solved by training. The analysis phase is used to determine what corrections are needed and to identify the important elements of the tasks. Supervisors and managers/unit heads should constantly assess (analyze) job site conditions and note deficiencies that can be corrected through training. Some of the conditions that should prompt additional safety training include:

- High labor turnover
- Increased incidents, accidents, injuries or near misses
- Implementation of new processes, equipment or procedures
- A lack of training or improper training from a previous employer
- A lack of knowledge of a work process
- Unfamiliarity with equipment
- Incorrect execution of a task

The employees themselves can provide valuable information on the training they need. Employees can identify safety and health hazards regarding:

- Concerns about job tasks
- Near-miss incidents
- Risks they are taking
- Jobs that involve hazardous operations or substances

Analysis regarding a need for training should preclude the possibility that other actions (such as hazard abatement or the implementation of engineering controls) would enable employees to perform their jobs properly.

Design

During the design phase the course developer uses the information gathered during the analysis phase and applies that information towards:

- Identifying course objectives

APPENDIX D: NCDOT Training Model (Continued) 2

Design (continued)

- Testing methods (for measuring retention and skill levels)
- Sequencing and structuring of delivery

Course objectives define observable, measurable and attainable goals which can be demonstrated by the participant. Proper demonstration by the participant indicates that the learning material or process has been retained and that the employee is capable of applying what was taught to the job task.

For a course objective to be effective, it should precisely identify what the individuals will do to demonstrate what they have learned or that the course objective has been reached. They should also describe the important conditions under which the individual will demonstrate competence and define what constitutes acceptable performance.

Using specific, action-oriented language, the instructional objectives should describe the preferred practice or skill and its objective behavior. For example, rather than using the statement: "The employee will understand how to use a respirator" as an instructional objective, it would be better to say: "The employee will be able to describe how a respirator works and when it should be used."

Objectives are most effective when worded in sufficient detail that other qualified persons can recognize when the desired behavior is exhibited. For this, it is necessary to identify what the employee is expected to do and in what ways, if any, the employee's performance is deficient. This information can should be obtained during the analysis phase and should pinpoint what an employee needs to know in order to perform his/her job.

A variety of training presentation styles and methods can be used depending upon the course location, the prospective students, available resources, i.e. classrooms, and the particular course objectives. Some of the various presentation styles used include:

- Lecture
- Lecture/discussion
- Demonstration

Development

The development phase involves creating or procuring instructional material, learning activities, and the delivery system (i.e. rooms, tables, equipment required, etc.). Course content can be developed through lesson plans, including instructor and participant outlines. Content of the lesson plans can be determined by such means as:

APPENDIX D: NCDOT Training Model (Continued) 3

Development (continued)

- Using accident and injury records to identify the type of accidents and how they occurred and what instructional material and method can be used to prevent them from recurring.
- Requesting employees to provide, in writing and in their own words, descriptions of their jobs including the tasks performed and the tools, materials, and equipment used.
- Observing employees at the worksite as they perform tasks, asking about the work, and recording their answers.
- Examining similar training program courses offered by other companies in the same industry.

Factors used to determine the type of learning activity to be incorporated into the training include:

- Training resources available to the employer
- Group training program that uses an outside third party trainers
- Personally training the employees using internal trainers or one-to-one mentors

Other factors include the kind of skills or knowledge to be learned. Is the learning oriented toward physical skills (such as the use of special tools) or toward mental processes and attitudes? Such factors will influence the type of learning activity designed by employers. The training activity can be group-oriented (with lectures, role play, and demonstration) or designed for the individual (with self-paced instruction).

The determination of methods and materials for the learning activity can be as varied as imagination and available resources will allow. Charts, diagrams, manuals, slides, films, viewgraphs (overhead transparencies), videotapes, audiotapes, or blackboard and chalk, or any combination of these and other instructional aids may be used. Whatever the method of instruction, the learning activities should be developed in such a way that the employees can clearly demonstrate that they have acquired the desired skills or knowledge.

Implementation

The training should be presented so that its organization, meaning, and objectives are clear to the employees. To achieve this trainers should:

- Provide overviews of the material to be learned
- Relate, wherever possible, the new information or skills to the employees' goals, interests, or experiences

APPENDIX D: NCDOT Training Model (Continued) 4

Implementation (continued)

- Reinforce what the employees learned by summarizing the program's objectives and the key points of information covered

In order to be motivated to learn the course material, the employees must be convinced of its importance and relevance. Among the ways of developing motivation are:

- Explaining the goals and objectives of instruction
- Relating the training to the interests, skills, and experiences of the employees
- Outlining the main points to be presented during the training session(s)
- Pointing out the benefits of training

An effective training program allows employees to participate in the training process and to practice their skills or knowledge. This will help to ensure that they are learning the required knowledge or skills. Employees can become involved in the training process by participating in discussions, asking questions, contributing their knowledge and expertise, learning through hands-on experiences, and through role-playing exercises.

Training presentations can be given in a variety of methods depending upon the location of the training, the prospective students, available resources, i.e. classrooms and particular course objectives.

Evaluation

To ensure that the training program is accomplishing its goals, an evaluation of the training can be valuable. Training should have a method of measuring the effectiveness of the training. An evaluation of training can give employers the valuable information regarding the training provided to its employees.

A plan for evaluating the training session(s) should be developed when the course objectives and content are developed. It should not be delayed until the training can be completed. Evaluation will help determine the amount of learning achieved and whether an employee's job performance has improved. Among the methods used in training evaluation are:

- Student opinion - post training questionnaires or informal discussions with employees can help employers determine the relevance and appropriateness of the training program provided.
- Supervisor observations - supervisors are in good positions to observe, evaluate and analyze employees' performance both before and after the training and note improvements or changes.
- Workplace improvements - the ultimate success of a training program may be exhibited in changes throughout the workplace that result in increased productivity through safer operating habits, reduced injury or accident rates, and lowered lost workdays.

APPENDIX D: NCDOT Training Model (Continued) 5

Evaluation (continued)

If, after evaluation, it is clear that the training was unable to provide the employees with the level of knowledge and skill that was expected, then it may be necessary to revise the training program or to retrain those individuals who do not meet the necessary course objectives. Among the questions that could be asked employees and trainers are:

- Were parts of the content already known and, therefore, unnecessary?
- What material was confusing or distracting?
- Was anything missing from the program?
- What did the employees learn and what did they fail to learn?

It may be necessary to repeat steps in the training process; that is, to return to the first steps (analysis and design) and retrace the training process. As the program is evaluated, the following questions should be asked:

- If a job analysis was conducted, was it accurate?
- Was any critical feature of the job overlooked?
- Were the important gaps in knowledge and skill included?
- Was material already known by the employees intentionally omitted?
- Were the instructional objectives presented clearly and concretely?
- Did the objectives state the level of acceptable performance that was expected of employees?
- Did the learning activity simulate the actual job?
- Was the learning activity appropriate for the kinds of knowledge and skills required on the job?
- When the training was presented, was the organization of the material and its meaning made clear?
- Were the employees motivated to learn?
- Were the employees allowed to participate actively in the training process?
- Was the employer's evaluation of the program thorough?

A critical examination of the steps in the training process will help assist in determining whether any course revisions are necessary. Using these steps will assist in presenting the training in a clear manner.

Sanitation SPP# 1910.141

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines to ensure that a clean and sanitary work environment is provided to North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Sanitary and healthy workplace conditions promote a productive work environment and ensure that employees' health and welfare are well protected.

This safety policy and procedure includes provisions for training and discussion on the sanitation requirements for construction jobsites and facilities.

It also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Risk Management within NCDOT.

This safety policy and procedure applies to all NCDOT employees.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.141) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.51).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT construction jobsites and facilities will be kept clean, sanitary, and equipped for employee health. When sanitation hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Sanitation will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Sanitation. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Sanitation.

6.1 Definitions

Chemical Toilet
Portable toilet that uses chemical disinfection.

Lavatory
Basin or similar vessel used exclusively for washing of the hands, arms, face, and head.

Nonpotable Water
Water that is not approved for drinking.

Potable Water
Water approved for drinking by the State or local authority.

Toilet Fixture
Fixture maintained within a toilet room for the purpose of defecation or urination or both.

Toxic Material
Material in concentration or amount which exceeds the applicable limit established by a standard.

Urinal
Toilet facility maintained within a toilet room for the sole purpose of urination.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are

- Training
- Construction Jobsite Sanitation Requirements
- Facility Sanitation Requirements

6.2.1 Training

NCDOT employees shall be instructed on the importance of sanitation in their workplaces. Good housekeeping and personal cleanliness in employee's job duties shall be emphasized to all employees. Additional specific job training will be conducted as conditions warrant. Employees shall be instructed upon initial employment or new job assignment.

6.2.2 Construction Jobsite Sanitation Requirements

Sanitation at construction jobsites must be properly managed and effectively integrated with the construction site activities. The components of a construction jobsite sanitation plan should include provisions for:

- Potable water
- Nonpotable water
- Toilets at construction sites

- Food handling
- Washing facilities
- Eating and drinking areas
- Vermin control
- Change rooms

Appendix A presents a construction jobsite sanitation plan and checklist per the above provisions.

6.2.3 Facility Sanitation Requirements

Sanitation at facilities must also be properly managed and effectively integrated with the facility's activities. The components of a facility's sanitation plan should include provisions for:

- Housekeeping
- Waste disposal
- Vermin control
- Toilet facilities
- Washing facilities
- Showers (as applicable)
- Change rooms (as applicable)
- Food and beverage consumption

NCDOT does not have clothes drying equipment at its facilities. Therefore, any cleaning of NCDOT supplied clothing is performed by contract.

Appendix B presents additional details for a facility's sanitation plan

6.3 Specific Responsibilities

6.3.1 Managers & Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of supplies and equipment to maintain a safe and healthy workplace. Managers/Unit Heads will obtain and coordinate the required training for employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

Managers/Unit Heads will ensure that adequate supplies are available.

6.3.2 Supervisors

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will audit for compliance with this safety policy and procedure during their Facility and Jobsite Audits.

Supervisors will ensure that assembly rooms, toilets, and office spaces are maintained in an orderly manner.

6.3.2 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

Each employee is responsible for maintaining NCDOT facilities in an orderly manner. Receptacles shall be used and waste disposed of properly. Spills, mud, and asphalt on footwear shall be removed promptly to prevent stains. Employees shall adhere to correct housekeeping and personal cleanliness in the performance of their job duties.

6.3.4 Safety & Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training. Safety and Risk Management will work with Purchasing and Central Equipment Unit to ensure that all newly purchased sanitation supplies and equipment comply with this safety policy and procedure and current safety regulations.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Appendix A: Construction Jobsite Sanitation Plan and Checklist

Jobsite:_____ Location:_____ Date:_____

Name:_____ Job Title_____

Potable Water

An adequate supply of potable water shall be provided. Portable containers that are used to dispense drinking water shall be capable of being tightly closed, equipped with a tap, clearly marked and not used for any other purpose. The common drinking cup is prohibited. (Water shall not be dipped from containers.)

YES	NO	
❑	❑	Do all the portable containers have tightly closed lids? If not, replace non-tightly closed containers.
❑	❑	Are all portable containers equipped with taps? If not, replace with tap equipped containers.
❑	❑	Are containers clearly marked? If not, mark containers.
❑	❑	Is there a sanitary dispenser for the single service cups? If not, obtain sanitary dispenser.
❑	❑	Is there a receptacle for the disposal of the used single service? If not, obtain receptacle.

Appendix A: Construction Jobsite Sanitation Plan and Checklist (continued 2)

Nonpotable Water

Nonpotable waters shall be identified by signs to indicate that the water is unsafe and is not to be used for drinking, washing, or cooking purposes. Nonpotable water trucks shall also be clearly marked and identified. Additionally, there shall be no cross-connection between systems furnishing potable and non-potable water.

YES	NO	
❑	❑	Are all non-potable containers and trucks clearly marked and identified? If not, mark containers and trucks.
❑	❑	Are back flow prevention devices installed to prevent back flow or back siphonage into a potable water system?

Toilets

YES	NO	
❑	❑	Does the construction crew have readily available access to nearby toilet facilities? If no, toilets shall be provided for employees per the following:

Number of Employees	Minimum Number of Toilet Facilities
20 or less	1
21 - 199	1 toilet seat and 1 urinal per 40 workers
200 or more	1 toilet seat and 1 urinal per 50 workers

YES	NO	
❑	❑	Is the project jobsite temporary? If yes, at least one toilet facility shall be made available.
❑	❑	Does the jobsite have access to a sanitary sewer? If no, then portable chemical toilets (e.g., "Porta Johns") shall be made available.

Appendix A: Construction Jobsite Sanitation Plan and Checklist (continued 3)

Food Handling

YES ❑ NO ❑

Are food handling service facilities onsite? If yes, ensure:

- All applicable laws, ordinances, and regulations of the local jurisdiction are met
- Food service facilities are operated with sound hygiene practices
- Dispensed food is wholesome, free from spoilage, and protected against contamination

Washing Facilities

YES ❑ NO ❑

Are employees engaged in the application of paints, coatings, herbicides, insecticides, or in other operations where contaminants may be harmful? If yes, and employees are not a mobile construction crew with transportation readily available to nearby washing facilities, then the following requirements are applicable:

- Lavatories with:
  -Hot and cold running water
  -Hand soap or similar cleansing agents
  -Individual cloth or paper hand towels, air blowers, or clean section of continuous cloth toweling
- Showers (if provided) will:
  -Be provided for each 10 employees of each sex
  -Have body soap or similar cleansing agents
  -Have hot and cold water feeding a common discharge line
  -Have individual clean towels

Eating and Drinking Areas

Ensure employees are not allowed to consume food or beverages in the toilet facilities or in any area exposed to toxic materials.

Appendix A: Construction Jobsite Sanitation Plan and Checklist (continued 4)

Vermin Control

Every enclosed workplace shall be constructed and maintained to prevent the entrance or harborage or rodents, insects, and other vermin.

Change Rooms

YES	NO
❑	❑

Are employees required to wear protective clothing because of the possibility of contamination with toxic materials? If yes, change rooms shall:

- Be equipped with storage facilities for street clothes
- Be equipped with separate storage facilities for the protective clothing

Appendix B: Facility Sanitation Requirements

Housekeeping

- All places of employment are to be kept clean.
- Floors in work areas are to be maintained in a dry condition. Where wet processes are used, drainage shall be maintained and false floors, platforms, mats, or other dry standing places shall be provided, where practical, or appropriate waterproof footgear shall be provided.
- Every floor, working place and passageway shall be kept free from protruding nails, splinters, loose boards, and unnecessary holes and openings.

Waste Disposal

- Any waste receptacle used for decaying solid or liquid waste or refuse shall be so constructed that it does not leak and may be thoroughly cleaned and maintained in a sanitary condition. Such a receptacle shall be equipped with a solid tight-fitting cover, unless it can be maintained in a sanitary condition without a cover.
- All sweepings, solid or liquid wastes, refuse and garbage shall be removed in such a manner as to avoid creating a menace to health and as often as necessary or appropriate.

Vermin Control

- Every enclosed workplace shall be constructed, equipped, and maintained to prevent the entrance of and harboring of rodents, insects and other vermin.
- A continuing and effective extermination program shall be instituted where the presence of vermin are detected.

Water Supply

- Potable water shall be provided in all places of employment for drinking, washing of the person, cooking, washing of foods, washing of cooking or eating utensils, washing of food preparation or processing premises and personal service rooms.
- Portable drinking water dispensers shall be designed, constructed, and serviced so that they shall be capable of being closed and shall be equipped with a tap. Open containers for drinking water from which water must be dipped or poured are prohibited.
- A common drinking cup and other common utensils are prohibited.

Appendix B: Facility Sanitation Requirements (continued 2)

Toilet Facilities

- Toilet facilities, in toilet rooms separate for each sex, shall be provided per the following:

Number of Employees	Minimum Number of Water Closets
1 to 15	1
16 to 35	2
36 to 55	3
56 to 80	4
81 to 110	5
111 to 150	6
Over 150	1 additional fixture for each additional 40 employees

Where toilet facilities will not be used by women, urinals may be provided instead of water closets. However, the number of water closets in those cases shall not be reduced to less than two-thirds of the minimum specified.

- Where toilet rooms will be occupied by no more than one person at a time and can be locked from the inside and contain at least one water closet, then separate toilet rooms for each sex need not be provided.
- The sewage disposal method shall not endanger the health of employees.
- Each water closet shall occupy a separate compartment with a door and walls or partitions between fixtures sufficiently high to assure privacy.

Washing Facilities

- Lavatories are to be made available in all places of employment.
- Each lavatory shall be provided with hot and cold running water.
- Individual hand towels of cloth or paper, warm air blowers, or clean individual sections of continuous cloth toweling convenient to the lavatories shall be provided.

Showers

- Whenever showers are required, one shower shall be provided for each 10 employees of each sex.
- Body soap or other appropriate cleaning agents convenient to the shower shall be provided.
- Showers shall be provided with hot and cold running water feeding a common discharge line.
- Employees who use showers shall be provided with individual clean towels.

Appendix B: Facility Sanitation Requirements (continued 3)

Change Rooms

Whenever employees are required by a particular OSHA standard or agency guideline to wear protective clothing because of the possibility of contamination with hazardous materials, change rooms equipped with storage facilities for street clothes and separate storage facilities for the protective clothing shall be provided.

Consumption of Food and Beverage on Premises

- No employee shall be allowed to consume food or beverage in a toilet room or in any area exposed to toxic material or infectious agents.
- Disposal containers constructed of smooth, corrosive resistant, easily cleanable or disposable material shall be provided and used for the disposal of waste food.
    - Number, size and location of such receptacles shall encourage their use and not result in overfilling.
    - They shall be emptied not less frequently than once each working day, unless unused, and shall be maintained in a clean and sanitary condition.
    - They shall be provided with solid tight-fitting covers unless sanitary conditions can be maintained without use of a cover.
- No food or beverage shall be stored in toilet rooms or in areas exposed to a toxic material or infectious agents
- In all places of employment where all or part of the food service is provided, the food dispensed shall be wholesome, free from spoilage, and shall be processed, prepared, handled and stored in such a manner as to be protected from contamination.
    - All food service employees shall wear appropriate clean outer clothing such as caps, coats, aprons, etc., while on duty and shall observe proper personal hygiene. No employee shall use tobacco in any form while engaged in the preparation and handling of food.
    - The hands of all employees handling food, utensils or equipment shall be kept clean and shall be washed before beginning work and after each visit to the toilet.
    - No person who has a contagious or infectious disease shall be allowed to work in food service.
    - Persons handling money should always wash hands prior to handling food or should use disposable gloves.

Unsafe Conditions SPP# 1910.002

Quick Reference

1.0 PURPOSE

The purpose of this safety policy and procedure is to establish the methods and accountability for the identification, avoidance, and elimination of unsafe and/or hazardous conditions in the workplace.

2.0 SCOPE AND APPLICABILITY

This safety policy and procedure provides guidelines to assist all employees of the North Carolina Department of Transportation (NCDOT) to identify unsafe conditions which may exist in the workplace. This procedure also details the area of responsibility for managers/unit heads, supervisors, employees, and Safety and Risk Management within NCDOT.

This safety policy and procedure affects all NCDOT employees.

3.0 REFERENCE

This safety policy and procedure is established in accordance with the Occupational Safety and Health Act of 1970 covered by the General Duty Clause.

4.0 POLICY

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. . When fire hazards cannot be eliminated, fire protection equipment, engineering practices, administrative practices, safe work practices, and proper training regarding fire protection will be used or implemented.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's policy on Unsafe Conditions. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor and to make all efforts to avoid accidents and injuries. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's policy on Fire Protection.

6.1 Training

It will be the responsibility of Safety and Risk Management to support development of safety training programs for all NCDOT activities. Furthermore, Safety and Risk Management will be responsible for performing safety audits, safety design, and technical compliance guidance.

6.2 Specific Responsibilities

This section details the provisions of this safety policy and procedure. The provisions adopted by NCDOT are: Training Requirements, Fire Hazards, Portable Fire Extinguishers, Fire Suppression Systems, and Fire Alarms and Alarm Systems

6.2.1 Managers & Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of required resources to eliminate unsafe conditions in their areas. Managers/Unit Heads will obtain and coordinate the required training for their employees.

Managers/Unit Heads will also ensure compliance through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any unsafe tasks or activities associated with his or her job.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will ensure that employees are provided with PPE as necessary for their job.

6.3.2 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

6.3.4 Safety & Risk Management

Safety and Risk Management will provide prompt assistance to manager/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training. Safety and Risk Management will work with Purchasing and Central Equipment Unit to ensure that all newly purchased equipment complies with current safety regulations and this safety policy and procedure.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Division Safety Staff

Division assigned safety staff will work with their management and employees to offer:

- Support to implement this process
- Perform associated training
- Communicate with Safety and Risk Management on needs to successfully implement and maintain this policy.

OSHA Recordkeeping and Reporting SPP# 1904

Table of Contents

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for compliance with OSHA recordkeeping and reporting requirements for NCDOT work-related fatalities, injuries, and illnesses.

2.0 Scope and Applicability

OSHA Recordkeeping standard requires NCDOT to record, post, and report all work-related fatalities, injuries, and illnesses.

This safety policy and procedure provides guidelines to assist all Divisions/Units of the North Carolina Department of Transportation (NCDOT) to meet the OSHA Recordkeeping and Reporting requirements. This procedure also details the area of responsibility for managers/unit heads, supervisors, employees, Division Safety Staff and Safety and Risk Management within NCDOT.

This safety policy and procedure affects all NCDOT employees.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for Recordkeeping and Reporting Occupational Injuries and Illnesses (29CFR1904).

4.0 Policy

It is the policy of NCDOT for all Divisions & Units to maintain OSHA recordkeeping on work-related fatalities, injuries, and illnesses to provide the necessary information which OSHA requires on an annual basis. Divisions and Units shall have this information readily available for OSHA compliance inspections of their sites upon request by the compliance officer. OSHA recordkeeping documents shall be retained for 5 years. NCDOT shall complete annual survey of Occupational Injury and Illness requests from OSHA and NCDOL.

NCDOT shall also report all fatalities, hospitalizations, amputations, or loss of an eye to NC Department of Labor.

5.0 General Responsibilities

It is the responsibility of each manager/unit head and supervisor to ensure implementation of NCDOT's policy on OSHA recordkeeping and reporting of work-related fatalities, injuries, and illnesses. It is also the responsibility of each NCDOT employee to report immediately any work-related injury or illness to his or her supervisor as soon as possible. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT'S safety policy and procedure on OSHA Recordkeeping and Reporting requirements.

6.1 Definitions

Establishment
An establishment is a single physical location where NCDOT operations are located or work is conducted. For activities where NCDOT employees do not work at a single physical location (such as maintenance, construction, transportation, communications, and similar operations), the establishment is the NCDOT physical location that either supervise such activities or serves as the base from which personnel carry out these activities.

OSHA 300 Log
OSHA Form 300 (spreadsheet log) titled "Work-Related Injuries and Illnesses" is used to record each OSHA recordable injury or illness for each NCDOT establishment or unit during the current calendar year. These documents must be retained for 5 years.

OSHA 300A Summary
OSHA Form 300A titled "Summary of Work-Related Injuries and Illnesses" is used to compile totals for number of cases, number of days away from work or job transfer or restriction, and total number of injury types or illnesses for the current calendar year. This form also has a section for Establishment and Employment Information which needs to be filled in for the site. The completed form for each calendar year must be signed by the highest site manager and posted for period February 1 thru April 30 of the following year. These documents must be retained for 5 years.

OSHA 301 Injury and Illness Incident Report or Equivalent Form 19
NCDOT uses the NC Industrial Commission Form 19 to record the injury information for each Work-Related Fatality, Injury or Illness incurred by NCDOT personnel. These documents must be retained for 5 years.

OSHA Recordable
A work-related injury or illness that meets all general recording criteria, and results in any of the following: death, days away from work, restricted work, or transfer to another job, medical treatment beyond first aid, or loss of consciousness while performing their normal job function.

Posting
The signed copy of OSHA 300A Summary of Work-Related Injuries and Illnesses must be posted for period February 1st thru April 30th of the following calendar year covered by the form. Post the form in a conspicuous place or places where notices to employees are customarily posted.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Reporting Fatalities, Hospitalizations, Amputations, and Losses of an Eye as a Result of Work-Related Incidents to OSHA
- OSHA 300 Logs
- WC Form 19
- OSHA 300A Summary
- OSHA Electronic Reporting
- OSHA BLS Surveys
- NCDOL PSNC Surveys

6.2.1 Reporting Fatalities, Hospitalizations, Amputations, and Losses of an Eye as a Result of Work-Related Incidents to OSHA

NCDOT shall report the death of any NCDOT employee as a result of a work-related incident within 8 hours after the death of the employee.

NCDOT shall also report the following work-related incidents involving NCDOT employees within 24 hours:

1. Any in-patient hospitalization of one or more NCDOT employees
2. Any work-related amputation of a limb or external body part with or without bone loss
3. Any work-related loss of an eye

Since NCDOT Division Safety Staff will have or can obtain all relevant information related to the incident, they shall be responsible for reporting to NC Department of Labor.

NCDOT Division Safety Staff shall report the fatalities, hospitalizations, amputations, and loss of an eye for any NCDOT employee in their Division directly to NC Department of Labor. Use the contact information below to report.

1. Call the NC Department of Labor during working hours (8 a.m. to 5 p.m.) at 919-779-8560 or 1-800-625-2267. After working hours, (5 p.m. to 8 a.m.), weekends or holidays, call State Capitol Police at (919) 733-3333.

2. Division Safety Staff shall also provide information to Safety & Risk Management Deputy Director for dissemination of the incident to OSHR Safety Director or safety staff and NCDOT management staff and Communications Office.

6.2.2 OSHA 300 Logs

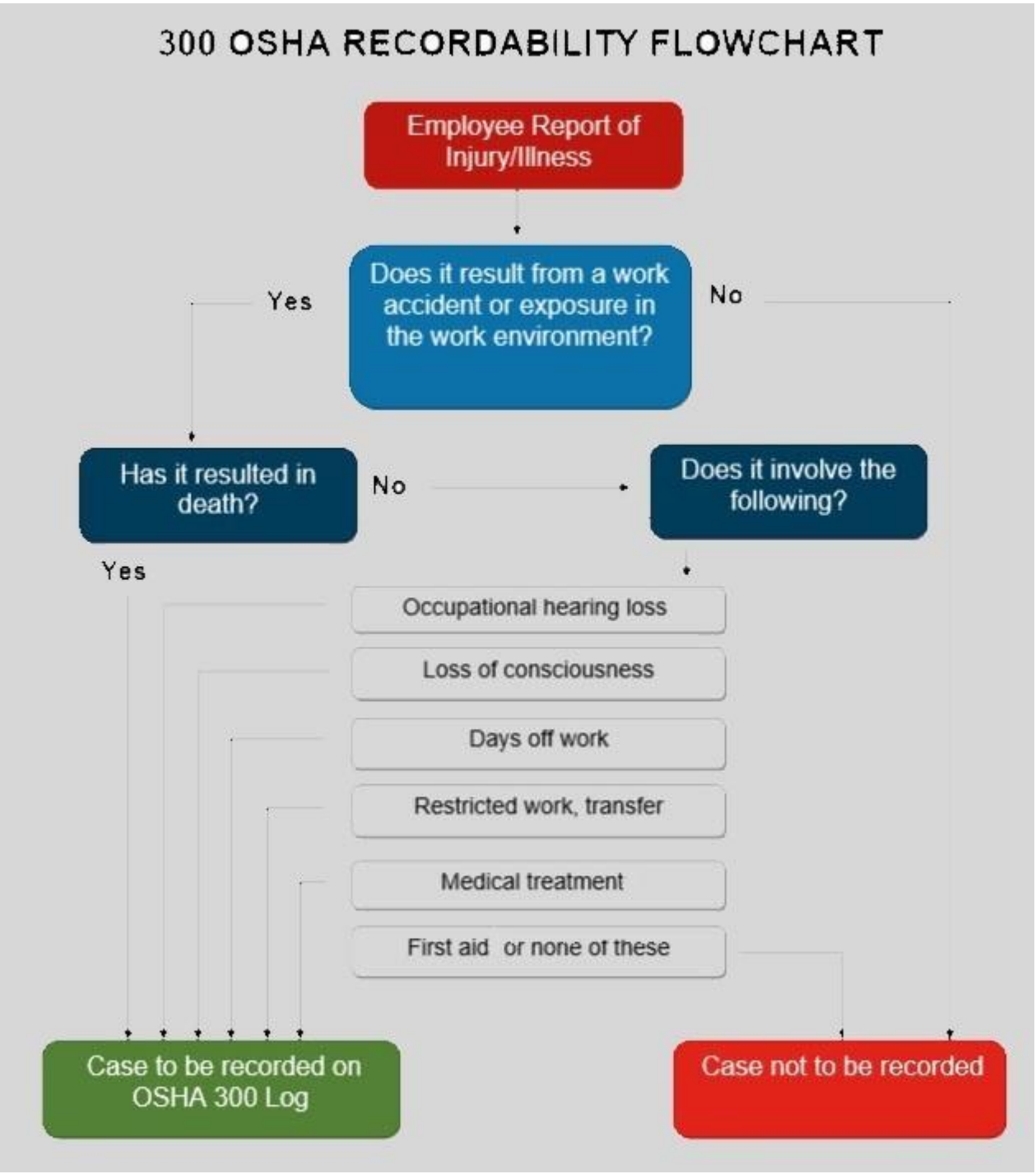
OSHA Form 300 (Spreadsheet Log) titled "Work-Related Injuries and Illnesses" (Appendix A) is used to record each OSHA recordable injury or illness for all NCDOT physical establishments or Units during the current calendar year. Each NCDOT physical location or Unit will determine how to group employees for the OSHA 300 log. The electronic copy available from OSHA website dated (Rev. 1/2004) should be used for Form 300 recordkeeping. Printed hard copies may also be used for manually filling out the 300 Log.

6.2.2.1 Recordkeeping Criteria (OSHA Recordability)

1. **Work-related Recordable Injury or Illness to be recorded on OSHA 300 log include Fatality, Injury, or Illness caused by, contributed to or aggravated by events or exposures in the work environment which includes: (OSHA Recordability Flowchart found in the next Section should be used as a reference for determining recordability)**
    a. Death
    b. Days away from work after day of injury
    c. Restricted work or transfer to another job after day of injury
    d. Medical treatment beyond first aid
    e. Loss of consciousness
    f. Diagnosed as a significant injury or illness
    g. Needlesticks and sharps injuries or exposure to blood or other potential infectious materials
    h. Cases involving medical removal under medical surveillance under OSHA standard for lead, silica, or other hazardous material.
    i. Hearing loss based on STS (Standard Threshold Shift) of 10dB or more in one or both ears relative to most current baseline audiogram averaged at 2,000, 3,000 and 4,000 Hz and overall hearing level at 25bB or more above audiometric zero, and hearing loss is work-related
    j. Work-related tuberculosis
2. **Non-worked related injury and illness not to be recorded**
    a. Voluntary participation in wellness, medical, fitness, or recreation program
    b. Eating, drinking, or preparing food
    c. Personal tasks outside of working hours
    d. Personal grooming, self-medication, or self-inflicted
    e. Motor vehicle accident in parking lot or company access road while commuting
    f. Common cold or flu
    g. Injury or illness occurs while an employee is on premises as a member of general public

3. **First Aid treatments not to be recorded listed below:**
    a. Use of non-prescription medication at non-prescription strength (licensed health care professional use of non-prescription at prescription strength is considered medical treatment and recordable)
    b. Administration of tetanus immunizations (other immunizations, such as Hepatitis B or rabies vaccine are considered medical treatment and recordable)
    c. Cleaning, flushing, or soaking wounds on the surface of skin
    d. Using wound coverings such as bandages or Steri-Strips (other wound closing devices such as sutures, staples, or surgical glue are considered medical treatment and recordable)
    e. Use of hot or cold therapy
    f. Use of any non-rigid support such as elastic bandages, wraps, or back belts, etc. (rigid or other means to immobilize parts of the body are considered medical treatment and recordable)
    g. Use of temporary immobilization devices for transporting accident victims such as splints, slings, neck collars, back boards, etc.)
    h. Drilling fingernail or toenail to relieve pressure, or drain fluid from a blister
    i. Use of eye patches
    j. Removing foreign bodies from the eye using only irrigation or a cotton swab
    k. Use of finger guards
    l. Use of massages (physical therapy or chiropractic treatment are considered medical treatment and recordable)
    m. Drinking fluids for relief of heat stress
4. **Determination if New Case for previous injury as follows:**
    a. The employee's previous recorded injury or illness of the same type that affected the same part of the body had recovered completely (all signs and symptoms had disappeared) from the previous injury or illness and an event or exposure in the work environment caused the signs or symptoms to reappear would be a new case.
    b. If an employee experiences the signs or symptoms of a previous recorded illness as a result of an event or exposure in the workplace that triggers an episode of asthma or rash, it would be a new case.

6.2.2.2 OSHA FORM 300 Recordability Flowchart



6.2.2.3 OSHA FORM 300 (OSHA 300 Log) INSTRUCTIONS

1. At Start of Each Year Create a New Blank Electronic Version of OSHA 300 Log (1/2004 version) or use a blank hard copy if recording manually.
    a. Enter year.
    b. Enter your unit under Establishment name
    c. Enter City your unit is located
    d. Enter NC as your State
2. Enter each OSHA Recordable Injury on the OSHA 300 Log within (7) calendar days. Start each year by using case no. 1 in Column "A" and continuing in sequential order for each additional case.
3. Enter the employee's name in Column "B". For a Privacy Case involving injuries or illnesses to an intimate body part or the reproductive system, do not enter the employee's name, but enter "Privacy Case".
4. Enter the employee's job title in Column "C".
5. Enter date of injury or onset of illness in Column "D".
6. Enter the location where the incident occurred in Column "E".
7. Enter a description of the injury or illness, parts of body affected, and object/substance that directly caused injury or illness in Column "F".
8. Classify the case by checking only one box (using "x"):
    a. **Death** – Column "G",
    b. Injury or Illness that resulted in **Days Away from Work** – Column "H"
    c. **Remained at Work with either Job Transfer or Work Restriction** – Column "I"
    d. **Remained at Work as Other Recordable Case** in Column "J".
9. Enter the number of **calendar days** the **injured or ill employee was Away from Work** in Column "K". The day of injury or illness does not count as day away from work. **When calendar day count reaches 180, stop counting and enter 180 in Column "K"**
10. Enter the number of days **the injured or ill employee was on Work Restriction** in Column "L".
11. For cases involving both Days Away from Work and Days Restriction only check the Days Away from Work Column "K" and record the number of days for in respective columns.
12. In Colum "M" check only one box (using "x") under the injury column or check one type of illness. Only one column should be checked; either an injury or illness.
    a. Injury in Column "M1".
    b. Skin Disorder in Column "M2".
    c. Respiratory Condition in Column "M3".
    d. Poisoning in Column "M4".
    e. Hearing Loss in Column "M5".
    f. All other illnesses in Column "M6".

13. Repeat this procedure for each additional OSHA recordable injury or illness throughout the calendar year.

6.2.2 Form 19 (Employer's Report of Employee's Injury or Occupational Disease to the NC Industrial Commission)

North Carolina Industrial Commission Form 19 is the equivalent of OSHA Form 301 for Injury and Illness Incident Report and shall be used by all NCDOT Units. The NCDOT current version of the Form 19 (Appendix B) is available electronically from Inside NCDOT Workers' Compensation Unit web page or can be obtained by contacting the Workers' Compensation Unit directly.

The Form 19 must be filled out as completely as possible, signed by supervisor and submitted to the Safety and Risk Management Workers' Comp Unit.

1. To be filled out '**completely**' and signed by Supervisor when the employee files a W.C. claim for an **Injury** or **Reported Injury with Refusal of Treatment**. The employees full name should be stated (no initials) and the employee(s) physical home address should be stated on the form 19. *If the employee receives their mail at an alternate location (example: PO Box), put that information on a separate sheet of paper with the employees' signature and send it in along with the Form 19.*
2. Make sure to enter Employee's Cost Center number, home phone number, date of birth, and date of hire.
3. Do NOT write the "full" social security number; only last 4 digits.
4. Provide information requested in the OSHA 301 Section at bottom of the form.
5. **First notice of accident/injury and loss work time due to accident/injury please Fax to the WCA's on the "same day" of the employee injury, along with any other supporting documents.**
6. Supervisors should mail the original copies to Workers Comp. section within 5 days.

6.2.3 OSHA Form 300A (Summary of Work-Related Injuries and Illnesses)

OSHA Form 300A titled "Summary of Work-Related Injuries and Illnesses" (Appendix C) is used to record totals of Work-Related Injuries and Illness for each NCDOT physical establishment (location) or Unit. The electronic version available from OSHA website dated (Rev. 1/2004) should be used for Form 300A annual summary. Manual hard copies may also be used for completing the 300A summary from manual hard copy OSHA 300 Log for summary year.

The completed and signed Form 300A summary shall be posted in a visible location for period Feb. 1st thru April 30th of the following year where it can be viewed by NCDOT employees working at that location.

OSHA requires that the Form 300A be completed and posted after each calendar year, regardless of whether or not a work-related injury or illness has occurred.

6.2.4.1 OSHA FORM 300A INSTRUCTIONS

1. At End of Each Calendar Year, Complete the Blank Electronic Version of OSHA Form 300A (1/2004 version) or a blank hard copy if recording manually. If electronic version of OSHA 300 Log is used, the totals will be transferred automatically to OSHA 300A worksheet. For Units doing manually, transfer total numbers from OSHA 300 to OSHA 300A summary.
2. Enter total number of cases from OSHA 300 Log.
    a. Enter total number of **Deaths** from page total at bottom of Column "G" on OSHA 300 Log.
    b. Enter total number of cases with **Days Away from Work** from page total at bottom of Column "H" on OHSA 300 Log.
    c. Enter total number of cases with **Job Transfer or Work Restriction** from page total at bottom of Column "I" on OSHA 300 Log.
    d. Enter total number of **Other Recordable Cases** from page total at bottom of Column "J" on OSHA 300 Log.
3. Enter total number of days from OSHA 300 Log.
    a. Enter total number of **Days Away from Work** from Column "K" on OSHA 300 Log.
    b. Enter total number of **Days of Job Transfer or Work Restriction** from page total at bottom of Column "L" on OSHA 300 Log.
4. Enter Injury and Illness totals from Column "M" on OSHA 300 Log for each of the following categories.
    a. Enter total number of **Injury** cases from page total at bottom of Column "M1" on OSHA 300 Log.
    b. Enter total number of **Skin Disorder** cases from page total at bottom of Column "M2" on OSHA 300 Log.
    c. Enter total number of **Respiratory Condition** cases from page total at bottom of Column "M3" on OSHA 300 Log.
    d. Enter total number of **Poisoning** cases from page total at bottom of Column "M4" on OSHA 300 Log.
    e. Enter number of **Hearing Loss** cases from page total at bottom of Column "M5" on OSHA 300 Log.
    f. Enter **All Other Illnesses** cases from page total at bottom of Column "M6" on OSHA 300 Log.

5. Enter Establishment Information for your Unit.
   a. Enter year at top right-hand corner of Form 300A.
   b. Enter your unit under Establishment name.
   c. Enter street address for your unit is located.
   d. Enter City your unit is located.
   e. Enter NC as your State.
   f. Enter Zip Code for unit address.
   g. Enter your Unit under Industry Description; include NCDOT followed by your Unit.
   h. Enter North American Industrial Classification (NAICS) for your Unit from the one of the classifications in Table below:

237310 – Highway, Street, and Bridge Construction	DOH & Asset Management Bridge Inspections and Bridge Maintenance	Road and bridge construction including bridge approaches and decking, curbs and gutters, and guardrails. Includes maintenance, repair (incl. potholes), and painting
926120 – Regulation and Administration of Transportation Programs	DMV, Fiscal, HR, IT, Traffic Safety, Transportation & Mobility, Preconstruction, Technical Services, Inspector General's office General: Business & Admin, Communications, Governance, DOH Construction Units All other NCDOT units.	Licensing of transportation equipment, facilities, and services Motor carrier licensing and inspection offices Motor vehicle licensing offices, government Public transportation commissions, non-operating Transit systems and authorities, non-operating Transportation departments, non-operating Transportation safety programs, government Public administration General services departments, government
483114 Ferry passenger transportation, coastal or Great Lakes (including St. Lawrence Seaway)	NCDOT Ferry Operations	Ferry transportation operations primarily engaged in providing water transportation of passengers in coastal waters
336611 Shipyard (i.e., facility capable of building ships)	NCDOT Ferry Shipyard	Activities of shipyards include the construction of ships, their repair, conversion and alteration, the production of prefabricated ship and barge sections, and specialized services, such as ship scaling.

6. Enter Employment Information for your Unit.
    a. Enter average number of employees in your Unit for the calendar year being reported.
    b. Enter total hours worked by all employees in your Unit last year. This number is available from NCDOT IT database which can be accessed by your Safety support staff. You can also estimate the total number of hours worked by multiplying total number of employees in your Unit by 2,000 hours/ employee/year.
7. Upon completion of the Form 300A, have the highest-ranking authority in your Unit sign and date the form.
8. Copies of the signed and dated 300A shall be posted in your Unit on bulletin boards so it may be viewed by all employees working at the location for period February 1st thru April 30th. Do not post the actual OSHA 300 log; only the OSHA 300A summary sheet.

6.2.4 OSHA Electronic Recordkeeping

OSHA requires NCDOT Units with 250 or more employees to electronically submit information from OSHA 300A Summary of Work-Related Injuries and Illnesses each year. OSHA will provide a secure website for electronic submissions to be completed by July 1st each year for preceding year Work-Related Injury and Illness information.

6.2.5 OSHA BLS Surveys (Bureau of Labor Statistics Survey of Occupational Injuries and Illnesses)

Each year the Bureau of Labor Statistics sends NCDOT BLS Surveys of Occupational Injuries and Illnesses for NCDOT establishments in certain counties. These surveys are sent to NCDOT Safety & Risk Management and are required to be completed within 30 days for counties designated for reporting each calendar year. Safety and Risk Management requests safety staff for NCDOT establishments in respective counties to provide specific information from OSHA 300 Logs to complete the survey. The following information is required to complete the BLS Survey:

1. OSHA 300 Log summary sheet of all injuries and illness for County or Unit in respective County for each survey.
2. The average number of employees in the County or Unit.
    a. Total number of hours worked is used to determine number of employees by dividing by 2,000 hours/year for each employee.
    b. Hours worked can be obtained using an IT Database.
    c. Total number of employees and hours worked can also be estimated.
3. The total number of hours worked in the County or Unit.
4. The total number OSHA recordable injuries for reporting year in the County or Unit.

5. The total number of "LWDC" cases that resulted in days away from work.
6. Specific information required from Form 19's for each LWDC. The Form 19's can be access from CareMC.
7. Provide this information in spreadsheet provided by Safety & Risk Management by the required date.
8. Safety & Risk Management will review and verify data prior to providing Survey information to NCDOL OSH who will enter data into BLS data base completing the BLS Survey for each calendar year.

6.2.6 NCDOL PSNC Surveys (NCDOL Public Sector Survey of Occupational Injuries and Illnesses)

Each year the NC Department of Labor (NCDOL) sends Public Sector Surveys of Occupational Injuries and Illnesses to NCDOT establishments throughout the state. The NCDOL survey is similar to the BLS Survey required by Federal OSHA, but is used by NCDOL to calculate DART (Days Away, Restrictions and Transfers) rate for each NCDOT establishment. The DART rates are compared to NCDOL annual target rate which determines priority for annual Compliance Inspections.

These Public-Sector Surveys are sent to NCDOT Safety Staff assigned to each establishment throughout the state and are required to be completed within 30 days even if they had no work-related injuries or illnesses recorded on their OSHA 300 Logs. The Survey should be completed Online using NCDOL website access for establishment ID # and Password assigned. The hard copy survey may also be completed manually and mailed to NCDOL address provided.

The following information is required to complete the Public-Sector Survey which must be submitted electronically using NCDOL website:

1. The average number of employees assigned to the establishment listed on the Public-Sector Survey and number of hours worked for that calendar year. This information may be obtained from OSHA 300A Summary for the establishment.
2. OSHA 300 Log summary sheet of all injuries and illness for the establishment for that calendar year.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring OSHA recordkeeping of Work-related Injuries & Illnesses are being maintained for their respective units or sites. Managers/Unit Heads shall assign an administrative person in their unit to maintain OSHA 300 Logs, OSHA 300A Summary, and submitting Form 19's and other Workers Compensation documents required for work-related injuries or illnesses where medical treatment is required.

Managers/Unit Heads will also certify and sign the OSHA 300A Summary as the highest ranking NCDOT representative for each site and ensure it is posted February 1 thru April 30 of the following calendar year on bulletin boards accessible for viewing by employees working or reporting to the site.

6.3.2 Supervisors

Supervisors shall ensure all work-related injuries or illness for employees under their supervision are reported using NCDOT Incident Reporting forms and forwarded to the designated personnel responsible for handling OSHA recordkeeping and initiating Workers Compensation claims for their location.

Supervisors are responsible for ensuring their employees know to report all work-related injuries and illnesses as soon as possible when the event occurs.

6.3.3 Employees

Employees shall report all work-related injuries or illnesses as soon as possible to their supervisors after an incident occurs.

6.3.4 Division Safety Staff

Division Safety Staff shall submit reporting to NC Department of Labor for all NCDOT work-related fatalities, hospitalizations, amputations, and loss of eye for their respective Divisions.

Division Safety Staff will support their respective Managers, Supervisors, and Individuals assigned to maintain OSHA 300 logs and related recordkeeping and reporting requirements.

Division Safety Staff shall complete NCDOL Public Sector Survey of Occupational Injuries and Illnesses if applicable for establishments in their Division.

6.3.5 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to manager/unit heads, supervisors, or others as necessary on any matter concerning work-related injuries and illnesses. Safety and Risk Management will assist in developing or securing the required training for OSHA recordkeeping of Work-related Injuries and Illnesses.

Workers Compensation Unit shall process all workers compensation claims resulting from work-related injuries and illnesses.

Safety Engineers will provide consultative and audit assistance to ensure OSHA recordkeeping and reporting requirements throughout NCDOT.

Appendix A: OSHA 300 Log

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year

U.S. Department of Labor
Occupational Safety and Health Administration

You must record information about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an injury and illness incident report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Form approved OMB no. 1218-0176

Establishment name

City State

Identify the person				Describe the case		Classify the case											
(A) Case No.	(B) Employee's Name	(C) Job Title (e.g., Welder)	(D) Date of injury or onset of illness (mo./day)	(E) Where the event occurred (e.g. Loading dock north end)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (e.g. Second degree burns on right forearm from acetylene torch)	**CHECK ONLY ONE** box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "injury" column or choose one type of illness:					
						Death	Days away from work	Remained at work		Away From Work (days)	On job transfer or restriction (days)	(M) Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other illnesses
								Job transfer or restriction	Other record-able cases								
						(G)	(H)	(I)	(J)	(K)	(L)	(1)	(2)	(3)	(4)	(5)	(6)
					Page totals	0	0	0	0	0	0	0	0	0	0	0	0

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office.

		Injury	Skin Disorder	Respiratory Condition	Poisoning	Hearing Loss	All other illnesses
Page	1 of 1	(1)	(2)	(3)	(4)	(5)	(6)

Appendix B: Form 19

North Carolina Industrial Commission

IC File #_____

EMPLOYER'S REPORT OF EMPLOYEE'S INJURY OR OCCUPATIONAL DISEASE TO THE INDUSTRIAL COMMISSION

*Emp. Code #0004210

*Carrier Code #999154

Employer FEIN_____

Carrier File #_____

To the Employer:
A copy of this Form 19 accompanied by a blank Form 18 must be given to the employee. It does not satisfy the employee's obligation to file a claim. The filing of this report is required by law. This form MUST be transmitted to the Industrial Commission through your Insurance Carrier.

Cost Center #:__ _____ Date of Hire #: __ _____

This Form 19 is not your claim for workers' compensation benefits. To make a claim, you must complete and sign the enclosed Form 18 and mail it to Claims Administration, N.C. Industrial Commission, 4335 Mail Service Center Raleigh, NC 27699-4335 within two years of the date of your injury or last payment of medical compensation. For occupational diseases, the claim must be filed within two years of the date of disability or the date your doctor told you that you have a work-related disease, whichever is later.

The I.C. File # is the unique identifier for this injury. It will be provided by return letter and is to be referenced in all future correspondence.

The use of this form is required under the provisions of the Workers' Compensation Act

Employee's Name (NO Initials)			Employer's Name		Telephone Number
Address (NO PO Box)			Employer's Address	City State Zip	
City	State	Zip	Insurance Carrier	Policy Number	
( ) -	( ) -		PO Box 98057	Raleigh NC 27624	
Home Telephone	Work Telephone		Carrier's Address	City State Zip	
xxx-xx-	☐ M ☐ F	/ /	(800)-365-5998	(866)-450-5137	
Social Security Number	Sex	Date of Birth	Carrier's Telephone Number	Fax Number	

Corvel Corporation

Employer	1.	Give nature of employer's business
Time And Place	2.	Location of plant where injury occurred County Department State if employer's premises ☐Y ☐N
	3.	Date of injury / / 4. Day of week Hour of day : ☐ A.M. ☐ P.M.
	5.	Was employee paid for entire day 6. Date disability began / / ☐ A.M. ☐ P.M.
	7.	Date you or the supervisor first knew of injury / / 8. Name of supervisor
Person Injured	9.	(a) Occupation when injured (b) Employment: Full Time, Part Time, Temp, Other...
	10.	(a) Time employed by you (b) Wages per hour $
	11.	(a) No. hours worked per day (b) Wages per day $ (c) No. of days worked per week (d) Avg. weekly wages w/o overtime $ (e) If board, lodging, fuel or other advantages were furnished in addition to wages, estimated value per day, week or month. $ per
Cause And Nature Of Injury	12.	Describe fully how injury occurred and what employee was doing when injured: (Statement made without prejudice and without vouching for correctness of information)
	13.	List all injuries and specify body part involved (e.g. right hand or left hand):
	14.	Date & hour returned to work / / at : .M. 15. If so, at what wages $ per
	16.	At what occupation 17. Employee's salary continued in full?
	18.	*Was employee treated by a physician
Fatal Cases	19.	Has injured employee died 20. If so, give date of death (Submit Form 29) / /

Employer name _____ Date Completed / /

Signed by _____ Official Title _____

OSHA 301 Information:

Case Number from Log:	Date Hired: / /	The Employee began work on date of incident: : ☐ A.M. ☐ P.M.	If off-site medical treatment provided, answer entire next line.	
Name of facility:		Address: Street/City/Zip/Telephone	ER visit? ☐ Yes ☐ No	Overnight stay? ☐ Yes ☐ No

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

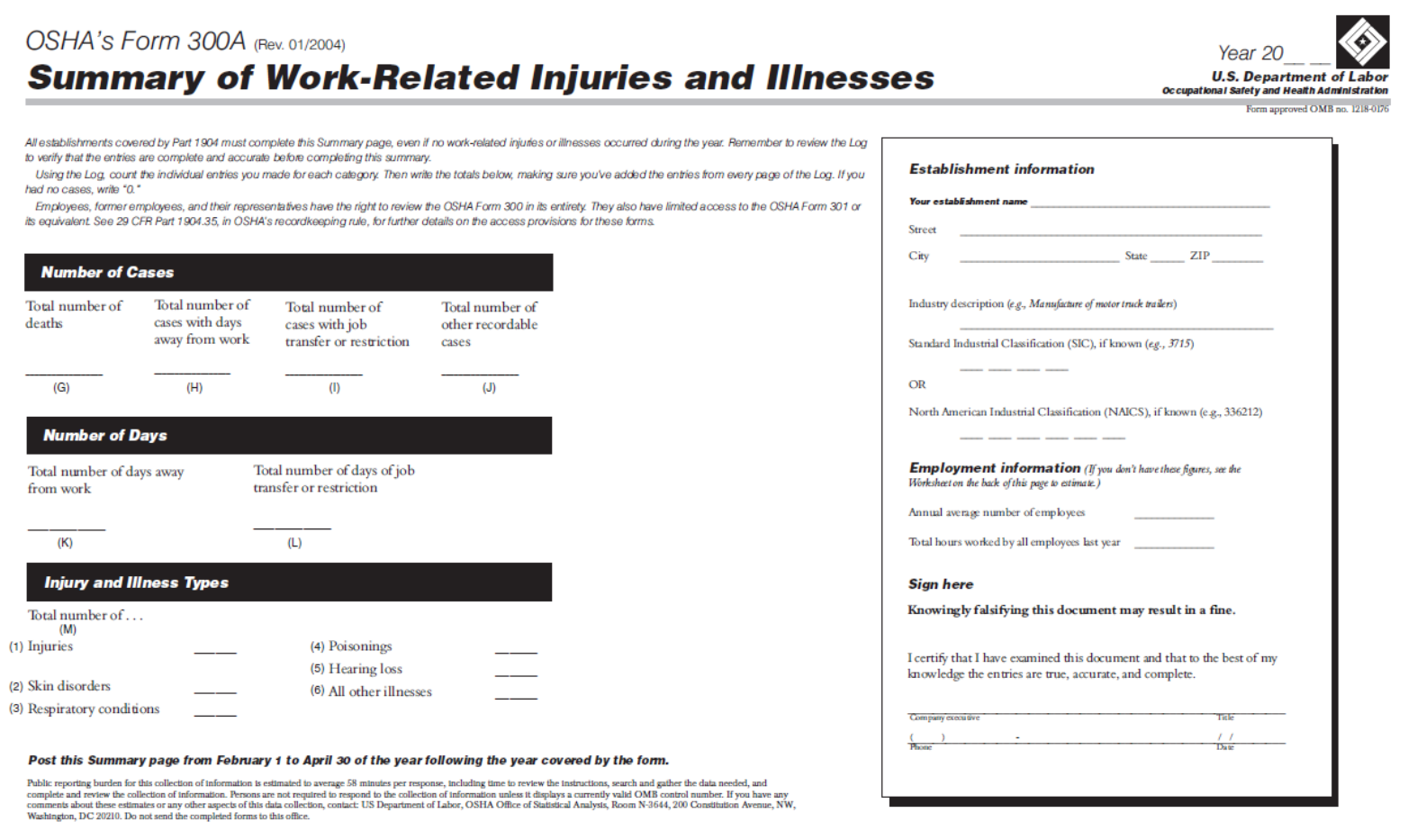
FORM 19
REVISED-DOT-6/18/2016
FROM IC REV 8/13/12
PAGE 1 OF 2

FOR IC USE ONLY
RESEARCHER:____
CC:____
EC:____
DATA ENTRY:____

FORM 19

SELF-INSURED EMPLOYER OR CARRIER MAIL TO:
NCIC - CLAIMS ADMINISTRATION
4335 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-4335
MAIN TELEPHONE: (919) 807-2500
HELPLINE: (800) 688-8349
WEBSITE: HTTP://WWW.COMP.STATE.NC.US/

Appendix C: OSHA 300A Summary of Work-Related Injuries and Illnesses



OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
_____ (G)	_____ (H)	_____ (I)	_____ (J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
_____ (K)	_____ (L)

Injury and Illness Types

Total number of . . . (M)

(1) Injuries _____
(2) Skin disorders _____
(3) Respiratory conditions _____
(4) Poisonings _____
(5) Hearing loss _____
(6) All other illnesses _____

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Public reporting burden for this collection of information is estimated to average 58 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ ZIP _____

Industry description (*e.g., Manufacture of motor truck trailers*)

_____

Standard Industrial Classification (SIC), if known (*e.g., 3715*)

___ ___ ___ ___

OR

North American Industrial Classification (NAICS), if known (e.g., 336212)

___ ___ ___ ___ ___ ___

Employment information (*If you don't have these figures, see the Worksheet on the back of this page to estimate.*)

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____ Company executive _____ Title

( ) - / / Phone Date

Author:	Paul Roberts	Revision #:	New
Approved By:	Bobby Lewis	Date Revised:	July 2019

SAFETY POLICY & PROCEDURE

Tree Felling and Chainsaw Use SPP# 1910.266

Contents

1.0 Purpose

The purpose of this safety policy and procedure is to establish tree felling and chainsaw use operation procedures for North Carolina Department of Transportation (NCDOT) employees engaged in these activities.

2.0 Scope and Applicability

This safety policy and procedure provides requirements for safe tree felling and chainsaw use to protect NCDOT employees. Since Tree Felling is an operation performed throughout NCDOT and Chainsaws are the primary powered tool used to perform the operation, both have been included in this SPP.

This document also details the areas of responsibility for managers/unit heads, supervisors, affected employees and Safety and Risk Management within NCDOT.

This safety policy and procedure affects NCDOT employees who as a result of their job duties are exposed to tree felling and chainsaw use hazards.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry Special Industries – Logging Operations (29 CFR 1910.266) as applicable to NCDOT operations.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. When tree felling and chainsaw use hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Tree Felling and Chainsaw Use will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

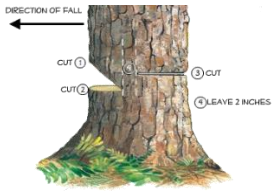
It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Tree Felling and Chainsaw Use. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined under Section 6.3.

6.0 Procedure

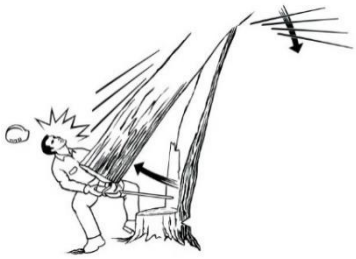
This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Tree Felling and Chainsaw Use operations.

6.1 Definitions

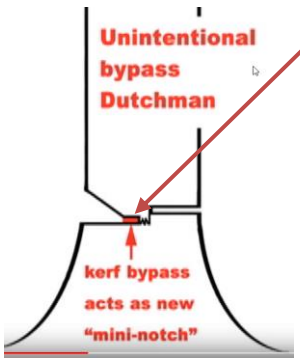
Back Cut
The last of the three cuts required to fell a tree using the conventional notch method made from the opposite side of the undercut at least 2 inches above the horizontal cut of undercut.



Barber Chair – A tree that while in the process of being cut, splits lengthwise and leaves a vertical piece of wood on top of the stump. It can occur when attempting to fell the tree while making the final Backcut with a Dutchman "Bypass" at notch cut on tree.



Barber Chair Hazard



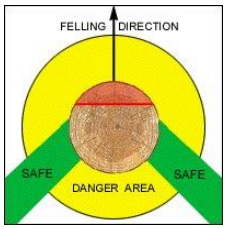
The bottom cut has extended to far into the hinge.

Boring
Using the nose or tip of the guide bar to saw into the tree while felling or bucking

Buck
To cut felled trees into logs.

Dutchman Notch
The seat that interferes with the smooth closing of the notch. Caused when one of the notch cuts is made too deep and extends beyond the endpoint of the other notch cut, known as "Bypass".

Escape Route
A predetermined path used by fallers when felling or bucking. Determine the direction and distance of the escape route and clear the route before cutting. There should be an escape route at a 45^0 angle. If possible, plan at least 2 escape routes.

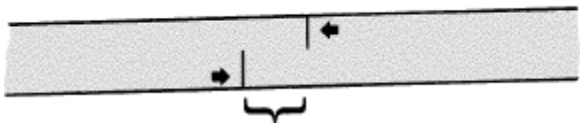


Kickback
A strong thrust of the saw back toward the tree feller, generally resulting from improper use of the
guide bar's nose or from pinching the bar in a cut.

Lean
The tilt of a tree away from its vertical position. Often two leans (such as head lean and side lean) may affect the same tree.

Limbing
To cut branches off felled trees.

Limb Lock Cut
The purpose of a limb lock cut is to relieve the pressure of a limb or tree that is under pressure. It prevents a limb under pressure from kicking back and striking the leg or pinching the saw. The first cut is made on the compression side of the tree, and the 2nd on the tension side of the tree limb 3-5" from the 1st cut. Both cuts should be deep enough to by-pass the fiber cut.



Spring Pole
A tree, segment of a tree, limb, or sapling which is under stress or tension due to the pressure or weight of another tree or ice. Pressure on a spring pole should be relieved by shaving a sufficient amount of wood from the underside of spring pole to release some of the tension and the tree breaks at the hinge point. Finish by cutting top side of spring pole ½" from past series of shallow underside cuts.

Tree Felling
To cut down trees.

Undercut
A notch cut in the tree to guide the direction of tree fall and prevent splitting or kickback comprised of first two cuts required to fell a tree. The first horizontal notch cut must be at least one third of the diameter of the tree. The second sloping cut must have enough angle to allow a wide opening as it meets the end of the first horizontal cut.

Wedge
A plastic or magnesium tool used by a tree feller to redistribute a tree's weight in the desired direction and to prevent a tree from falling backward. It also is used while bucking to prevent the guide bar from being pinched. Driving the wedge into the tree can promote the direction of the fall.

Widow Maker - A loose or broken limb that may be rotted, laying loose on top of other limbs or ready to fall onto people standing below or underneath the working area below. Widow makers may exist in trees next to the tree intended to be cut. Limbs, from the tree intended to be cut, may brush against other trees containing widow makers.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Chainsaw Use
- PPE
- Tree Felling
- Traffic Control
- Night-Time Operations
- First Aid

6.2.1 Training

All employees shall receive chainsaw and tree felling training prior to engaging in such operations. Training in safe operations shall include:

- Proper operation and maintenance of a chainsaw
- PPE required when operating chainsaw
- Proper method for tree felling and hazards associated
- Initial training may be hands-on or on-the-job training, but subsequent instructor led training should be conducted and documented.
- If a chainsaw is to be used in a bucket truck or other type of aerial lift employee must receive training and be qualified to operate the aerial lift being used.

6.2.2 Chainsaw Use

Follow manufacturer guidelines when using a Chainsaw.

1. Operators shall check controls, chain tension, all bolts, handle, and ensure throttle lock operates properly and chain catcher is in place to ensure they are functioning properly and adjusted according to the manufacturer's instructions. Report all needed repairs promptly and do not use any equipment that is unsafe.
2. Do not wear loose jewelry or chains. Snug fitting clothing shall be worn but allow complete freedom of movement.

3. Always use the following precautions when handling fuel and refueling the chainsaw:
    a. Always store gasoline in an approved container.
    b. Do not smoke while handling fuel.
    c. Beware of static electricity and sparks between saw and fuel cans (metal and plastic).
    d. Always stop the engine to refuel the tank and allow engine to cool.
    e. Avoid spilling fuel or oil. Spilled fuel should always be cleaned up.
    f. Do not remove fuel tank cap when engine is running.
    g. Move the chainsaw at least 10 feet from the fueling point before starting the engine.
4. Wear all applicable PPE listed in Section 6.2.3 prior to using the chainsaw.
5. Before you start the engine, make sure the chain is not contacting any object and the chain brake is engaged.
6. The preferred method is to start the chainsaw engine on the ground. Do NOT drop start or air drop start a chain saw. The leg lock method may also be used to start a chainsaw.
7. Never start the chainsaw until you are at the location where you intend to use the saw.
8. Do not allow other persons to be near the chainsaw when starting or cutting.
9. Shut off or engage the chain brake whenever the saw is carried more than 50 feet or on hazardous terrain.
10. When carrying the saw, keep the bar facing behind you.

6.2.3 PPE

The following PPE shall be worn when using a chainsaw:

1. DOT Loggers hard hat w/ mesh face shield and hearing protection earmuffs are preferred head, face, eye, and hearing protection. Safety glasses are required under the mesh face shield.
2. Safety glasses
3. Hard-hat with chip shield, ear plugs or earmuffs (chainsaws run at 119dB typically)
4. Full Wrap Around Chain Saw Chaps
5. Cut resistant leather gloves
6. Sturdy construction safety toe work boots
7. Snugly fitting Safety Vest if exposed to moving traffic or equipment.
8. Never wear a Safety Vest when using a chipper.
9. Fall protection consisting of full body harness and fall arrest lanyard or restraint if operating chainsaw from aerial lift.

6.2.4 Tree Felling

No felling or limbing of trees is allowed without the presence of at least 2 workers. The worker not actually running the chainsaw shall remain clear of the cutting so that the can call for help if needed.

Before felling or cutting down a tree, the work area around the tree should be cleared to allow safe access and an escape route planned.

Conduct hazard assessment of the area for:

- Overhead Powerlines or other Utilities (notify Power or Utility company if needed)
- Old fence or metal,
- Vines or poison Ivy/Oak etc.
- Animals or pets
- Children in residential areas or where housing exists.
- Rotted or dead wood.
- Curb and gutter or crossover pipe that can be damaged.
- Residential cars or trucks that may be parked in or near the drop zone.
- Pedestrians and onlookers who may wander into the area.
- Below ground utilities (that may be affected from limbs or trees stabbing into the ground during the fall.

All workers not involved in the operation should keep clear of the work area (at least two tree lengths). The following conditions must also be evaluated to ensure safe operation:

- Shape of the tree
- Wind force and direction; cease operations if wind speed approach 40 MPH.
- Hazardous weather conditions
- Location of overhead utilities
- Lean of tree
- Condition of tree (decayed, hollow, weak spots, stress from vines or other trees, nails and spikes that can damage the chain or cause kickback)
- Traffic or any other concerns when tree falls

Proper procedures for felling trees using a chainsaw:

1. A notch and back cut method should be used in felling trees with diameter of ten inches or greater measured at belt height.
    a. The first top cut of notch should be 45˚ angle to 1/3rd of tree diameter.
    b. The second bottom cut of notch should be horizontal to end of first cut. The 2nd cut must meet cleanly with the 1st cut or the tree will lean into the cut possibly snapping prematurely or binding the bar.
    c. The order of these (2) cuts may be reversed obtaining same results.
    d. The final back cut is a horizontal cut from opposite side of notch 1” – 2” above the notch corner stopping a point that will leave hinge width about 1/10th of the tree diameter. Tree will fall in direction of the notch. It is very important to leave hinge wood to control the fall of the tree.
    e. After making the final back cut, take your escape route to avoid being in area when tree falls.
    f. Bore Cut and Wedges may be necessary to direct the fall of trees with lean and on larger diameter trees.
    g. To ensure the tree will not fall backwards when making the final back cut, wedge can be placed into the back cut.
2. Once the tree has fallen, limbing and bucking can be performed. Ensure the area is clear of any trip hazards during this process.

6.2.5 Traffic Control

Traffic control must be performed when cutting trees next to road. All signs must be erected to control traffic in each direction.

- Communications by line of sight or by radio must be established before beginning work.
- Radio communications is required when out of line of sight. Verbal communications are required before the release of any traffic and not by the sound of idling equipment
- Take any necessary precautions when working to drop trees that are in a curve or over a hill.
- For any trees that are dropped into or toward the road, the traffic must be completely stopped in each direction.

6.2.6 Night-Time Operations

Night-time and call out operations for the removal of trees and limbs increase the danger and risk of injuries. Therefore, a minimum of (2) NCDOT personnel is required. Due to risk of injury or potential fatalities, there are no exceptions to this policy. If possible, the removal of trees and limbs will be delayed until daytime when operations will be safer.

- Appropriate lighting and signage will need to be addressed first.
- Signage must be placed well in advance of curves and allow time for stopping. Highway Patrol, Sheriffs Dept, and local Police should be called for operations where visibility and line of sight will present hazards.
- If the work cannot be performed safely, it will be delayed until daytime.
- Lighting used by crews will consist of vehicle headlights, mobile light stands, vehicle mounted lights, headlamps or other feasible methods.
- Additional crew members will be called out if needed for flagging and warning the crew of errant traffic and other situations and conditions that require material handling more than 2 people can safely handle.
- Other equipment needed for the removal of trees will be determined by the Supervisor and County Maintenance Engineers.

6.2.7 First Aid

At least one member of each crew shall be trained in First Aid and CPR. Training must be current.

Each crew must have at least (1) 25-unit first aid kit on hand consisting of the following items:

- 1-4x4 Bandage Compress
- 1-Box 3x3 Sterile Gauze Pads (4 per box)
- 1-Triangular Bandage (40” x40”x40”)
- 1-2”x 4 yards Gauze Bandage
- 1/2 inch x 2.5 yards Adhesive Tape (2 per box)
- 1-Boxes of 1”x3” Adhesive Bandages (16 per box)

- 1-Sterile Buffered Isotonic Eyewash Kit (1 oz.) with 2 eye pads, 2 adhesive strips
- 1-Instant Cold Pack
- Hand Sanitizer (1/32 oz. pks 6 per box)
- Antiseptic Wipes (10 per box)
- Triple Antibiotic Ointment (1/57 oz. pks 10 per box)
- Sting Relief Swabs (10 per box)
- 1-Eye/Skin Wash 1oz.
- 1-CPR Breather Barrier
- Disposable Nitrile Gloves (2 per box)
- Burn Treatment (10 per box)
- 1-Burn Dressing (4”x4”) gel soaked
- 2–Trauma Pads (5”x9”)
- 1-Scissors
- First Aid Guide
- **Due to the potential severity of injury and excessive bleeding to a body part from chainsaw cut, additional and larger (8”x10” Gauze Pads) should be added to First Aid Kits for Tree Felling and Chainsaw use.**

First aid kits should be replenished with any depleted items after each use and inspected yearly to replace any expired items.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for equipment, related supplies and PPE for chainsaw use and tree felling operations.

Manager/Unit Heads will obtain and coordinate the required Tree Felling and Chainsaw Use training for the affected employees. Manager/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training perform any of the tasks or activities associated with this safety policy and procedure.

Supervisors will communicate appropriate needs to managers/unit heads and/or other supervisors.

Supervisors will ensure that employees are provided and wear PPE as required for Tree Felling and Chainsaw Use.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

Employees shall be responsible for reporting suspected unsafe conditions or equipment to the competent person.

6.3.5 Safety and Risk Management

Safety and Risk Management shall provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or providing Chainsaw and Tree Felling training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure

6.3.6 Central Inventory Unit

The Central Inventory Unit or MRO contract supplier will be responsible for maintaining an inventory of chainsaws, related supplies and first aid kits.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Flammable and Combustible Liquids SPP# 1910.106

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for North Carolina Department of Transportation (NCDOT) employees who handle flammable and combustible liquids.

2.0 Scope and Applicability

NCDOT uses flammable and combustible liquids in its everyday operations. Flammable and combustible liquids require careful handling. Mixing and using these liquids, smoking, and using electrical equipment around them add to the hazards.

This safety policy and procedure presents guidelines for the safe use, and storage of flammable and combustible liquids. It presents training provisions, a discussion on health hazards and on the flammable and combustible liquids classification system. Additionally, this safety policy and procedure presents information on the typical NCDOT uses of flammable and combustible liquids, storage requirements, and disposal details.

This document details the areas of responsibility for managers/unit heads, supervisors, and employees within NCDOT.

This safety policy and procedure affects NCDOT employees who are exposed to the hazards associated with flammable and combustible liquids.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Administration for General Industry 29 CFR (1910.106) and Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926.152).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, flammable and combustible liquids will always be handled in a careful manner to minimize fire and explosion hazards. When these hazards exist that cannot be eliminated, the engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE) and proper training regarding Flammable and Combustible Liquids will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Flammables and Combustible Liquids. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions and identifies responsibilities required by NCDOT's safety policy and procedure on Flammable and Combustible Liquids.

6.1 Definitions

Barrel
A container holding 42 U.S. gallons.

Boiling Point
The boiling point of a liquid at a pressure of 14.7 pounds per square inch absolute (p.s.i.a.) or, if boiling point is unavailable, the 10 percent point of a distillation may be used as the boiling point of a liquid.

Closed Container
A container sealed by means of a lid or other device such that neither liquid nor vapor will escape at ordinary temperatures.

Fire Area
An area of a building separated from the remainder of the building by construction which has a fire resistance of at least 1 hour and having communicating openings properly protected by an assembly which has a fire resistance of at least 1 hour.

Flashpoint
The minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.

Liquid
Any material which has a fluidity greater than that of 300 penetration asphalt when tested which includes both flammable and combustible liquids.

Combustible Liquids
Any liquid having a flashpoint at or above 100°F. Combustibles are divided into two classes as follows:

- Class II Liquids will include those with flashpoints at or above 100°F and below 140°F or higher, except any mixture having components with flashpoints of 200°F or higher, the volume of which make up 99 percent or more of the total volume of the mixture.
- Class III Liquids will include those with flashpoints at or above 140°F. and below 200°F., except any mixture having components with flashpoints of 200°F or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.
- Class IIIB Liquids will include those with flashpoints at or above 200°F.

Flammable Liquids
Any liquid having a flashpoint below 100°F except a mixture having components with flashpoints of 100°F, or higher, the total of which make up 99 percent or more of the total volume of the mixture. Flammable Liquids are divided into three classes as follows:

- Class 1A include liquids having flashpoints below 73°F and having a boiling point below 100°F.
- Class 1B include liquids having flashpoints below 73°F and having boiling points at or above 100°F.
- Class1C include liquids having flashpoints at or above 73°F and having boiling points below 100°F.

Unstable Liquid
A liquid which in a pure state or as commercially produced or transported will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure, or temperature.

Portable Tank
A closed container having a liquid capacity over 60 U.S. gallons and not intended for fixed installation.

Pressure Vessel
A storage tank or vessel which has been designed to operate at pressures above 15 p.s.i.g.

Protection From Exposure
Adequate fire protection for structures on property adjacent to tanks, where there are employees of the establishment.

Safety Can
An approved container of not more than 5 gallons capacity, having a spring-closing lid and spout cover and so designed that it will relieve internal pressure when subjected to fire exposure.

Vapor Pressure
The pressure measured in pounds per square inch (absolute) exerted by a violate liquid as determined by the "Standard Method of Test for Vapor Pressure of Petroleum Products."

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Health Hazards
- Classification
- General Safety Requirements
- Uses
- Storage
- Disposal

6.2.1 Training

Employees who work with flammable and combustible liquids will be trained at the time of initial employment or assignment. Refresher training shall be provided at the discretion of the supervisor.

6.2.2 Health Hazards

Flammable and combustible liquids create health hazards when inhaled or when they contact skin. Intoxication and other acute and chronic conditions may result from breathing vapors of flammable liquids. Irritation results from the solvent action that these liquids have on the skin's natural oils and tissue.

Vapors from flammable and combustible liquids are generally heavier than air. They will flow into pits, tank openings, confined areas, and low places where they may displace oxygen and contaminate the normal air, causing toxic and explosive atmospheres.

Oxygen deficiency may also occur in closed containers, such as a tank that has been closed for a long time and in which rusting has consumed the oxygen. Confined spaces should be tested for toxic and flammable atmosphere and oxygen levels. See SPP #1910.146, Confined Space Entry, for additional details.

6.2.3 Classification

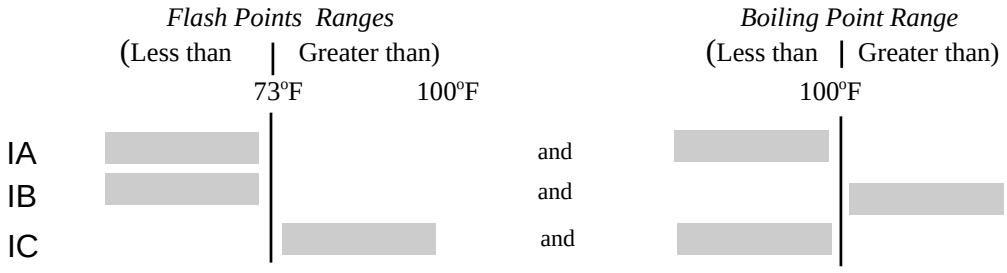
The National Fire Protection Association (NFPA) developed a classification system for flammable liquids and combustible liquids that uses flash point, vapor pressure and anticipated ambient temperature conditions.

The flash point of a liquid is the lowest temperature at which the vapor pressure of the liquid is just sufficient to produce a flammable mixture at the lower limit of flammability.

Vapor pressure is a property of a liquid in a closed container. The atmosphere above the liquid is a mixture of air and vapors of the liquid.

The temperatures at which the flash point and boiling point occurs also is used to determine the NFPA classification of a liquid. The following charts illustrate the classification of liquids based upon flash and boiling points.

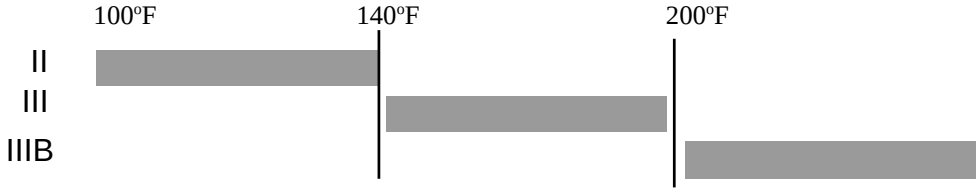
Flammable Liquids Classification



Combustible Liquids Classification

Flash Points Ranges

(Less than Greater than)



6.2.4 General Safety Requirements

Flammable and combustible liquids require careful handling. General safety requirements to minimize flammable and combustible liquids hazards include:

- Preventing dangerous mixtures
- Not smoking
- Avoiding static electricity

Preventing dangerous mixtures of flammable and combustible liquids is important to minimize fire and explosion hazards. Identify fill openings, discharge openings, and control valves on equipment containing flammable and combustible liquids by colors or labels, or both. Mark each tank with the name of the product or otherwise identify it. Keep lines from tanks of different types and classes of products separated.

Use a portable approved container for handling flammable liquids in quantities up to 5 gallons. Clearly identify the containers with lettering or a color code.

Not smoking in a building or area where flammable and combustible liquids are stored, handled, or used minimizes fire and explosion hazards. Employees should not smoke or carry strike-anywhere matches, lighters, and other spark-producing devices when inside a flammable and combustible liquid storage building. The size of the restricted area will depend on the type of products handled, the design of the building, local codes, and local conditions. *No Smoking* (see figure 1) signs must be conspicuously posted in buildings and areas where smoking is prohibited.

Figure 1

Avoiding static electricity minimizes fire and explosion hazards caused by spark discharges. Static electricity is generated by the contact and separation of dissimilar material. For example, static electricity is generated when a fluid flows through a pipe or from an opening into a tank.

A static spark poses great danger where a flammable vapor may be present in the air, such as at the outlet of a flammable liquid's container, and around a tank truck's fill opening or barrel bunghole. When a difference in electrical potential is present, a spark between two bodies can occur because there is not a good electrical-conductive path between them.

To prevent static electricity, bonding and grounding of flammable and combustible containers must be done. Bonding eliminates the static charge potential between two or more containers. Grounding eliminates the static difference between a container and the earth.

Bonding and grounding do not eliminate static charges. Bonding equalizes the potential between two containers so that a spark will not occur between them. Grounding will discharge a charged conductive container.

Figure 2 presents how two containers should be bonded during the filling process. Figure 3 illustrates how electrical charges can build up in piping with recommended locations of the bonding wire at a truck loading/unloading facility. Figure 4 illustrates the use of a filter to dissipate electrical charges at a truck loading facility. Figure 5 presents a grounding configuration for aboveground storage tanks.

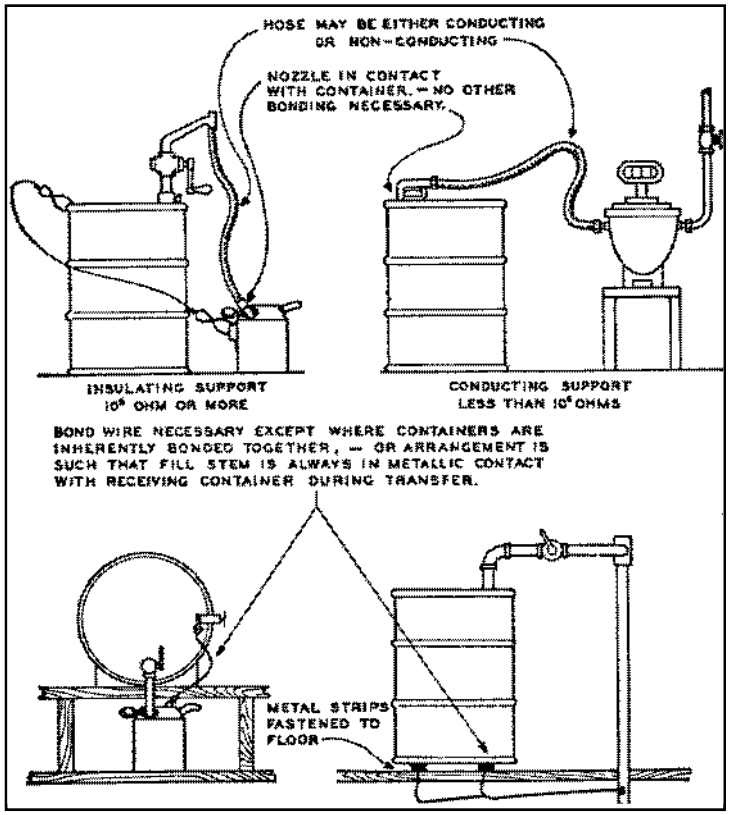


Figure 2

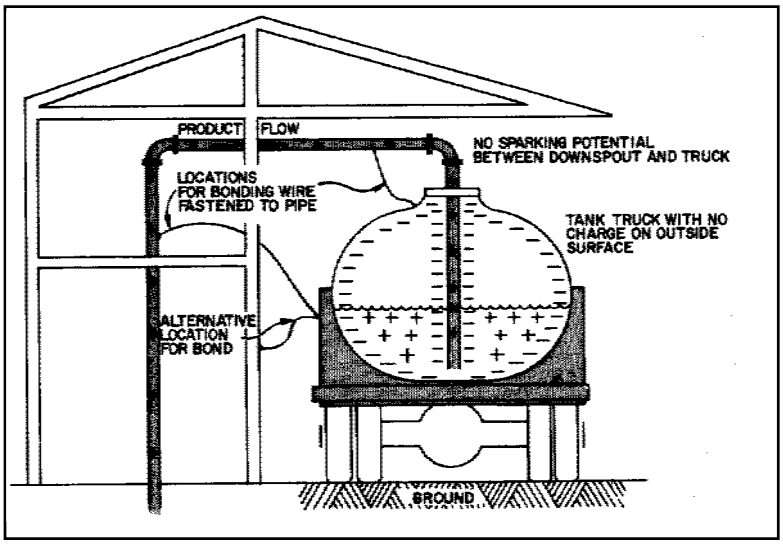


Figure 3

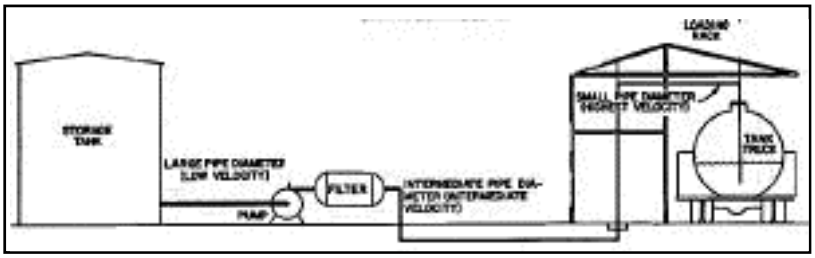


Figure 4

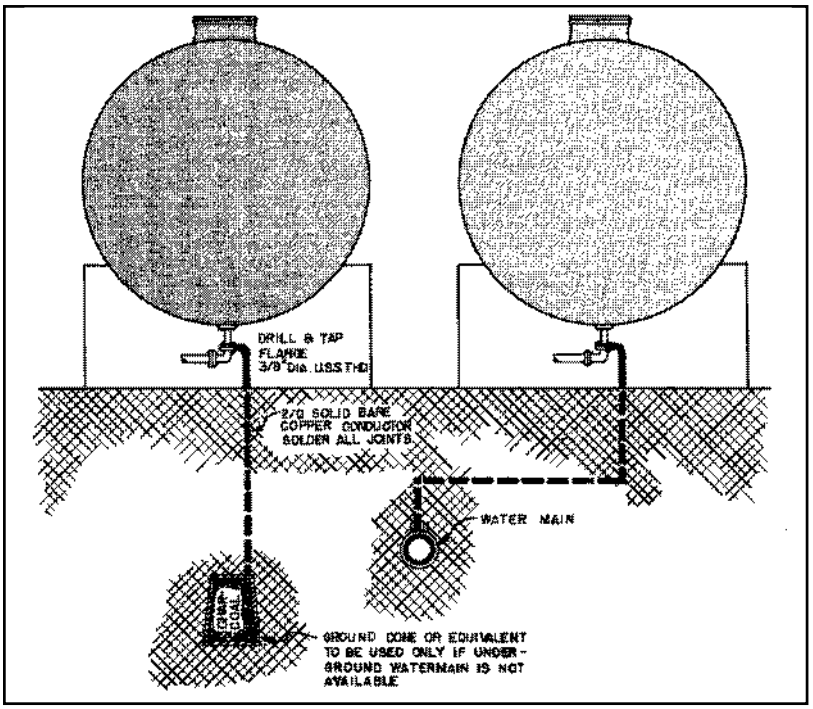


Figure 5

6.2.5 Uses

Flammable and combustible liquids are used in a variety of applications in NCDOT. Common uses include:

- Dip tanks
- Drying ovens
- Oil burners
- Cleaning metal parts
- Internal combustion engines
- Spray booths
- Liquefied petroleum gases

When employees use these liquids, they should know and follow the necessary precautions with any of the uses of flammable and combustible liquids. (It should be noted that gasoline should never be used for cleaning parts or starting fires.) Appendix A presents a list of common flammable and combustible liquids used in NCDOT.

6.2.6 Storage

Storage requirements for flammable and combustible liquids are based on the storage quantity. The table on the following page presents general storage requirements based on capacity.

Flammable and combustible liquids can be stored in a variety of configurations depending upon capacity, use, storage configurations and classification. They include:

- Indoor storage areas
- Outdoor storage cabinets
- Outdoor storage
- Container and portable tank storage
- Fixed tank storage

Indoor storage areas are those areas where the primary function is to store liquids. This includes inside rooms, cut-off rooms, attached buildings, liquid warehouses, and hazardous material storage lockers. These storage areas should be constructed to be fire-resistant per NFPA 30. Additional construction requirements for storage areas are based on the classifications of the stored liquids and whether or not these liquids are dispensed.

Outdoor storage cabinets are used to store not more than 120 gallons of Class I, Class II, or Class III liquids. Storage cabinets are designed and constructed to limit the internal temperature at the center of the cabinet. These cabinets can be constructed of either metal or wood and must be marked, “FLAMMABLE-KEEP FIRE AWAY.”

Storage Capacity	Storage Container
Less than 60 gallons	Drums or other containers
Greater than 60, less than 660 gallons	Portable tanks
Greater than 660 gallons	Aboveground tanks, underground tanks, inside storage of fixed, and portable tanks

Outdoor storage of liquids in containers and portable tanks is permissible in either piles or racks. Appendix B presents outdoor storage requirements for liquids in containers and portable tanks. See NFPA 30 for additional details.

Container and portable tank storage should be used for the storage of liquids that do not exceed 60 gallons (containers) and 660 gallons (portable tanks). Appendix C presents the maximum allowable container sizes by classification.

Fixed tank storage of liquids is applicable to capacities greater than 660 gallons and includes the following tank configurations:

- Aboveground
- Underground
- Inside storage of liquids in fixed and portable tanks (Storage tank buildings)

Appendix D presents fixed tank installation criteria for all the above fixed tank configurations.

6.2.7 Disposal

If uncontaminated flammable and combustible liquids are not to be used they can be:

- Returned to the vendor
- Salvaged for resale
- Used in some other approved way

If recycling or recovery of used or dirty flammable and combustible liquids is not feasible, then it should be handled by a licensed disposal contractor. Used flammable and combustible liquids are never to be disposed of into the earth or into any water bodies.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of equipment and supplies to aid in the safe use and storage of flammable and combustible liquids. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that employees will not handle flammable and combustible liquids until they have been trained. They will also identify those areas through their facility and jobsite audits that have improper flammable and combustible liquid storage.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure. They are also to report immediately to their supervisor any hazardous or unsafe condition regarding flammable and combustible liquids' use and storage.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: List of Common Flammable and Combustible Liquids Used in NCDOT

Common Name	Flash Point (Degrees F)
Acetic Acid	109
Acetic Anahydride	129
Acetone	0
Acetylene	Gas
Adhesives, Commercial Type-	- 5 to 60
Adhesives and Sealers	>20
Aniline Hydrochloride	380
Anti-freeze	232
Asphalt, Cutback	50
Asphalt, Liquid (Grade MC30 and MC70)	100
Asphalt, Liquid, Medium Cure	150
Asphalt, Liquid, Rapid Cure	50
Asphalt, Liquid (Grade SC-70)	150
Asphalt, Liquid, Slow Cure (Grade SC-250)	175
Asphalt, Liquid, (Grade SC-800)	200
Asphalt, Liquid, (Grade SC-3000)	225
Asphalt, typical (Petroleum pitch or tar)	400
Benzene	12
Benzine (Petroleum Ether)	<0
Butane	Gas
Butyl Alcohol	84
Butyl Phthalyl Butyl Glycolate	390
Car Undercoating	>50
Carbon Monoxide	Gas
Carburetor Cleaners	>70
Cleaning ‘Safety’ Solvent	>105
Denatured Alcohol	60
Diesel Fuel No. 1-D	100
Diesel Fuel No. 2-D	125
Diesel Starting Fluid - See Ethyl Ether	
Diphenylamine	307
Duplicating (printing) fluids	>50
Electrostatic Toner	>110
Epoxy Catalysts (hardeners)	80
Epoxy Resins	>35 (most above 300)
Epoxy Thinner (solvents)	>50
Ethyl Alcohol	55
Ethyl Chloride	-58
Ethyl ether	-49

APPENDIX A: List of Common Flammable and Combustible Liquids Used in NCDOT (Cont'd) 2

Common Name	Flash Point (Degrees F)
Formic Acid (90% solution)	122
Fuel Oil (Fuel Oil No.2)	100
Gasoline	-45
Glycerine	320
Herbicides (Weed Killers)	>85
Hydrogen Sulfide	Gas
Insecticides (Insect Killer)	> 80
Isobutyl Alcohol	82
Isopropyl Alcohol (Propanol)	53
Kerosene (Fuel Oil No. 1)	100
Methyl Alcohol (Methanol)	52
Methane	Gas
Methyl Ethyl Ketone	21
Naphtha, coal tar type	107
Naphtha, petroleum	< 1
Naphtha, VM&P, 50 ^{0}F Flash	50
Naphtha, VM&P, High Flash	80
Naphtha, VM&P, Regular	28
Nitrobenzine	190
Oleic Acid	372
Paint, Enamel	>50
Paint, Epoxy (coating)	60
Paint, Lacquer	10 to 40
Paint and Varnish Removers	>20
Primers, Paint (coatings)	>40
Propane	Gas
Rust Preventive Coating	>100
Salicyclic Acid	315
Spray Lubricant (WD-40, etc.)	> 90
Tartaric Acid	410
Thinners, Enamel	0 to 150 (40 common)
Thinners, Lacquer	0 to 100 (40 common)
Toluene	40
Type and Office Machine Cleaners	40
Waxes	>100
Window Cleaner	>90
Windshield Washer	>50
Xylene	81

APPENDIX A: List of Common Flammable and Combustible Liquids Used in NCDOT (Cont'd)3

Special notes on selected flammable and combustible liquids.

Ammonium Nitrate - Ignites when mixed with acetic acid. May react violently or explode with powdered metals.

Ammonium Persulfate - May explode when mixed with aluminum powder. Will explode with sodium peroxide if subjected to crushing (or heating or if a stream of CO^2 is passed over it).

Magnesium Nitrate - Oxidant. In contact with easily oxidizable substances may ignite or explode.

Mercuric Nitrate - May explode when heated to decomposition.

Perchloric Acid - Strong oxidant. May explode on contact with organic materials.
Potassium Bromate - Strong oxidant. May react with many substances and cause ignition of combustible materials.

Potassium Chloride - Powerful oxidizing material. May form explosive mixture with easily oxidizable material.

Potassium Nitrate - Oxidizing material. In contact with easily oxidizable material may cause combustion or explosion.

Silver Nitrate - Oxidizing material. Increasing flammability of other oxidizing materials.
Sodium Nitrite - Oxidizing agent. If in contact with easily oxidizable substances, combustion or explosion may result.

APPENDIX B: Outdoor Liquid Storage Requirements

Outdoor Liquid Storage in Containers

Class	Container Storage -Max per Pile in Gallons	Container Storage -Max per Pile in Height (Ft)	Distance Between Piles or Racks (Ft)	Distance to Property Line that Is or Can Be Built Upon	Distance to Street, Alley, or Public Way
IA	1,100	10	5	50	10
IB	2,200	12	5	50	10
IC	4,400	12	5	50	10
II	8,800	12	5	25	5
III	22,000	18	5	10	5

Outdoor Liquid Storage in Portable Tanks

Class	Portable Tank Storage -Max per Pile in Gallons	Portable Tank Storage -Max per Pile in Height (Ft)	Distance Between Piles or Racks (Ft)	Distance to Property Line that Is or Can Be Built Upon	Distance to Street, Alley, or Public Way
IA	2,200	7	5	50	10
IB	4,400	14	5	50	10
IC	8,800	14	5	50	10
II	17,600	14	5	25	5
III	44,000	14	5	10	5

APPENDIX C: Maximum Container and Portable Tank Sizes by Classification

Container Type	Flammable Liquids			Combustible Liquids	
	Class IA	Class IB	Class IC	Class II	Class III
Glass	1 pint	1 quart	1 gallon	1 gallon	5 gallons
Metal	1 pint	5 gallons	5 gallons	5 gallons	5 gallons
Approved Plastic	1 pint	5 gallons	5 gallons	5 gallons	5 gallons
Safety Cans	2 gallons	5 gallons	5 gallons	5 gallons	5 gallons
Metal Drum	60 gallons	60 gallons	60 gallons	60 gallons	60 gallons
Metal Portable Tanks	660 gallons	660 gallons	660 gallons	660 gallons	660 gallons
Polyethylene	1 gallon	5 gallon	5 gallons	60 gallons	60 gallons
Fibre Drum				60 gallons	60 gallons

APPENDIX D: Fixed Tank Installation Criteria

There are several criteria associated with fixed tank installations. In all of these installations, NFPA 30 should be consulted for further details.

Aboveground storage tanks should meet several criteria in its installation. These criteria include:

- Location
- Spacing
- Control of spillage
- Remote impounding
- Venting
- Emergency relief venting
- Tank openings other than vents
- Abandonment
- Foundations and supports

Underground storage tanks should meet several criteria in their installation. These criteria include:

- Location
- Burial depth and cover
- Corrosion protection
- Vents
- Tank openings other than vents
- Abandonment
- Foundations and supports

Storage tank buildings should also meet several criteria in their installation. These criteria include:

- Location
- Construction
- Ventilation
- Drainage
- Vents
- Tank openings other than vents
- Electrical equipment provisions
- Fire prevention and control measures
- Foundations and supports

Additionally, for areas subject to flooding, more specific provisions are required for all tank storage configurations.

Explosives SPP#1910.109

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish the guidelines and procedures through which North Carolina Department of Transportation (NCDOT) employees have the training and proper equipment when working with or in close proximity to explosives or blasting operations.

2.0 Scope and Applicability

Certain operations in NCDOT may require the use of explosives and may include:

- Secondary road construction
- Beaverdam demolitions
- Boulder and large rock removals
- Old bridge removals

Explosives use within NCDOT is a vital part of construction operations; however, tragic consequences can result from the unauthorized use or misuse of explosives. Therefore, this safety policy and procedure provides guidelines for safe handling and use of explosives by NCDOT employees.

This safety policy and procedure includes provisions for training and discussion of qualifications for explosives specialists. Discussion is presented on the type of explosives used in NCDOT, the minimum equipment required to initiate explosives, electric blasting precautions around radio frequencies, and how to obtain explosives equipment. It includes explosives storage and label, signs, and marking requirements. Additionally, discussion is presented on transportation, security, and recordkeeping requirements.

This document details the areas of responsibility for managers/unit heads, supervisors, employees, Explosive Specialists, and Safety and Loss Control within NCDOT.

This policy affects all NCDOT Explosives Specialists, Drillers, Handlers, Explosives Conveyance Operators, Machine Operators, and other employees who, through the performance of their duties, may be exposed to hazards involving the storage, transport, handling or use of explosives.

3.0 References

This safety policy and procedure is established in accordance with Occupational Safety and Health Administration for General Industry (29 CFR 1910.109), Occupational Safety and Health Administration for the Construction Industry (29 CFR 1926.902), US Department of Transportation Regulations (49 CFR Part 170 - 178), US Department of the Treasury, BATF Regulations (27 CFR Part 55).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, unauthorized use of explosives is strictly prohibited and will not be tolerated. When explosives hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, and proper training regarding Explosives will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Explosives. It is also the responsibility of each NCDOT employee to report immediately any unsafe act to his or her supervisor. Specific responsibilities are outlined in Section 6.3.

6.0 Procedure

This section provides definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Explosives.

6.1 Definitions

ANFO
A blasting agent consisting of a mixture of ammonium nitrate and fuel oil.

Binary Explosive
Explosives that consist of two or more unmixed, commercially manufactured, prepackaged chemicals, including oxidizing chemicals, flammable liquids, or solids that are not independently classified as explosives. When combined, however, the mixture is classified as an explosive and is stored, transported, and handled as an explosive.

Blaster's Galvanometer
An instrument used to measure the electrical resistance of detonators (EB caps) and circuits.

Blasting Agents
Blasting agents are generally considered safer than Class A, B, or C explosives and yet, when properly initiated, they function in the same manner as Class A explosives. Not being cap sensitive, they require a strong primer. An example is Ammonium nitrate and fuel oil mixture (ANFO).

Blasting Cap
See Detonator below.

Booster Primer
An explosive charge, usually of high strength and high detonation velocity, used to improve the initiation of less sensitive explosives materials.

Class A Explosives / Explosives 1.1
Possessing detonating hazards, such as dynamite, lead azide, nitroglycerin, picric acid, black powder, detonators (blasting caps), and detonating primers.

Class B Explosives / Explosives 1.3
Possessing flammable hazards, such as propellant explosives, including some smokeless propellants.

Class C Explosives / Explosives 1.4, 1.5, 1.6
Includes certain types of manufactured articles which contain Class A or Class B explosives, or both, as components but in restricted quantities. Includes blasting agents.

Detonator
Any device containing a detonating charge that is used for initiating detonation in an explosive. The term includes, but is not limited to, electric blasting caps of instantaneous and delay types, blasting caps for use with a safety fuse, and detonating cord delay connectors.

Explosives
Any chemical compound, mixture, or device, the primary or common purpose of which is to function by explosion, i.e., with substantially instantaneous release of gas and heat.

Explosives Specialist
A trained qualified employee authorized to use, store, and transport explosives for NCDOT.

High Explosives
Explosives that are characterized by a very high rate of reaction, high pressure development, and the presence of a detonation wave in the explosive. Examples include dynamite, cap sensitive water gels, slurries, emulsions, and cast boosters.

IME
Institute of Makers of Explosives.

Low Explosives
Explosives that are characterized by deflagration or a low rate of reaction and the development of low pressure. Examples include black powder, safety fuse, igniters, igniter cords, and fuse lighters.

Magazine
Any building or structure, other than an explosives manufacturing building, used for the storage of explosives.

Slurry Explosives
An explosives product containing substantial proportions of water and high properties of ammonium nitrate, some of which are in a solution of water.

Vehicle Attendance
A motor vehicle is attended when the person in charge of the vehicle is on the vehicle, awake, or is within 100 feet of the vehicle and has it within his unobstructed field of view.

Water Gels
A Class A Explosives comprised mainly of water and ammonium nitrate.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training Requirements
- Qualifications of Explosives Specialists
- Types of Explosives
- Minimum Equipment Required to Initiate Explosives
- Radio Frequency Hazards with Electric Blasting Caps
- Equipment Procurement
- Explosives Storage
- Label, Signs, and Marking Requirements
- Transportation of Explosives on NCDOT Equipment
- Security and Recordkeeping

6.2.1 Training Requirements

Safety and Loss Control will conduct comprehensive training and retraining annually on the safe storage, transport, handling, and use of explosive products. The New Explosives Specialists Certification Course will consist of 32 hours of classroom materials and field applications. The Recertification Course will consist of 16 hours of classroom materials. Emphasis will be placed on workshops and practical exercises in each course.

Comprehensive final examinations will be given to ensure each employee is capable of performing his job safely. Only those students passing the written examination and demonstrating proficiency in the practical applications will be certified or recertified as NCDOT Explosives Specialists. See Appendix A for details of the required instructional topics.

6.2.2 Qualifications Of Explosive Specialists

Explosives Specialists must successfully complete the Explosives Safety Course prior to performing their job duties. Those whose duties require

involvement in the storage, handling, transport or use of explosives or those in direct supervision of these activities must successfully complete the explosives safety course prior to performing their job duties.

All individuals who successfully complete the training will receive a certificate. This certificate is valid for three years at which time recertification is necessary.

Employees who are not active in explosives work during the three year period must take the full course before being recertified.

6.2.3 Types of Explosives

Explosive materials may be divided into three classes:

- High Explosives
- Low Explosives
- Blasting Agents

High Explosives are explosive materials which can be caused to detonate by means of a blasting cap. Examples include dynamite, cap sensitive water gels, slurries, emulsions, and cast boosters.

Low Explosives are explosive materials which, when confined, can be caused to deflagrate. Examples include black powder, safety fuses, igniters, igniter cords, and fuse lighters.

Blasting Agents are substances classified by the U.S. Department of Transportation as blasting agents. Ammonium nitrate and fuel oil are examples.

The type of explosives products used in NCDOT blasting operations include:

- Water gel high explosives
- Binary Explosives
- Detonators (Blasting caps)
- Booster Primers
- Blasting Agents

Water gels are the primary type of high explosive used in NCDOT blasting operations. Water gels are comprised of water and high property ammonium nitrate. Nitroglycerin-based high explosive dynamites should not be ordered or used in NCDOT blasting operations. Water gels are considered safer and equally effective.

Two component (binary) explosives are recommended for small jobs that require only a few sticks of explosives. Binary explosives are also classified as high explosives once they are mixed.

Detonators (blasting caps) are used to initiate either a chemical or thermal reaction in the explosive by means of an electric or non-electric catalyst.

Examples of some typical blasting caps are shown in Figure 1.

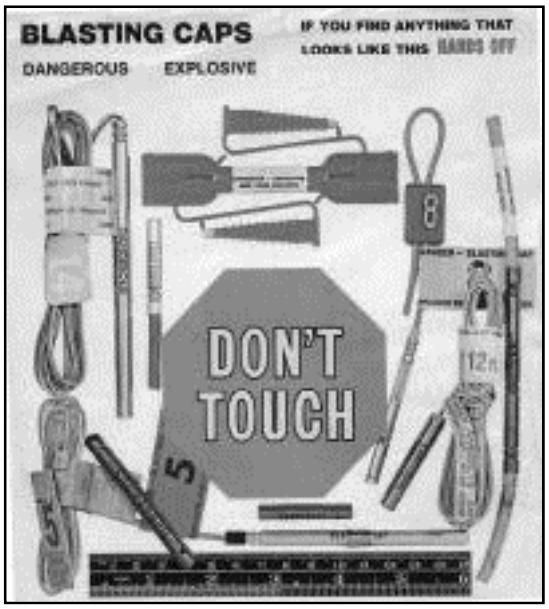


Figure 1

Booster Primers are high explosives used with detonators (blasting caps) to ensure complete detonation of water gel explosives. The initiation of water gel explosives is affected by temperature and shelf life. Therefore, NCDOT requires the use of booster primers on all electric and non-electric detonators (caps).

Pre-mixed ammonium nitrate and fuel oil (ANFO) is the blasting agent predominately used in NCDOT blasting operations and is available on state contract. Mixing your own blasting agents (i.e., ANFO) is strictly prohibited. The result can be hazardous and may not give the desired results. Also, there are severe penalties for manufacturing explosives without a license.

6.2.4 Minimum Equipment Required to Initiate Explosives

Two types of explosives initiation systems are used in NCDOT blasting operations. These two initiation systems are:

- Electric Initiation System
- Non-Electric (Shock Tube) Initiation

The minimum equipment required to initiate electrical and non-electrical blasting are detailed in Appendix B. Under no circumstances will an Explosives Specialist initiate blasting without the minimum equipment detailed in Appendix B. Failure to use the minimum equipment may result in incomplete blasting or create unsafe and dangerous conditions.

6.2.5 Extraneous Electricity Hazards with Electric Blasting Caps

Premature detonations of electric blasting caps are possible due to extraneous electricity entering the electric blasting circuit. Extraneous electricity can be introduced into an electric blasting circuit by either direct contact (e.g., stray currents and static electricity) or through the effect of electric and/or magnetic fields (e.g., inductive coupling, capacitive coupling, and electromagnetic or radio waves).

Therefore, precautions shall be taken to prevent accidental discharge of electric blasting caps from stray ground current, static electricity, current induced by radar, radio transmitters, lighting, adjacent power lines, dust storms, or other sources of extraneous electricity. Appendix C details the required precautions against extraneous electricity.

6.2.6 Equipment Procurement

Equipment that is specific to blasting operations can be obtained through the normal inventory process. The explosives and explosives supply contract is updated bi-annually.

Non-sparking bed liners for vehicles can be obtained from the Central Equipment Unit on an as-needed basis.

Information on Type 2 portable magazines that meet IME 22 specifications can be obtained through Safety and Loss Control.

6.2.7 Explosives Storage

Proper storage prevents unauthorized access to explosives materials and reduces their deterioration. All explosives materials, including blasting agents, detonators, detonating cords, boosters, blasting caps, and electric and non-electric blasting caps should be stored in magazines.

There are three types of magazines used in NCDOT for the storage of explosives materials. These magazine types are Type 1, Type 2, and Type 3. Appendix D presents details on magazine types and explosives storage requirements by explosives class.

6.2.8 Labels, Signs, and Markings

Properties where Type 1 magazines are located and properties where Type 2 magazines are located outside buildings must be posted with signs reading: "EXPLOSIVES - KEEP OUT/OFF" as shown in Figure 2.

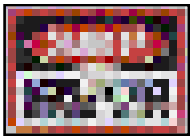


Figure 2

Ammonium nitrate storage bins or piles must be clearly identified by signs reading "AMMONIUM NITRATE" with letters at least 2 inches high.

6.2.9 Transportation of Explosives on NCDOT Equipment

Explosives transport shall meet several requirements to protect the life, health, and safety of the public and NCDOT employees. Appendices E and F detail these requirements.

6.2.10 Security and Record Keeping

Strict security and record keeping requirements for inventory control, illegal entries into magazines, magazine security, and explosives activity are detailed in Appendix G.

6.3. Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure that the necessary vehicles, equipment, test instruments, explosives products and supplies are budgeted for, acquired, and maintained in a state of readiness for use in explosives work.

Managers/Unit Heads will encourage supervisors of Explosives Specialists and blasting projects to successfully complete the Explosives Safety Course. Managers/Unit Heads are responsible for coordinating required training with the Safety and Loss Control.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process

6.3.2 Supervisors

Supervisors will ensure that all Explosives Specialists have the required training and certification prior to handling or using explosives. Supervisors will support Explosives Specialists through the provision of appropriate vehicles, equipment, supplies, materials, and competent manpower to ensure the safe and efficient use of explosives.

Supervisory personnel who supervise Explosives Specialists and their projects should successfully complete an Explosives Safety Course.

6.3.3 Employees

It is the responsibility of each employee to identify potential hazards associated with the storage, handling, transportation, and use of explosives. It is also the responsibility of each employee to refrain from work involving explosives without training specific to the hazards of the tasks involved and/or close supervision by the Explosives Specialist.

Employees are required to follow instructions by the trained Explosives Specialist in all matters of explosives work and explosives safety.

6.3.4 Explosives Specialists

It is the responsibility of the Explosives Specialist to successfully complete the required Explosives Safety Course and possess a current Explosives Specialist certification card prior to handling, transporting, or using explosives. The Explosives Specialist also has responsibility to ensure training of employees who assist with work on their explosives projects in recognizing and avoiding hazards specific to the assigned tasks and to supervise the work of those employees. Additionally, the Explosives Specialist will always make the final decision on whether or not a shot can be safely fired.

Department of Corrections inmates are not permitted to handle any explosives. They may be permitted to work with the drilling, but must leave the shot area prior to live explosives being brought in.

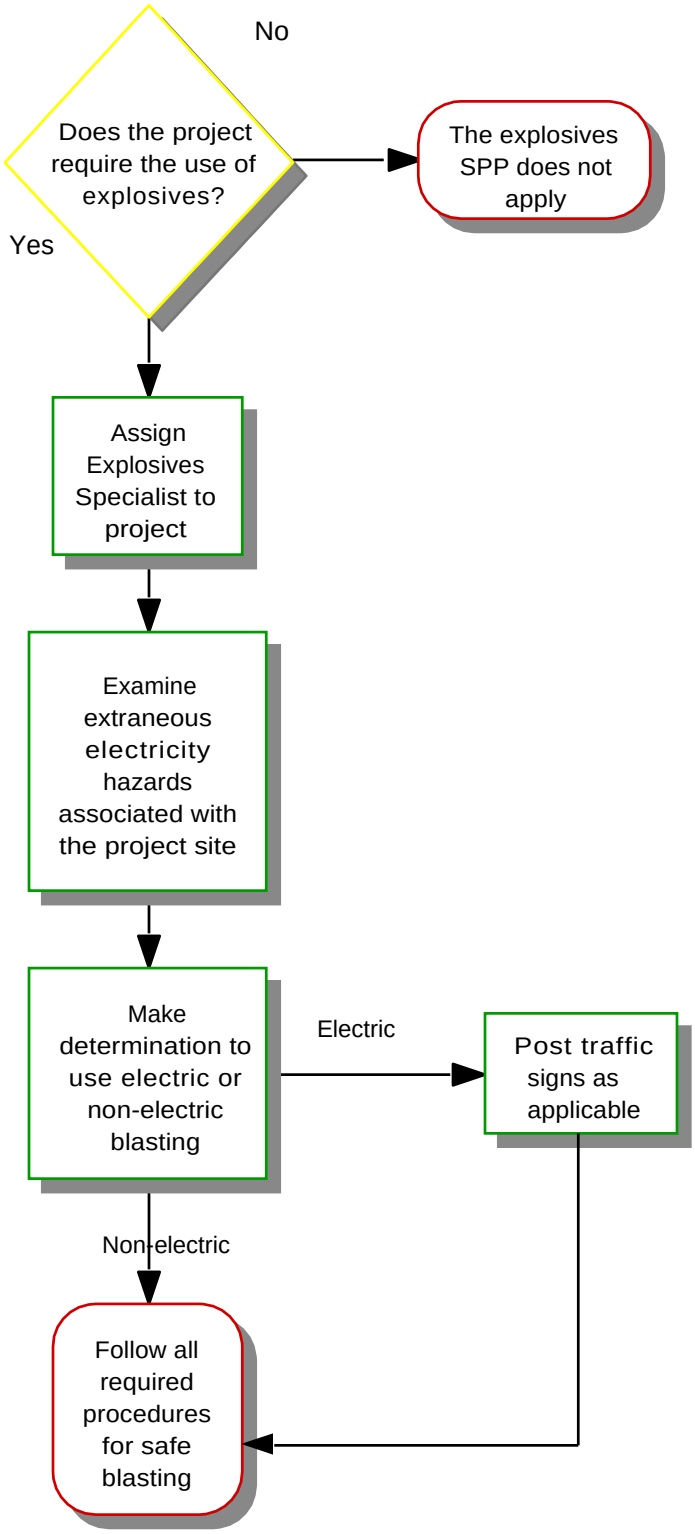
6.3.5 Safety and Loss Control

Safety and Loss Control is responsible for conducting explosives safety schools. Safety Engineers are responsible for ensuring that explosives safety training, explosives products, supplies, and related equipment that are made available to the Explosives Specialist are of the highest quality and are safe and appropriate for the work to be performed.

Safety Engineers will also make periodic explosives safety surveys to ensure safe practices are in use. Safety and Loss Control Safety Engineers may be used to evaluate shot plans, blasting sites, seismographic surveys, and electrical conditions that may present a hazard to blasting.

Safety Engineers will be available to NCDOT managers/unit heads, supervisors, Explosives Specialists, and affected employees for consultation in matters of blasting safety.

Explosives Flow Chart



APPENDIX A: Training Requirements and Required Publications

Explosives Training Requirements

Instruction will consist of the following topics:

- Definitions and Explosives Properties
- Explosives History and Types Of Explosives
- Basic Electricity
- Detonation Mechanisms
- Blasting Instruments
- Transportation of Explosives Material
- Electrical Hazards
- Fire Hazards
- Misfires
- Powder Factors and Variables Affecting Them, Placement of Boreholes
- Friction and Impact Detonations
- Fly Rock and Other Hazards
- Loading and Firing Methods
  - Electric Initiation of Explosives
  - Non-Electric Initiation of Explosives
- Storage, Security, and Recordkeeping
- Use of Check List and Shot Planning
- Policies, Standards, Rules, and Regulations

Sufficient employees must be trained to provide a NCDOT Certified Explosives Specialist for each worksite requiring the involvement of NCDOT employees in the storage, handling, transportation, or use of explosives.

Required Publications for Reading

In addition to successfully completing the Explosives Safety Course, Explosives Specialists must develop a working knowledge of the following publications:

- OSHA 29 CFR 1910.109
- OSHA 29 CFR 1926.902
- IME Publication No. 17, Safety in Transportation, Storage, Handling, and Use of Explosives
- NC Department of Labor Industry Guide #13 - A Guide to the Safe Storage of Explosives Products.
- NC Department of Labor Industry Guide #11 - A Guide to Protection Against Radio Frequency Hazards During the Use of Electric Blasting Caps (detonators)

APPENDIX B: Equipment Required for Electrically and Non-Electrically Initiated Blasting

Electrically Initiated Blasting

An Explosives Specialist will not engage in performing *electrically initiated blasting* without the following minimum equipment:

- Operational blaster's galvanometer
- Operational blasting machine with capacity adequate for the work to be performed (capacitive discharge [CD] blasting machine is preferable)
- Millisecond (ms) delay and instant electric detonators (eb caps)
- Two 500 foot lengths of 14 gauge blasters lead (firing) line (not duplex) with suitable lead line reels (wire must be solid copper, not stranded)
- Spool of 20 gauge connecting wire (wire must be solid copper, not stranded)
- Blaster's pliers and powder punch (non-sparking)
- A non-conductive tamp suitable in length
- A non-metallic measuring tape

Non-Electrically Initiated Blasting

An Explosives Specialist will not engage in performing *non-electrically (shock tube) initiated blasting* without the following minimum equipment:

- **Blaster's** shock tube initiating device
- Non-electric detonators (nonel caps or EZ-Dets)
- Shotgun primers (required for most shock tube initiators)
- 17 ms delay non-electric detonators (Primadet Primers)
- A minimum of 500 feet of non-electric lead in line (shock tube) for each shot to be fired
- Splice connectors
- **Blaster's** pliers and powder punch (non-sparking)
- A non-conductive tamp suitable in length
- A non-metallic measuring tape

APPENDIX C: Electric Blasting Precautions Around Extraneous Electricity

- Stray current is defined as current flow outside an insulated conductor system. It generally arises as a result of defective insulation on electrical power systems or on electrically operated equipment. Other sources of stray current include electrified fences, cathodic protection for underground pipelines, electric railway lines or any electric system that either accidentally or on purpose uses a ground return path. A stray current survey can be made at a blast site by a Safety Engineer if stray current sources are identified.

- Capacitive and inductive coupling refers to electrical energy that may be introduced into a blasting circuit by electric and magnetic fields, respectively, that are associated with a power line. If a blast site is in close proximity to high voltage power lines, precautions should be taken. Use non-electric initiation if possible.

- Detonators shall be short-circuited in holes which have been primed and shunted until wired into the blasting circuit.

- The prominent display of adequate signs, warning against the use of mobile radio transmitters, must be made on all roads within 1,000 feet of blasting operations. Whenever adherence to the 1,000 foot distance would create an operational handicap, a competent person shall be consulted to evaluate the particular situation, and alternative provisions may be made which are adequately designed to prevent any premature firing of electric blasting caps. Description of any such alternatives shall be made in writing by the competent person and shall be certified as preventing any premature firing of electric blasting caps. The description shall be maintained at the construction site during duration of the work, and shall be available for inspection by representatives of the NC Commissioner of Labor.

- Examples of blastings signs warning against the use of radios per the previous paragraph are shown in Figure 3.

Figure 3

- Mobile radio transmitters which are 100 feet or less from electric blasting caps, in other than original container, shall be de-energized and effectively locked.

APPENDIX D: Types of Magazines and Explosives Storage Requirements

Types of Magazines

There are three types of magazines used in NCDOT for the storage of explosives materials:

- *Type 1 magazines* are permanent magazines for the storage of high explosives. Other classes of explosives materials may also be stored in Type 1 magazines.
- *Type 2 magazines* are mobile or portable indoor and outdoor magazines for the storage of high explosives.
- *Type 3 magazines* are portable outdoor magazines for the temporary storage of high explosives while attended (a day box, for example)

Storage of Classes of Explosives Materials

In the following table, the classes of explosives materials are paired with types of magazines.

Storage of Classes of Explosives Materials by Magazine Type

Class of Explosives Materials	Magazine Type 1	2	3
High Explosives (dynamite; cap-sensitive water gels; slurries; emulsions; cast boosters)	•	•	•
Low Explosives (black powder)	•	•	•
Class A Detonators	•	•	•
Detonating Cords	•	•	•
Class C Detonators*	•	•	•
Safety Fuses, Electric Squibs, Ignitors, and Ignitor Cords	•	•	•
Blasting Agents	•	•	•

Note: Detonators must never be stored in the same magazine with other explosives.

****Includes electric detonators with leg wires 4 feet long or longer or detonators with empty plastic tubing 12 feet long or longer that contain not more than 1 gram explosives (excluding ignition and delay charges).***

APPENDIX E: Transportation Requirements for Explosives

- Drivers transporting explosives over public highways must have a valid Commercial Drivers License (CDL) with a Hazardous Materials endorsement.
- Only authorized persons qualified in explosives handling and/or blasting operations are allowed in or around vehicles transporting explosives materials.
- Explosives, blasting detonators, and blasting agents will not be transported with tools, equipment, materials, or other cargo.
- Tools, equipment, and/or materials of non-hazardous nature can be carried in separate compartments as long as the hazards are not increased.
- No loose cargo will be permitted in the compartment with explosives.
- OSHA regulations prohibit the transportation of electric blasting detonators and other explosives on the same vehicle. However, same vehicle transportation is permissible if both items are packed in their original containers, properly labeled, and deposited in approved containers or compartments. See Appendix F for details on same vehicle transport for detonators and explosives.
- Explosives and/or blasting detonators will not be transported on trailers unless the trailers are specifically designed and/or equipped for explosives hauling or storage.
- Explosives A or Explosives 1.1 USDOT placards will be displayed on all four sides of a vehicle carrying any amount of Class A/ Class 1.1 as shown in Figure 4.

Figure 4

- Each vehicle used for the transportation of explosives will have two fully charged fire extinguishers in good condition not less than 10 ABC rating each. The driver shall be trained in the proper use of a fire extinguisher.
- Motor vehicles carrying explosives, detonators, or blasting agents will not be taken inside a garage or shop for repairs or servicing.
- No motor vehicle transporting explosives shall be left unattended.

APPENDIX F: Same Vehicle Transportation Requirements for Detonators and Explosives

Same vehicle transportation of detonators and other explosives is permissible if both items are packed in original, properly labeled, and approved containers or compartments. These containers or compartments shall conform to IME Safety Library Publication Number 22. Recommended vehicle locations are as follows:

- A portable approved container placed within and readily removable from the cargo-carrying space of the vehicle
- A container securely attached to the vehicle as is shown in Figure 5
- A compartment built into the cargo space of the vehicle as is shown in Figure 6
- The cab of the vehicle is not acceptable as the compartment or container in which the detonators shall be placed

Detailed construction requirements are outlined in IME Safety Library Publication 22. General construction requirements for the container or compartment shall be as shown in Figures 7 and 8 and as listed below:

- The metal surface of the cargo compartment shall be lined with non-sparking material and the vehicle shall have tight floors.
- Open body vehicles cargo areas shall be covered with a fire and moisture resistant tarpaulin or equivalent.
- Explosives shall not be piled higher than the sides or tailgate of the transporting vehicle.

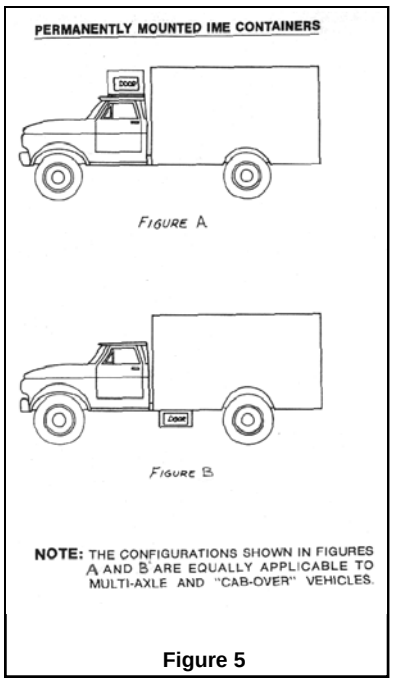


Figure 5

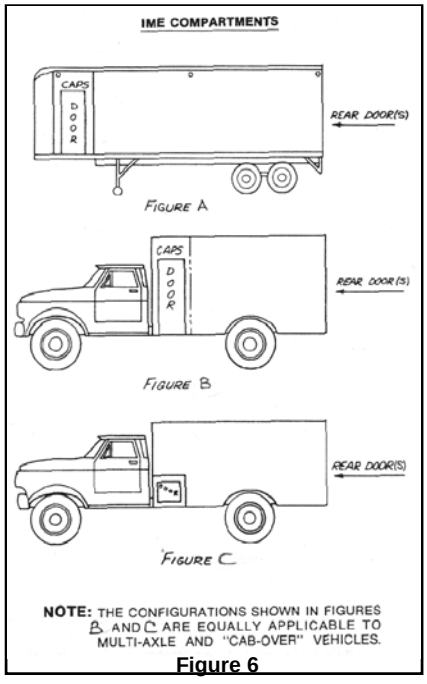


Figure 6

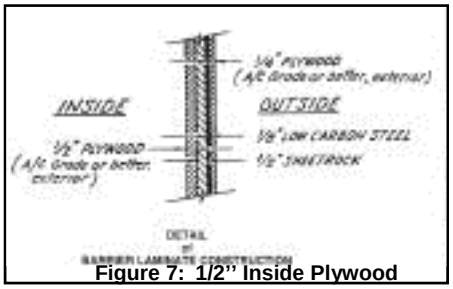


Figure 7: 1/2" Inside Plywood

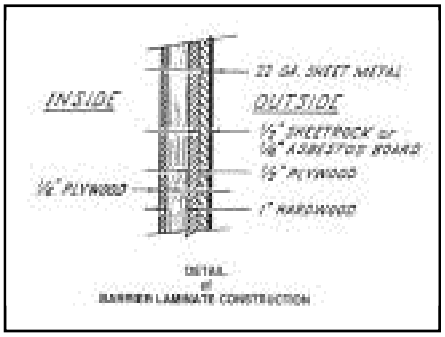


Figure 8: 1/4" Inside Plywood

APPENDIX G: Security and Record keeping Requirements for Explosives

- All magazines should be checked for illegal entry at least every three days. Any illegal entry, theft or loss of explosives must be reported within 24 hours to:
  - US Treasury Department, Alcohol, Tobacco and Firearms Division 1-800-800-3855
  - North Carolina Department of Transportation, Safety and Loss Control
  - Local Law Enforcement Officials (Police Chief, Sheriff, Fire Marshall)
  - Division Engineer
  - District Engineer
- All magazine construction will conform to the requirements of OSHA 1910.109 and US Department of the Treasury, Bureau of Alcohol Tobacco and Firearms CFR 27, Part 55 which pertain to magazines.
- All magazines will be equipped with two five-tumbler padlocks. These locks shall be covered with one-quarter inch steel caps to prevent the use of saws or bolt cutters.
- Explosives logs for each magazine will be maintained by case, box, or bag and odd units (sticks, detonators, boosters or, in the case of bagged products, by weight) of explosives products. An entry will be made in the log each time explosives are taken from the magazine or returned to it. The log must reflect the exact quantity of each type of explosives product on hand at all times.

  Note: NCDOT inventory control requirements are based on weight of the products; however, BATF and OSHA requirements are based on full case and unit count.

These requirements apply to electric and non-electric detonators, booster primers, binary (two component) explosives products, and any high explosives, low explosives, or blasting agents stored in the magazine.

Spray Finishing SPP# 1910.107

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for spray finishing when using flammable and/or combustible materials.

2.0 Scope and Applicability

Paint spraying operations within the North Carolina Department of Transportation (NCDOT) are usually performed in detached buildings or areas or in spray booths. The paint spray mixtures contain combustible and flammable components. Therefore, precautions must be exercised during spray finishing operations to minimize hazards associated with combustible and flammable materials.

This safety policy and procedure provides guidelines for spray finishing when using flammable and/or combustible materials. It includes provisions for training, spray booth construction, and spray booth housekeeping guidelines. Additionally, guidelines are presented on illumination, ventilation, Personal Protective Equipment (PPE), drying of spray painted items, and storage of flammables and combustibles. Discussion is also presented on pipe, hose and container inspection guidelines, and disposal of cleaning solvents.

This document also details the areas of responsibility for managers/unit heads, supervisors, and employees within NCDOT.

This safety policy and procedure affects NCDOT employees in the:

- Equipment Unit
- Highway Maintenance
- Ferry Division
- Traffic Engineering
- Sign Shops
- Bridge Maintenance
- Aviation Unit

Additionally, this safety policy and procedure applies to employees in any other operation who are exposed to hazards associated with spray finishing using flammable and/or combustible materials.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.107).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT will operate spray paint booths to minimize employee exposure to flammable and/or combustible materials and to minimize fire hazards. When these hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Spray Finishing will be implemented.

These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Spray Finishing. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Spray Finishing.

6.1 Definitions

Aerated Solid Powders
Aerated solid powders shall mean any powdered material used as a coating material which shall be fluidized within a container by passing air uniformly from below. It is common practice to fluidize such materials to form a fluidized powder bed and then dip the part to be coated into the bed in a manner similar to that used in liquid dipping. Such beds are also used as sources for powder spray operations.

Approved
Shall mean approved and listed by a nationally recognized testing laboratory (i.e., Underwriters Laboratories [UL]).

Dry Spray Booth
A spray booth not equipped with a water washing system. A dry spray booth may be equipped with:

- Distribution or baffle plates to promote an even flow of air through the booth
- Overspray dry filters to minimize dusts
- Overspray dry filters to minimize dusts or residues entering exhaust ducts
- Overspray dry filter rolls designed to minimize dusts or residues
- Powder collection systems when dry powders are being sprayed

Electrostatic Fluidized Bed
A container holding powder coating material which is aerated from below to form an air-supported expanded cloud of such material which is electrically charged with a charge opposite to the charge of the object to be coated. Such object is transported through the container immediately above the charged and aerated materials in order to be coated.

Fluidized Bed
A container holding powder coating material which is aerated from below to form an air-supported expanded cloud of such material through which the preheated object to be coated is immersed and transported.

Spray Booth
A power-ventilated structure provided to enclose or accommodate a spraying operation to confine and limit the escape of spray, vapor, and residue, and to safely conduct or direct them to an exhaust system.

Spraying Area
Any area in which dangerous quantities of flammable vapors or mists, or combustible residues, dusts, or deposits are present due to the operation of spraying processes.

Waterwash Spray Booth
A spray booth equipped with a water washing system designed to minimize dusts or residues entering exhaust ducts and to permit the recovery of overspray finishing material.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Booth Construction
- Housekeeping
- Illumination
- Ventilation
- PPE
- Storage of Flammables and Combustibles
- Pipes, Hoses, and Containers
- Cleaning and Residue Disposal
- No Smoking Signs

6.2.1 Training

Employees who perform spray finishing activities will be trained in the proper and safe operation of spray finishing operations. Additionally, they will be trained in:

- Why spray booths are used
- Hazards of combustible and flammable materials
- Types of spray finishing operations in NCDOT
- Understanding what PPE is required
- Storage and handling requirements for combustible and flammable materials

6.2.2 Booth Construction

Spray booths will be constructed of steel, concrete, masonry, or other non-combustible material. The structure will be adequately supported to ensure stability and will be designed to sweep air currents toward exhaust outlets and will meet all requirements of CFR 1910.107.

Figure 1 illustrates a typical spray booth installation. In the event an approved spray booth is not available, spray finishing or spray painting may be done outside (out of doors) in open air with the supervisor's approval.

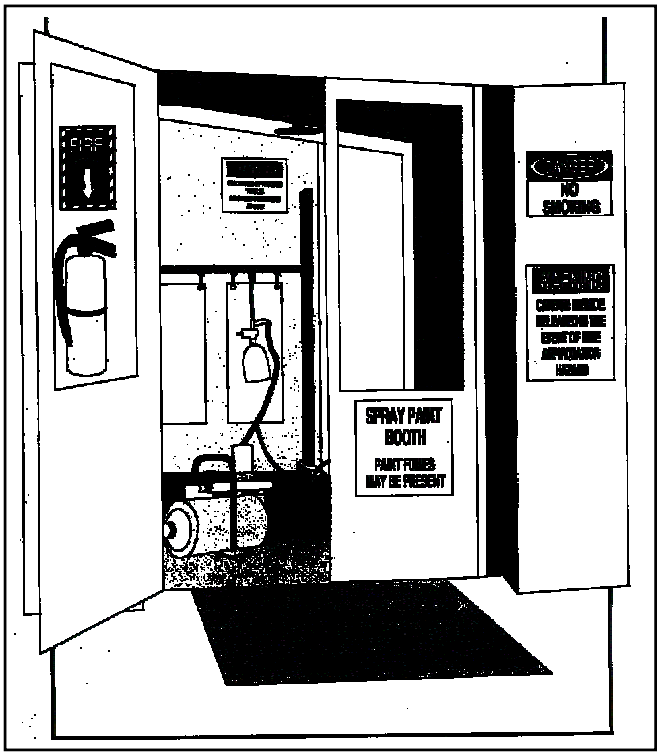


Figure 1

6.2.3 Housekeeping

Spray booth interiors will be kept clean with 3 feet on all sides of the booth clear of storage and combustible materials.

6.2.4 Illumination

Spray booths will be illuminated by protected lighting devices such as recessed or covered lighting fixtures. Clear panels may be used to cover fluorescent lights to protect them from overspray. All lighting fixtures will be mounted in locations that are isolated or not likely to be broken or damaged by the operation.

All wiring will be placed in conduit boxes or in fittings containing no taps, splices, or terminal connections.

6.2.5 Ventilation

All spraying areas will be equipped with mechanical ventilation adequate to remove flammable vapors, mists, or powders to a safe location and to confine and control combustible residue. Ventilation systems will operate during the entire spray operation and afterward until vapors are safely removed. Exhaust will be directed outside of buildings into areas where it will not accumulate in pockets and cause fire hazards.

Fans used to ventilate spray rooms will be constructed to reduce the chance of friction fires by using nonferrous or nonsparking material at friction points. Fan motors will be mounted outside booths or ducts and will be protected by a cage or other device to prevent damage from other operations.

Refer also to SPP# 1910.301, Electrical Related Safe Work Practices, for additional details on electrical safety requirements.

6.2.6 Personal Protective Equipment (PPE)

Respirators are required for any spray finishing other than very minor touch-up procedures. Where negative pressure respirators are worn, the user must be properly enrolled in the NCDOT Respirator Program. (See SPP# 1910.134 for specific requirements.)

Safety footwear (steel toe shoes/boots) will be required when there is a potential for foot injury from rolling or falling objects or from objects piercing the sole. Safety helmets (hard hats) will be required when head injury by falling materials or objects could occur.

Affected employees will use appropriate eye and/or face protection when exposed to eye or face hazards from flying particles, liquid chemicals, molten metals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. (See SPP# 1910.132 for specific PPE requirements.)

Hand protection will be required when hazards such as skin absorption of harmful substances, severe cuts, lacerations, abrasions, puncture wounds, harmful extremes of temperature, or burns from thermal or chemical sources are present.

6.2.7 Drying

Equipment, parts, and/or components that have been sprayed will be placed in a designated area for drying that is free from all sources of ignition.

6.2.8 Storage of Flammables and Combustibles

Storage of flammables and combustibles will comply with SPP# 1910.106, Flammable and Combustible Liquids. The quantity of flammables and combustibles located inside the spray booth will not exceed the expected amount for use during the particular operation.

6.2.9 Pipes, Hoses and Containers

All pipes, hoses, and connectors will be checked periodically to ensure they are functioning properly. All frayed, worn, or damaged equipment will be repaired or replaced immediately before operations can begin or continue.

Only approved containers will be used to store, transport, or spray materials. Spray gun containers will be constructed of metal, with properly sealing lids, and designed with relief valves to prevent air pressure buildup.

When flammable or combustible material is transferred from one container to another, the containers will be properly electrically grounded or bonded to prevent static electricity discharges.

6.2.10 Cleaning and Residue Disposal

All cleaning solvents will be restricted to those having flashpoints of not less than 100^{0}F. Solvents normally used to clean spray equipment are not restricted by this. All cleaning of equipment will be done inside the spray booth with proper ventilation in operation.

Residue, stripping, and other debris will be disposed of daily in closed metal containers with tightly fitting covers and stored in a safe location until removed from the facility.

6.2.11 No Smoking Signs

All spray booth areas will have posted "No Smoking" signs large enough in contrasting colors (as shown in Figure 2) to adequately warn all employees of the hazardous operation. Warning signs will be cleaned or replaced as required to ensure they are readable at all times. Refer to SPP # 1910.145, Accident Prevention Signs and Tags, for additional signage details.

Figure 2

6.3. Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of proper equipment, supplies and training. They will be also responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with spray finishing through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities associated with spray finishing. Supervisors will ensure that precautions are taken to ensure that employees are protected from sources of ignition, any possible drift of sprayed materials, and other hazards.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will ensure that employees are provided with the appropriate PPE as necessary for their job.

Supervisors will ensure that only qualified employees are assigned or permitted to perform duties related to the hazards of spraying operations using flammable and/or combustible materials.

Supervisors will ensure that hazards caused by broken, worn, defective, or otherwise inappropriate supplies, materials, tools, or equipment are repaired before the work begins.

Supervisors will perform daily pre-shift checks for visibly damaged, worn, or frayed pipes, hoses, and connectors and will conduct more detailed periodic inspections to ensure safe operations.

6.3.3 Employees

It is the responsibility of each employee to identify potential hazards when required to work with or near spraying operations using flammable and/or combustible materials and report immediately those suspected hazards to his or her supervisor.

It is also the responsibility of each employee to refrain from work involving exposure to potential hazards of spraying operations using flammable and/or combustible materials without instruction/training specific to the hazards of the tasks involved.

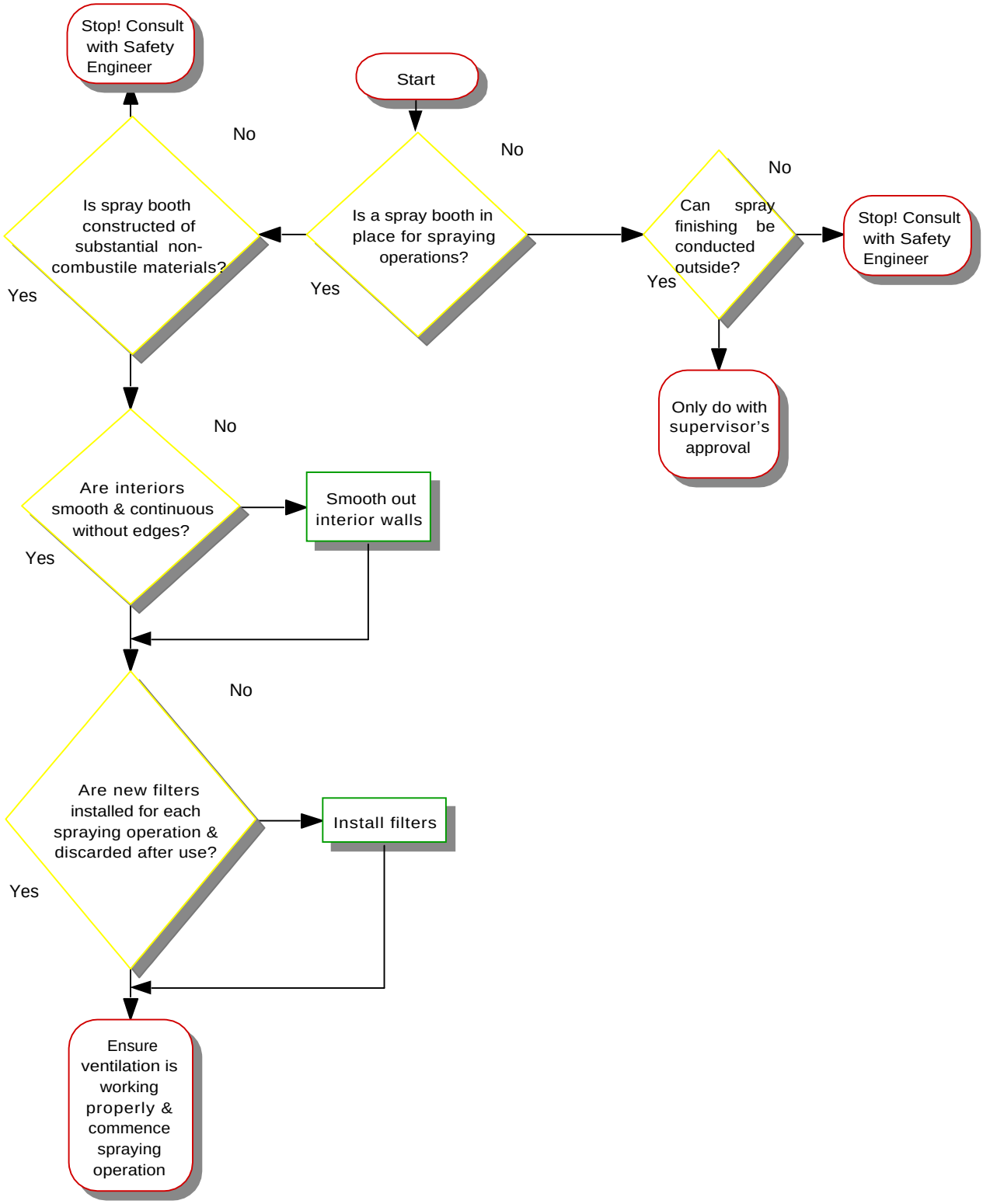
Employees will report to their supervisors all frayed, worn, damaged, or otherwise defective equipment.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure including surveys of spray finishing operations. Safety and Loss Control will assist in developing or securing required training. Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased spray paint booths comply with current safety regulations.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Spray Finishing Flowchart



NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Machine Guarding SPP# 1910.212

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish requirements for the safety of North Carolina Department of Transportation (NCDOT) employees while working near machines with hazardous moving parts.

2.0 Scope and Applicability

A wide variety of mechanical motions and actions on machines may present hazards to NCDOT employees. These can include movement of rotating members, reciprocating arms, moving belts, meshing gears, cutting teeth, and any part that may impact or shear.

This safety policy and procedure provides guidelines for safeguarding and recognizing mechanical hazards due to dangerous moving parts. It includes provisions for training, discussion on where these hazards occur, machine guarding requirements, machinery maintenance and repair requirements, label, signs, and marking requirements for machines with hazardous moving parts.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure includes but is not limited to the following equipment typically used in NCDOT:

- Concrete Circular Saws
- Woodworking Machines (Circular, Radial, Handsaws)
- Power Lawnmowers
- Power Presses
- Metal Working Machines
- Walk-Behind Rotary Mowers
- Abrasive Wheel Machines (Grinders)
- Pulleys
- Sprockets
- Chains
- Fanbelts
- Jointers and Sanding Machines
- Flywheels
- Hand and Portable Power Tools
- All classes of mechanized field equipment

This document also affects any employee who is exposed to mechanical hazards due to a machine's moving parts including machine operators and maintenance and repair personnel.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.212 through 1910.244).

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, any machine part, function, or process that may cause injury must be guarded. When mechanical hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Machine Guarding will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Machine Guarding. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Machine Guarding.

6.1 Definitions

Abrasive Wheel
A bench grinder wheel consisting of various particles bonded together and used for grinding objects to a particular shape or size.

Electrical Guard
Electronic means of protection provided to protect employees from electrical components or accidental equipment start-up.

Guard
An enclosure designed to protect employees from rotating or moving mechanical parts.

Kickback Device
Any device that protects the operator from equipment throwing the work back towards the operator.

Portable
Hand-held operated.

Ring Test
The use of a non-metallic object to tap a grinding wheel at 45 degree intervals. If the wheel exhibits a dead sound, the wheel is unsafe to use.

Shield
An enclosure or barrier designed to protect employees from processes involving the possibility of disintegrating machine parts or parts being ground upon, pressed, or struck.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Recognizing Where Hazards Occur
- Machine Guarding Requirements
- Machinery Maintenance and Repair
- Label, Signs, and Marking Requirements

6.2.1 Training

Employees who operate machines with hazards due to moving parts shall be trained on how to use the machine guards and why the guards are in place. Employee training should include the following instructions and hands-on training:

- Description and identification of the hazard associated with the machine
- The guards, how they provide protection, and the hazard for which they are intended
- Precautions to take when machine is unguarded during maintenance and repair
- What to do and who to contact if a guard is damaged, missing, or defective

Employees shall be trained upon initial assignment or when any new guards are put in place.

6.2.2 Recognizing Where Hazards Occur

Dangerous moving parts on machines presents hazards that need guarding. The three basic areas that require machine guarding are:

- Point of Operation
- Power of Transmission Apparatus
- Other Moving Parts

The point of operation is that point where work is performed on the material, such as cutting, shaping, boring, or forming of stock.

Power transmission apparatus are all components of the mechanical system which transmit energy to the part of the machine performing the work. These components include flywheels, pulleys, belts, connecting rods, couplings, cams, spindles, chains, crank, and gears.

Other moving parts include all parts of the machine which move while the machine is in operation. These can be reciprocating, rotating, and transverse moving parts, as well as feed mechanisms and auxiliary parts of the machine.

6.2.3 Machine Guard Types

Guards are barriers which prevent access to danger areas. The four general types of guards are:

- Fixed
- Interlocked
- Adjustable
- Self-adjusting

A fixed guard is a permanent part of the machine. It is not dependent upon moving parts to perform its intended function. Figure 1 presents an example of a fixed guard.

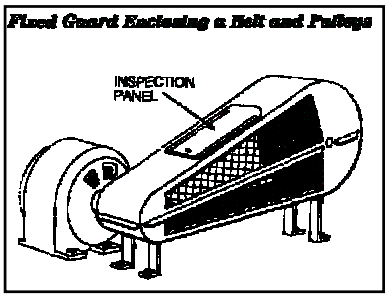


Figure 1

Interlock guards, when they are opened or removed, automatically shuts off or disengages the machine. Adjustable guards allow flexibility in accommodating various sizes of stock as illustrated in Figures 2, 3, and 4. Self-adjusting guards protect the operator by placing a barrier between the danger area and the operator.

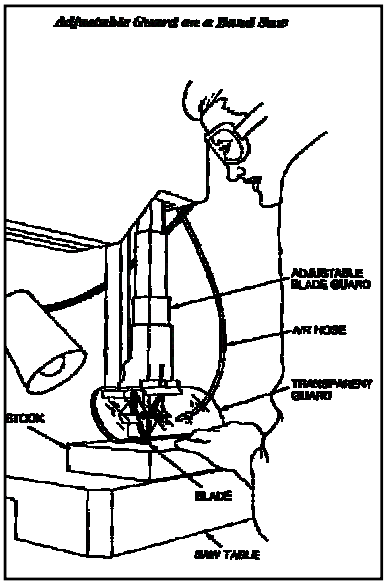


Figure 2

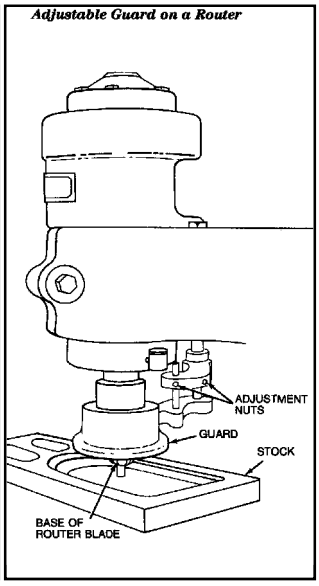


Figure 3

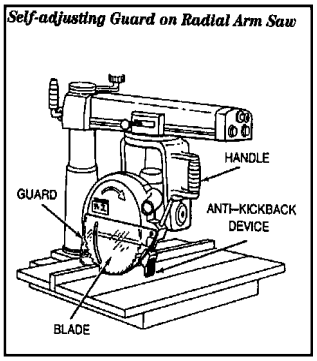
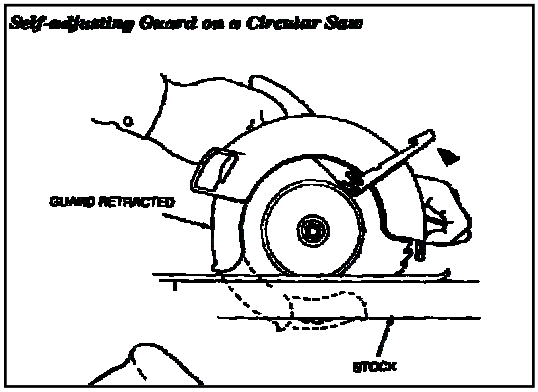


Figure 4

Self-adjusting guards allow a large enough opening to admit stock. After the stock is removed, the guard returns to its rest position. Figure 5 presents an example of a self-adjusting guard.

Figure 5



6.2.4 Machine Guarding Requirements

Machine guards must protect employees from mechanical hazards. To do so, these machine guards must:

- Prevent contact
- Be secured to the machine
- Protect from falling objects
- Not create new hazards
- Not interfere with job performance
- Allow for safe lubrication of the machine

Appendix A presents a checklist to determine your operation's machine guarding needs.

Examples of guarding methods include barrier guards, two hand-tripping devices, and electronic safety devices. Appendix B presents general machine guarding requirements.

Appendix C presents examples of some specific machine guarding requirements on selected NCDOT equipment.

6.2.5 Machinery Maintenance and Repair

Machine design should permit lubrication and adjustment without removal of guards. If machine guards must be removed, the maintenance and repair crew must never fail to replace them.

Ideally, maintenance work should not be performed until the machine is disconnected and locked out. For mechanical power presses, safety blocks should be used as an additional safeguard, although the machine may be locked out electronically. Refer to SPP # 1910.147, Lockout/Tagout, for details on Lockout/Tagout Procedures.

All woodworking machines will be maintained in good condition. This includes replacing dull blades, cutting heads, and damaged or unserviceable parts. Equipment blade changes or adjustments will be performed only when the power source has been disconnected to comply with the lockout, tagout standard. Equipment in which guards cannot be installed shall be removed from service. This includes older equipment which never had factory-installed guards.

All bearings will be lubricated and any debris removed from their surface to prevent fires. All adjustments will be made by an employee who is trained and knowledgeable about the particular piece of equipment being adjusted.

6.2.6 Label, Signs, and Marking Requirements

Appendix D presents some specific examples of label requirements for machine guarding.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of machine guards for their operation. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that affected employees are trained in the safe operation of all machines which will be used in the performance of their duties.

Supervisors will ensure that an adequate supply of Personal Protective Equipment (PPE) is maintained in inventory and that employees are provided with PPE as necessary for their job.

6.3.3 Employees

Employees shall immediately inform their supervisor if any guard or shield is damaged or becomes inoperable.

Employees shall also report immediately any recognized hazard to their supervisor.

Employees shall not operate any machine which does not have an operable guard as originally designed.

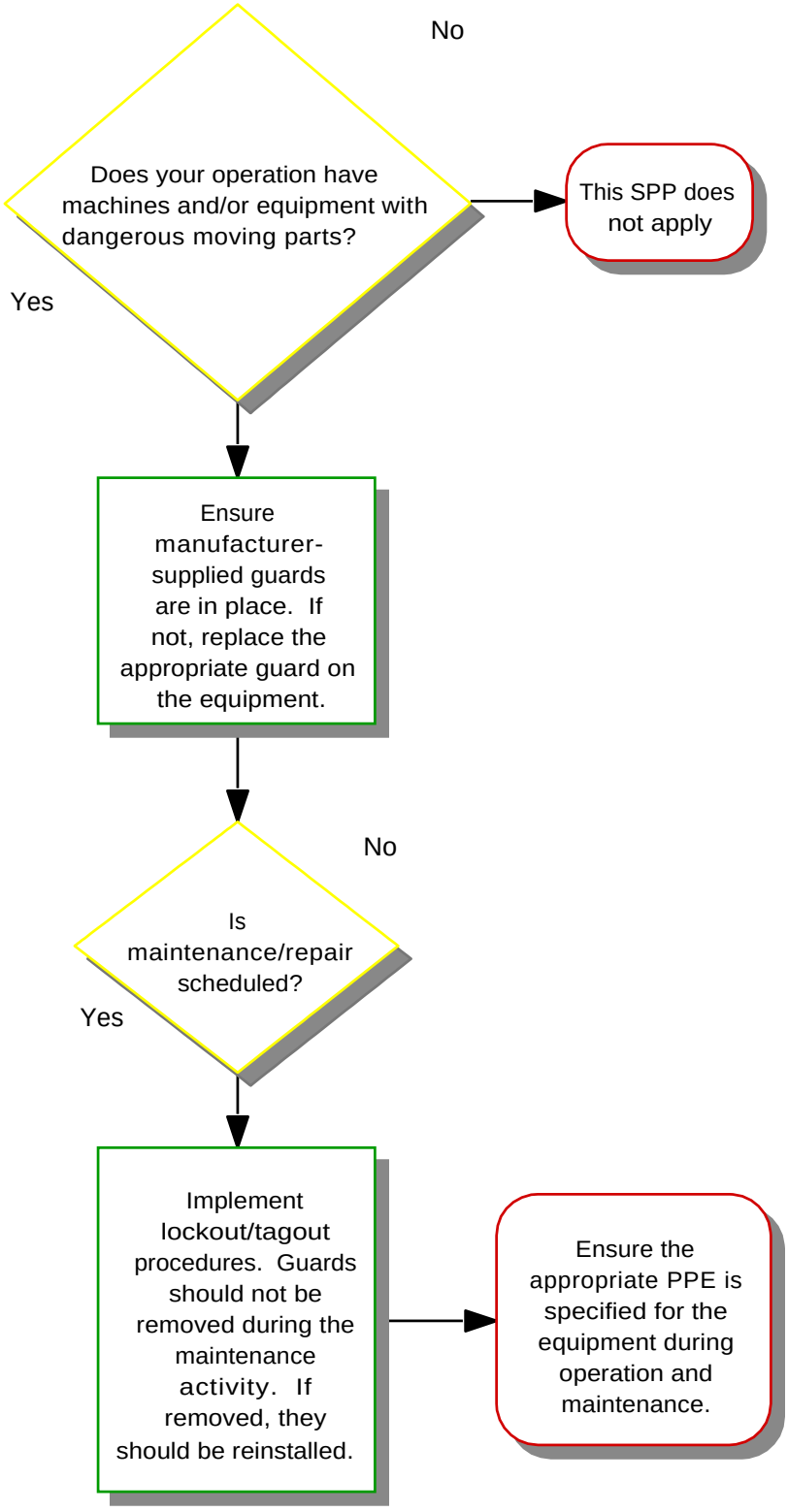
Employees shall not remove or otherwise modify any machine guard except to perform allowed routine maintenance or service.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training. Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased machines with hazardous moving parts comply with this safety policy and procedure.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Machine Guarding Flowchart



APPENDIX A: Machine Guarding Needs Checklist

Requirements for All Safeguards

Yes	No		
☐	☐	•	Do the safeguards prevent workers' hands, arms, and other body parts from making contact with dangerous moving parts?
☐	☐	•	Are the safeguards firmly secured and not easily removed?
☐	☐	•	Do the safeguards ensure that no objects will fall into the moving parts?
☐	☐	•	Do the safeguards permit safe, comfortable, and relatively easy operation of the machine?
☐	☐	•	Can the machine be oiled without removing the safeguard?
☐	☐	•	Is there a system for shutting down the machinery before safeguards are removed?
☐	☐	•	Can improvements be made to the existing safeguards?

Mechanical Hazards

The point of operation:

☐	☐	•	Is there a point-of-operation safeguard provided for the machine?
☐	☐	•	Does it keep the operator's hands, fingers, and body out of the danger area?
☐	☐	•	Is there evidence that the safeguards have been tampered with or removed?
☐	☐	•	Could you suggest a more practical, effective safeguard?
☐	☐	•	Could changes be made on the machine to eliminate the point-of-operation hazard entirely?

Power transmission apparatus:

☐	☐	•	Are there any unguarded gears, sprockets, pulleys, or fly-wheels on the apparatus?
☐	☐	•	Are there any exposed belts or chain drives?
☐	☐	•	Are there any exposed set screws, key ways, or collars?
☐	☐	•	Are starting and stopping controls within easy reach of the operator?
☐	☐	•	If there is more than one operator, are separate controls provided?

Other moving parts:

☐	☐	•	Are safeguards provided for all hazardous moving parts of the machine, including auxiliary parts?

APPENDIX A: Machine Guarding Needs Checklist (Continued) 2

Nonmechanical Hazards

Yes	No		
☐	☐	•	Have appropriate measures been taken to safeguard workers against noise hazards?
☐	☐	•	Have special guards, enclosures, or Personal Protective Equipment (PPE) been provided, where necessary, to protect workers from exposure to harmful substances used in machine operation?

Electrical Hazards

☐	☐	•	Is the machine installed in accordance with National Fire Protection Association and National Electrical Code requirements?
☐	☐	•	Are there loose conduit fittings?
☐	☐	•	Is the machine properly guarded?
☐	☐	•	Is the power supply correctly fused and protected?
☐	☐	•	Do workers occasionally receive minor shocks while operating any of the machines?

Training

☐	☐	•	Do operators and maintenance workers have the necessary training in using the safeguards and why?
☐	☐	•	Have operators and maintenance workers been trained in locating safeguards, how they provide protection, and what hazards they protect against?
☐	☐	•	Have operators and maintenance workers been trained in the circumstances in which guards can be removed?
☐	☐	•	Have workers been trained in the procedures to follow if they notice damaged, missing, or inadequate guards?

Protective Equipment and Proper Clothing

☐	☐	•	Is Personal Protective Equipment (PPE) required?
☐	☐	•	If PPE is required, is it appropriate for the job, in good condition, kept clean and sanitary, and stored carefully when not in use?
☐	☐	•	Is the operator dressed safely for the job (that is, no loose-fitting clothing or jewelry)?

APPENDIX A: Machine Guarding Needs Checklist (Continued) 3

Machinery Maintenance and Repair

Yes	No		
☐	☐	•	Have maintenance workers received up-to-date instruction on the machinery they service?
☐	☐	•	Do maintenance workers lock out the machine from its power sources before beginning repairs?
☐	☐	•	Where several maintenance persons work on the same machine, are multiple lockout devices used?
☐	☐	•	Do maintenance persons use appropriate and safe equipment in their repair work?
☐	☐	•	Is the maintenance equipment itself properly guarded?

Other Items to Check

☐	☐	•	Are emergency stop buttons, wires, or bars provided?
☐	☐	•	Are the emergency stops clearly marked and painted red?
☐	☐	•	Are there warning labels or markings to show hazardous areas?
☐	☐	•	Are the warning labels or markings appropriately identified by yellow, yellow and black, or orange colors?

APPENDIX B: General Machine Guarding Requirements

- The machine guard must prevent hands, arms, or any other part of an employee's body from making contact with dangerous moving parts. A good machine guard system eliminates the possibility of the operator or another person placing his or her hands near hazardous moving parts.

- Employees should not be able to remove or tamper easily with the machine guard. Guards should be made of durable material that will withstand normal use and must be firmly secured to the machine.

- Falling objects should not be able to fall into any moving parts of the machine. Small objects or tools dropped into cycling machines can easily become projectiles.

- A machine guard should not have any shear points, sharp edges, or unfinished surfaces which could cause lacerations. If a machine guard creates a new hazard, it defeats its own purpose.

- Any machine guard which impedes a worker from performing the job quickly and comfortably might soon be overridden or disregarded.

- The machine should be able to be lubricated without removing the guards. Locating oil reservoirs outside the guards with a line leading to the lubrication point will reduce the need for the operator or maintenance worker to enter the hazardous area.

APPENDIX C: Specific Machine Guarding Requirements on Selected NCDOT Equipment

Bandsaws

All portions of the blade on a bandsaw will be guarded except for the portion of the blade being used to cut. This guard will be adjusted for different thicknesses of stock. All roller or guide wheels will be enclosed to protect against pinching. Tension adjustments will be made to ensure the blade is at the proper tension level to reduce breakage and injury. Proper PPE shall be worn at all times.

Circular Saw

Any circular saw provided with manufacturer installed guards shall have these guards in place and in operable conditions when the saw is in operation. This will include guards protecting pulleys, chains, gears, shafts, and other moving parts. All saw fences and kickback devices such as kickback pawls or "dogs" will be in use during operation regardless of the angle or the thickness of the cut being performed. If fences or other safety devices are removed during the change of blades, etc. they shall be replaced prior to operation. If conditions arise in which the supplied guard cannot be used, then a suitable jig will be used in place of the guard provided the limits of the saw are not exceeded. Unusual shaped materials will not be cause for routine removal of guards. If conditions are such that the saw blade is exposed and contact with the blade from either beneath or behind the saw table is possible, then that portion of the blade must be guarded against contact. Proper PPE shall be worn at all times.

Compressed Air

Compressed air used for cleaning purposes shall be regulated at the gun to a maximum of 30 psi. Employees operating gun shall wear PPE as well as take measures to protect adjacent workers from flying debris.

Concrete Saw (Circular)

All factory supplied blade guards will be placed in the lowered position prior to start up. Blade guards will be raised only when cutting is completed and the engine has been shut down. The blade guide bar shall be installed and maintained to deem it unnecessary to raise the guard to see the surface guide mark. Only the proper type of blade will be used in these saws.

Hand and Portable Power Tools

NCDOT supervisors shall be responsible for ensuring all hand tools are in good working condition and that tools are used as designed for specific tasks, such as hammering, cutting, or driving screws, bolts, and nuts. Proper PPE shall be worn at all times when employees' duties require use.

APPENDIX C: Specific Machine Guarding Requirements on Selected NCDOT Equipment (Continued) 2

Jointers

All jointers or planers will be adjusted to prevent the knife edge of the blade from extending more than 1/8 inch in height. The blade opening or throat that exposed the cutting blade will be no more than 2-1/2 inches when tables are set for zero cuts. Proper PPE shall be worn at all times when operating this equipment. All jointers or planers will be equipped with the automatic adjustable guards that cover the cutting surface completely. The guard will automatically adjust itself to cover the unused portion of the cutting head and will remain in contact with the stock at all times.

Portable Circular Saws (Skill Saw)

Guards will be used and maintained in good condition on portable circular saws to prevent contact with the operator or support surface. The upper guard will cover the entire upper portion of the blade down to the shoe. The bottom or cutting portion of the blade will be covered by a retractable guard designed to rotate and expose only the portion of the blade being used to cut.

Power Lawnmowers

All mowing equipment shall be operated with the manufacturer installed guards in operable condition. Pieces of guards missing or damaged guards shall be repaired before mowers are returned to service. All walk-behind, riding rotary, and reel power mowers will have guards in place to protect the operator from power chains, belts, gears, and thrown objects.

All controls will be clearly identified and operators trained before operation. A stop or kill switch shall be provided to quickly shut down the mower. Proper PPE shall be worn at all times.

Power Presses

All materials being pressed on electrically or manual hydraulic powered presses shall be guarded by a 1/4 inch Lexan shield or an expanded metal shield placed between the part and the operator. This shield may be fixed to the press or portable. The shield shall be used when pressing any type of material.

Radial Saws (Radial Arm)

Radial saws will be designed with an adjustable guard to prevent the blade from extending beyond the material being cut. The table used for installation of the saw will be elevated in the front so as to allow the blade to return to the back of the table when the cut is complete. Radial saws with functioning auto return springs need not be tilted. Radial saws will be operated with a upper hood that fully encloses the upper portion of the blade. The hood will be constructed in such a manner that it will protect the operator from flying debris (i.e., sawdust or chips). Radial saws will use safety kickback devices such as pawls or "dogs" to reduce the risk of wood being kicked back at the operator. The saw will be labeled with information advising the operator of the direction of travel of the blade. Proper PPE shall be worn at all times.

APPENDIX C: Specific Machine Guarding Requirements on Selected NCDOT Equipment (Continued) 3

Sanding Machines

Each sanding machine will be provided with guards in place at all nip points where the sanding belt runs onto a pulley (roller). Any portion of the sanding belt not in use will be guarded against contact while the machine is in use. Proper PPE shall be worn at all times when operating this equipment.

Walk-Behind and Riding Mowers

The mower blade will be fully enclosed except on the bottom and the deck will extend below the lowest cutting point of the blade in the lowest cutting position. If a bag attachment is used, warning instructions will be affixed to the deck adjacent to the discharge chute which will state that mower is not to be used without guards in place.

Openings in the deck for the discharge will not exceed 30 degrees of the entire surface of the deck itself. The opening will be labeled "Danger Keep Hands and Feet Clear" or stronger wording.

All safety devices such as those controlling clutch engagement, blade engagement, or rotation of any part will not be altered or bypassed to prevent it from being used.

Wheel Inspections

Immediately before mounting, all grinding wheels will be inspected and "ring" tested. The wheel must have two blotters before it can be installed. Wheel washers must fit properly against blotters and the nut hand tightened only.

Woodworking Machines

All woodworking machines will be operated with the manufacturer-installed guards in place at all times. Removal of guards will be allowed only for adjustment or repair. Equipment will be locked or tagged out of service during adjustments or repair in accordance with NCDOT safety policy and procedure on lockout and tagout.

Work Rests

On off hand grinding machines, work rests will be used to support the stock. The guards will be adjusted to allow for wheel wear and will be positioned (no more than 1/8") from the wheel to prevent the material from being jammed between the wheel and guard. Guard and wheel adjustment and replacement will be performed only after the equipment has been locked or tagged out.

APPENDIX D: Selected Machine Guarding Labeling Requirements

Appropriate labels shall be placed on all machines (old and new) requiring machine guarding when the machine is not in operation or while it is being serviced. If labels have been painted over, defaced, or removed they should be replaced .

Woodworking Machinery Requirements

Radial Saws

The direction of the saw rotation must be conspicuously marked on the hood. In addition, a permanent label at least 1-1/2 inches by 3/4 inch must be affixed to the rear of the guard at about the level of the arbor. The label must read as follows:

DANGER:

DO NOT RIP OR PLOUGH FROM THIS END

Mechanical Power Presses

Presence Sensing Device Initiation (PSDI)

Prior to the initial use of any mechanical press in the PSDI mode, two sets of certification and validation are required.

A label shall be affixed to the press as part of each installation certification/validation and the most recent recertification/revalidation. The label must indicate:

- The press serial number
- The minimum safety distance
- The fulfillment of design certification/validation
- The employer's signed certification
- The identification of the OSHA-recognized third party validation organization and its signed validation
- The date the certification/validation and recertification/revalidation are issued

Portable Power Tools Guards

Power Lawn Mowers

The phrase "CAUTION. BE SURE THE OPERATING CONTROL(S) IS IN NEUTRAL BEFORE STARTING THE ENGINE" or similar wording must be clearly visible at an engine starting control point on self-propelled mowers.

APPENDIX D: Selected Machine Guarding Labeling Requirements (Continued) 2

Portable Powered Tool Guards (Continued)

Walk-Behind and Riding Rotary Mowers

Warning instructions must be affixed to the mower near the opening stating that the mower shall not be used without either the catcher assembly or the guard in place.

The word “CAUTION” or stronger wording must be placed on the mower at or near each discharge opening.

Jacks - Loading and Marking

The rated load shall be legibly and permanently marked in a prominent location on the jack by casting, stamping, stenciling, or other suitable means.

Jacks which are out of order shall be tagged accordingly.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Cranes in Construction SPP# 1926.1400

Table of Contents

1.0 Purpose

The purpose of this safety policy and procedure is to establish crane operation procedures for North Carolina Department of Transportation (NCDOT) employees who operate or work near cranes.

2.0 Scope and Applicability

A variety of cranes are used in NCDOT operations for bridge and road construction projects. Cranes are an important category of machinery in NCDOT because of the productivity and economic benefits associated with crane use. However, cranes can be dangerous pieces of equipment if basic hazards are ignored. Crane operators shall be properly trained and evaluated to safely operate cranes. Crane Operator Certification is required if operating cranes with capacities exceeding 2,000 lbs.

This safety policy and procedure provides guidelines for avoiding hazards associated with crane operation. It includes provisions for training, discussion on the types of cranes used in NCDOT, listing of hazards common to cranes, and discussion on crane safety.

This document also details the areas of responsibility for manager/unit heads, supervisors, employees, and Safety and Risk Management within NCDOT. This safety policy and procedure affects crane operators, riggers, signalers, and any employee who because of their job duties works with or near cranes.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for Construction Industry (29 CFR 1926 Subpart CC – Cranes and Derricks in Construction).

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT cranes will not be operated by untrained employees or in a manner that endangers employees or the public.

When crane hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding cranes will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Cranes and Derricks in Construction. It is also the responsibility of each NCDOT employee to report immediately any unsafe condition to their supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Cranes.

6.1 Definitions

Articulating Crane
Crane whose boom consists of a series of folding, pin connected structural members, typically manipulated to extend or retract by power from hydraulic cylinders.

Appointed
Assigned employee with specific responsibilities by the employer or the employer's representative.

Angle Indicator
An accessory which measures the angle of the boom to the horizontal.

Axis of Rotation
The vertical axis around which the crane superstructure rotates.

Audible Signal
A signal made by a distinct sound or series of sounds. Examples include, but are not limited to, sounds made by a bell, horn, or whistle.

Base
The traveling base or carrier on which the rotating superstructure is mounted such as a car, truck, crawlers, or wheel platform.

Boom
An inclined spar, strut, or other long structural member which supports the upper hoisting tackle on a crane or derrick. Typically, the length and vertical angle of the boom can be varied to achieve increased height or height and reach when lifting loads. Booms can usually be grouped into general categories of hydraulically extendible, cantilevered type, latticed section, cable supported type or articulating type.

Boom Angle
The angle between the longitudinal centerline of the boom and the horizontal. The boom longitude centerline is a straight line between the boom foot pin (heel pin) centerline and boom point sheave pin centerline.

Boom Hoist
A hoist drum and rope reeving system used to raise and lower the boom. The rope system may be all live reeving or a combination of live reeving and pendants.

Boom Hoist Limiting Device
This type of device disengages boom hoist power when the boom reaches a predetermined operating angle. It also sets brakes or closes valves to prevent the boom from lowering after power is disengaged.

Boom Stop
A device used to limit the angle of the boom at the highest position.

Brake
A device used for retarding or stopping motion by friction or power means.

Center of Gravity
The center of gravity of any object is the point in the object around which its weight is evenly distributed. If you could put a support under that point, you could balance the object on the support.

Competent Person
One who can identify existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Counterweight
A weight used to supplement the weight of the machine in providing stability for lifting working loads.

Crawler Crane
Crane that has a type of base mounting which incorporates a continuous belt of sprocket driven track.

Drum
The cylindrical members around which ropes are wound for raising and lowering the load or boom.

Dynamic Loading
A load introduced into the machine or its components by forces in motion.

Load (Working Load)
The external load in pounds applied to the crane including the weight of load- attaching equipment such as load blocks, shackles, and slings.

Load Ratings
Load ratings are the manufacturer's load capacity in pounds.

Outriggers
Extendible or fixed metal arms, attached to the mounting base, which rest on supports at the outer ends.

Reeving
A rope system in which the rope travels around drums and sheaves.

Rope
A wire rope unless otherwise specified.

Side Loading
A load applied at an angle to the vertical plane of the boom.

Standing (Guy) Rope
A supporting rope which maintains a constant distance between the points of attachment to the two components connected by the rope.

Structural Competence
The ability of the machine and its components to withstand the stresses imposed by applied loads.

Superstructure
The rotating upper frame structure of the machine and the operating machinery mounted thereon.

Swing
The rotation of the superstructure for movement of loads in a horizontal direction about the axis of rotation.

Swing Mechanism
The machinery involved in providing rotation of the superstructure.

Tackle
An assembly of ropes and sheaves arranged for hoisting and pulling.

Transit
The moving or transporting of a crane from one location to another.

Wheelbase
The distance between centers of front and rear axles. For a multiple axle assembly, the axle center for wheelbase measurement is taken as the midpoint of the assembly.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training and Evaluation
- Crane Operator Certification
- Types of Cranes Used in NCDOT
- Hazards Common to Cranes
- Crane Safety

6.2.1 Training

6.2.1.1 Crane Operators

NCDOT's training and evaluation program for crane operators shall include:

- Must be trained and evaluated by NCDOT for the type of cranes they will be operating.
- Classroom training on properly operating DOT cranes and how to recognize and avoid safety hazards.
- General technical information for crane control operation and performance characteristics including limitations
- Crane shift inspection requirements
- Procedures for preventing power line contact
- Ground conditions and equipment support
- Locate and use info in operating manual
- Calculate crane capacity and understand load chart information
- Evaluation of each employee to determine that they understand the information provided during classroom training.
- Hands-on training and operator-in-training evaluation
- Signal Types including hand and voice using radio or cell phone. Cell phone use by crane operator must be hands free.
- Signal person requirement when point of operation not in full view or direction of travel obstructed.
- Refresher training must be provided based on evaluation of knowledge and skills.

Appendix A presents further details on Specific Operating Procedures.

6.2.1.2 Crane Signal Person

NCDOT shall ensure Crane Signal Person is trained and qualified prior to giving signals for Crane operations. Training shall include the following:

- Know and understand types of signals used.
- Signal Types including hand, voice using radio or cell phone.
- If hand signals are used, the signal person muse know and understand the Standard Method illustrated by chart in Appendix C which must also be posted at the worksite.
- Voice signals must be agreed upon prior to crane operation.

Signal Person must be provided if point of operation or travel is not in full view of crane operator.

6.2.2 Crane Operator Certification

NCDOT must ensure Crane Operators obtain Certification by an Accredited Crane Operator Testing Organization for Cranes above 2,000 lb. capacity for the type of crane they will be operating.

- NCDOT will provide Crane Operator training prior to Certification process.
- A trained crane operator that is not certified is permitted to operate equipment only as an operator-in-training for tasks within their abilities and monitored by a trainer who must be a certified crane operator.
- Operators-in-training must not operate cranes if any part of the equipment could get within 20 feet or more of a power line.
- NCDOT will evaluate the operator-in-training using a Nationally Certified Crane Operator. Their Supervisor will sign-off on the evaluation.
- The Crane Operator is now able to apply for Certification.
- Certification is valid for 5 years.

6.2.3 Types of Cranes Used in NCDOT

NCDOT bridge and road construction activities typically utilize a variety of cranes in the following categories:

1. Mobile Boom Cranes
2. Digger Derrick Cranes

Photos below show examples of these types of cranes that may be used by NCDOT.

- Mobile Rough Terrain and Wheel-Mounted Telescopic Boom Cranes

- Commercial Mobile Truck-Mounted Telescopic Boom Cranes

- Mobile Crawler Telescopic Boom Cranes

- Digger Derrick Crane

6.2.4 Hazards Common to Cranes

There are inherent hazards associated with crane operations. Therefore, being aware of these hazards is the first step in minimizing these hazards and in promoting a safe working environment. The most common hazards associated with crane use are:

- Powerline contact
- Overloading
- Failure to use outriggers; soft ground and structural failure
- Pinch points
- Obstruction of vision
- Travel upset in rough terrain cranes
- Boom disassembly on boom cranes

Appendix B presents and details preventive measures for these hazards.

6.2.5 Crane Safety

Crane accidents can be prevented if considerations are given to safe use and operation of the crane. The primary components of crane safety are:

- Competent and qualified employees who operate and work with and around cranes
- Hazard prevention requirements being in place

Refer to Section 6.2.1 for details on the competency and qualifications requirements for NCDOT crane operators.

Hazard prevention requirements include:

- Preconstruction planning
- Job hazard analysis
- Communication
- Lifting capabilities
- Rigging practices
- Controlling and holding the load
- Ballast or counterweights
- Footing
- Rope inspection and wire rope requirements
- Inspection schedule
- Transporting cranes
- Preventive maintenance

Appendix C presents further details on hazard prevention requirements for crane safety.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring adequate funds are available for the purchase of proper equipment, supplies, training and certification if applicable (cranes with capacity exceeding 2,000 lbs.) for crane operators and employees associated with crane operations.

Managers/Unit Heads will also be responsible for identifying the employees affected by this safety policy and procedure.

Manager/Unit Heads will obtain and coordinate the required training for the affected employees. Manager/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process. Managers/Unit Heads shall be responsible for ensuring all cranes operators are properly trained.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training perform any of the tasks or activities associated with this safety policy and procedure.

Supervisors must ensure operators of cranes exceeding 2,000 lb. capacity be certified or an operator in training monitored by a certified operator.

Supervisors will communicate appropriate needs to managers/unit heads and/or other supervisors.

Supervisors will ensure that employees are provided with PPE as necessary for their job.

Supervisors will ensure the safe operation of cranes. Additionally, they will ensure that all equipment, wire ropes, slings, and other related accessories are in good working condition. If any indication of damaged equipment is present, the equipment will be removed from service and replaced or repaired before operations begin.

6.3.3 Employees

Employees who are involved in crane operations will ensure that all safety procedures are followed. Operators will ensure specific operating procedures are followed. No load will be moved until all precautions have been taken to ensure that the load can be lifted, moved, and placed safely. Each employee is responsible to bring hazards to the attention of their supervisor for correction as soon as the hazard is recognized.

Employees will ensure that all PPE is worn properly for the specific hazard involved and that all equipment is in good working order. Refer to SPP # 1910.135, Personal Protective Equipment, for additional details.

6.3.4 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing and securing required training. Safety and Risk Management will also work with Purchasing and Fleet Procurement Unit to ensure that all newly purchased equipment complies with safety regulations.

Safety and Risk Management will periodically inspect and report to supervisors any deficiencies observed that relate to cranes.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Fleet Procurement

Fleet Procurement Unit will be responsible for ensuring that all newly purchased cranes comply with this safety policy and procedure and current safety regulations.

Appendix A: Specific Operating Practices

Operating Practices

The crane operator shall not engage in any practice which will divert his attention while engaged in operating the crane.

When crane operator is physically or mentally unfit, then the operator shall not engage in the operation of this equipment.

The crane operator shall respond to signals only from the appointed signal man, but shall obey a stop signal at any time, no matter who gives it.

The crane operator shall be responsible for those operations under his direct control. Whenever safety is in question, the crane operator shall have the authority to stop and refuse to handle loads until safety has been assured.

No load is to be moved until the swing path and the landing site have been assured to be safe.

If a warning signal is furnished, it shall be sounded each time before traveling and intermittently during travel, particularly when approaching workmen.

Before leaving his crane unattended, the crane operator shall:

- Land any attached load, bucket, or other device
- Disengage clutch
- Set travel, swing, boom brakes, and other locking devices
- Put controls in the OFF position
- Stop the engine
- Secure crane against accidental travel
- When wind alarm is given or on leaving crane overnight, set ground chocks on truck and crawler cranes
- Lower crane booms to ground level or otherwise fasten securely against displacement by wind loads or other outside forces
- If there is a lockout/tagout sign on the switch or engine starting controls, the operator shall not close the switch or start the engine until the warning or lock has been removed by the person placing it there
- Before closing the switch or starting the engine, the operator shall see that all controls are in the OFF position and all personnel are in the clear

If power fails during operation, the crane operator shall:

- Set all brakes and locking devices
- Move all clutch or other power controls to the OFF position
- If practical, the suspended load should be landed under brake control

Appendix A: Specific Operating Practices (Continued) 2

The crane operator shall familiarize him or herself with the equipment and its proper care. If adjustments or repairs are necessary, or any defects are known, he or she shall report the same promptly to the appointed person and upon changing shifts shall also notify the next operator of the defects.

All controls shall be tested by the crane operator at the start of a new shift. If any controls do not operate properly, they shall be adjusted or repaired before operations are begun.

Booms which are being assembled or disassembled on the ground with or without support of the boom harness should be securely blocked to prevent dropping of the boom and boom sections.

Moving Loads

The following procedures will be observed when moving loads:

- The crane will be level and blocked if necessary
- The load will be properly secured and balanced
- The rope will be straight, not kinked
- Multiple part lines will be straight, not kinked
- The hook will be brought over the load to prevent swinging
- The lifting action will be a smooth acceleration
- The load will clear all obstructions
- Side loading will be limited to freely suspended loads
- Cranes will not be used for dragging loads sideways
- No load will be moved while employees are on the load or hook
- Employees will not work under loads
- The brakes will be tested prior to each lift when the weight approaches the maximum for the crane
- Outriggers will be used when necessary
- Loads will not be lowered below the point where less than two wraps of rope remain on their drums

Operating Near Electric Power Lines

NCDOT Cranes shall maintain a minimum clearance of 20 feet from all power lines.

It is recommended that a person be designated to observe the clearance and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means.

Before the commencement of operations near electrical lines, the person responsible for the job shall notify the owners of the power lines or their representative providing them with all information about the specific job and requesting their cooperation.

Any overhead wire shall be considered energized unless the owner or the electrical utility representative gives positive indication that the line is not energized.

Appendix B: Hazards Common to Cranes

Powerline Contact

Powerline contact is the inadvertent contact of any metal part of a crane with a high-voltage powerline.

Most powerline contacts occur when a crane is moving materials adjacent to or under energized powerlines and the hoist line or boom touches a powerline. Contact also frequently occurs during pick-and-carry operations when loads are being transported under energized powerlines. Sometimes the person who is electrocuted is touching the crane or getting on or off it when the hoist line or boom inadvertently comes into contact with an energized powerline.

The best hazard prevention method to avoid such an occurrence is to position the crane to keep a 20 foot clearance so the boom or hoist line cannot reach the powerlines.

Powerline contact usually occurs because no one considered the need for specific hazard prevention measures to avoid using cranes near powerlines. The key to avoiding powerline contact is pre-job safety planning. Planning is one of the greatest accident deterrents available in the workplace.

A single individual should have overall supervision and coordination of the project and must initiate a positive direction to assure that pre-job safety planning is done before any cranes arrive at the worksite.

It is extremely difficult for a crane operator to:

- Judge accurately clearances between a crane and powerlines simply using vision
- See more than one visual target at a time
- Overcome the camouflaging characteristics that trees, buildings, and other objects have upon powerlines

Sometimes a crane operator cannot judge the clearance of the boom from the powerline because the boom blocks the operator's view to the right. Sole reliance upon the performance of crane operators, riggers, and signalers, without any planning to separate cranes from powerlines, has resulted in many deaths.

Overloading

Overloading occurs when the rated capacity of a crane is exceeded while a load is being lifted and maneuvered, resulting in upset or structural failure. Overloading also occurs when improperly interpreting load charts. The crane operator must always know the weight of the load.

Cranes easily upset from overloading. On some models, the weight of a boom without a load can create an imbalance and cause some high-reach hydraulic cranes to upset when the boom is positioned at a low angle. This has occurred even with outriggers extended.

Appendix B: Hazards Common to Cranes (Continued) 2

The variables that affect lifting capacity include:

- The ability to lower a boom increases the radius and reduces its capacity
- The ability to extend a hydraulic boom increases the radius and reduces lifting capacity
- The ability to lower a boom while extending a boom quickly reduces lifting capacity
- The crane's tipping capacity can vary when the boom is positioned at the various points of the compass or clock in relation to its carrier frame
- Not extending the outriggers affect the crane's stability
- Relying upon perception, instinct, or experience to determine whether the load is too heavy and not responding fast enough when the crane begins to feel light.

All these variables create conditions that lead to crane operators inadvertently exceeding the rated capacity, tipping the load, and upsetting the crane. The variables may also lead to structural failure of the crane.

With the advent of solid-state micro-processing electronics, load-measuring systems evolved. Such systems can sense the actual load boom angle and length, warn the operator as rated capacity is approached, and stop further movement. Load-measuring systems automatically prevent exceeding the rated capacity at any boom angle, length, or radius. Most U.S. crane manufacturers offer load-measuring systems as standard equipment on new cranes. There are after-market suppliers of these devices for older model cranes.

For years, the only control to avoid upset from overload has been reliance upon a crane operator's performance and the use of load charts. Optimally, formal training should be provided for all crane operators to ensure a working knowledge of crane load charts.

Failure to Use Outriggers; Soft Ground and Structure Failure

Crane upset can occur when an operator does not extend the outrigger or when a crane is positioned on soft ground.

Many cranes upset because the use of outriggers is left to the discretion of the crane operator. For example, sometimes a crane operator cannot extend the outriggers because of insufficient space or outrigger pads may be too small to support the crane even on hard ground. However, the use of outriggers is not voluntary. Load capacity charts are based either on the use of fully extended outriggers or on "rubber" for rubber-tired cranes. If outriggers cannot be fully extended, then capacities in the on-rubber chart must be used.

Outriggers have collapsed because they were overloaded, defective, or located on inadequate foundation.

Appendix B: Hazards Common to Cranes (Continued) 3

Determining the load weights is generally viewed as the responsibility of the site supervisor who must inform the operator before the lift is made. The operator must still be able to determine or estimate load weights, to evaluate and verify the weight provided. Based on the load weight, the operator knows if it is necessary to use outriggers.

The surest way to avoid an accident is to make the machine inoperable until the operator activates necessary safeguards. This could include limit switches to prevent boom movement until outriggers are extended and in place to avert upset.

Soil failure occurs because the ground is too soft, or the outrigger pads are not big enough. When poor soil is encountered, or the outriggers have inadequate floats or pads, well-designed blocking or cribbing is needed under the outriggers.

Pinch Points

There are two types of crane pinch points:

- Within the swinging radius of the rotating superstructure of a crane, in areas in which people may be working, is a pinch point where people can be crushed or squeezed between the carrier frame and the crane cab, or the crane cab and an adjacent wall or other structure.
- Many unguarded gears, belts, rotating shafts, etc., on older cranes are pinch points to which employees may be exposed.

A pinch point is created by the narrow clearance between the rotating superstructure (cab) of a crane and the stationery carrier frame. This narrow clearance is referred to as the danger zone.

The swing area of the crane cab and counterweight must be barricaded against entry into the danger zone.

The removal of water jugs, tool boxes, and rigging materials from crane cabs would reduce the incentive to enter the danger zone.

The installation of rearview mirrors for the crane operator provides an added safeguard so the operator can see into the turning area of the cab and counterweight.

Obstruction of Vision

Safe use of a crane is compromised when the vision of an operator, rigger, or signaler is blocked, and employees cannot see what the others are doing.

The crane size alone limits the operator's range of vision and creates many blind spots, preventing the rigger, signaler, oiler, and others affected by the crane's movement from having direct eye contact with the crane operator.

Appendix B: Hazards Common to Cranes (Continued) 4

There are two general categories for obstructions to operators' vision:

- Obstruction by the crane's own bulk
- Obstruction by the work environment

To overcome the hazard of blind spots while loads are being lifted, the use of radios and cell phones is much more effective than relying upon several signalers to relay messages by line of sight.

The use of automatic travel alarms is an effective way to warn those in the immediate vicinity of crane travel movement in pick-and-carry functions.

Travel Upset in Mobile Hydraulic Cranes (Rough Terrain and Wheel-Mounted Telescoping Boom)

Because of a high center of gravity, a mobile hydraulic crane can easily upset and crush the operator between the boom and the ground.

This type of crane is easily overturned on road shoulders or other embankments during travel from one location to another.

The best preventive measure for operator safety is the installation of a crush-resistant cab and seatbelt. In the event of a travel upset, the operator would be protected.

Preconstruction Planning

Most crane accidents could have been easily prevented if the safe use of cranes had been incorporated at the preconstruction planning meeting. The planning stage meeting is the best time to address hazard avoidance. Planning before actual crane operations begin can eliminate major craning hazards from the jobsite and make operations more efficient.

For Digger Derrick crane operations, contact the NC811 service to locate underground utilities prior to digging operations begin.

Job Hazard Analysis

Before actual craning operations are begun at the jobsite, a specific job hazard analysis should be conducted to ensure that preconstruction planning is adequate. When pre-job planning has been neglected, this on-site job hazard analysis is necessary to ensure that craning operations can be done safely.

Appendix C: Hazard Prevention Requirements for Crane Safety

Communication

Standard signals to the operator shall be in accordance with the ANSI standard, unless voice communication equipment (cell phone, radio, or equivalent) is used. Signals shall always be discernible or audible. No response shall be made unless signals are clearly understood.

Hand signals shall be in accordance with Figure 1 and shall be posted conspicuously.

Special signals shall be agreed on in advance by the operator and the signal person and should not conflict with standard signals. These special signals are for operations not covered by the hand signals or for special conditions that occur from time to time.

If it is necessary to give instructions to the operator other than provided by the established signal system, the crane motions shall be stopped.

Modes of communication must be agreed upon in preconstruction planning and in the job hazard analysis.

Lifting Capabilities and Load Ratings

During preconstruction planning, lifting requirements should be analyzed by an engineer competent to establish whether the crane to be used has adequate lifting capability. The job hazard analysis should verify that the crane to be used has enough boom length for the lift.

All cranes will be marked with the load ratings and loads will not exceed this amount. A load rating chart will be affixed inside the cab of each crane in sight of the operator. Percentage of loads causing tipping are indicated by crane type and design, and maximum limits will not be exceeded.

Appendix C: Hazard Prevention Requirements for Crane Safety (Continued) 2

Hand Signals for Crane Operation

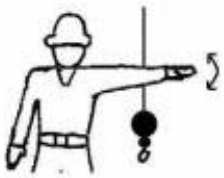
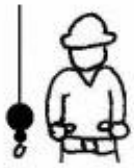
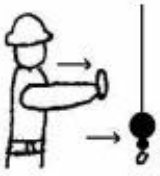
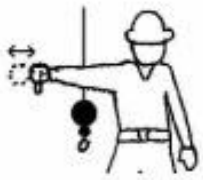
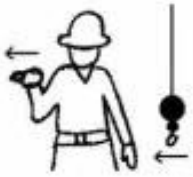
 **STOP** – With arm extended horizontally to the side, palm down, arm is swung back and forth.	 **EMERGENCY STOP** – With both arms extended horizontally to the side, palms down, arms are swung back and forth.	 **HOIST** – With upper arm extended to the side, forearm and index finger pointing straight up, hand and finger make small circles.
 **RAISE BOOM** – With arm extended horizontally to the side, thumb points up with other fingers closed.	 **SWING** – With arm extended horizontally, index finger points in direction that boom is to swing.	 **RETRACT TELESCOPING BOOM** – With hands to the front at waist level, thumbs point at each other with other fingers closed.
 **RAISE THE BOOM AND LOWER THE LOAD** – With arm extended horizontally to the side and thumb pointing up, fingers open and close while load movement is desired.	 **DOG EVERYTHING** – Hands held together at waist level.	 **LOWER** – With arm and index finger pointing down, hand and finger make small circles.
 **LOWER BOOM** – With arm extended horizontally to the side, thumb points down with other fingers closed.	 **EXTEND TELESCOPING BOOM** – With hands to the front at waist level, thumbs point outward with other fingers closed.	 **TRAVEL/TOWER TRAVEL** – With all fingers pointing up, arm is extended horizontally out and back to make a pushing motion in the direction of travel.

Figure 1

Appendix C: Hazard Prevention Requirements for Crane Safety (Continued) 3

Hand Signals for Crane Operation (continued)

 **LOWER THE BOOM AND RAISE THE LOAD** – With arm extended horizontally to the side and thumb pointing down, fingers open and close while load movement is desired.	 **MOVE SLOWLY** – A hand is placed in front of the hand that is giving the action signal.	 **USE AUXILIARY HOIST** (whipline) – With arm bent at elbow and forearm vertical, elbow is tapped with other hand. Then regular signal is used to indicate desired action.
 **CRAWLER CRANE TRAVEL, BOTH TRACKS** – Rotate fists around each other in front of body; direction of rotation away from body indicates travel forward; rotation towards body indicates travel backward.	 **USE MAIN HOIST** – A hand taps on top of the head. Then regular signal is given to indicate desired action.	 **CRAWLER CRANE TRAVEL, ONE TRACK** – Indicate track to be locked by raising fist on that side. Rotate other fist in front of body in direction that other track is to travel.
 **TROLLEY TRAVEL** – With palm up, fingers closed and thumb pointing in direction of motion, hand is jerked horizontally in direction trolley is to travel.		

Appendix C: Hazard Prevention Requirements for Crane Safety (Continued) 4

Rigging Practices

The requirements for slings to support loads are well defined in OSHA Standards 29 CFR 1910.184 and the requirements for rigging equipment are defined in 29 CFR 1926.251.

Loads will be moved using slings or other approved devices, not by wrapping the rope around the load.

Controlling and Holding the Load

The use of tag lines to control movement of the load is very important. Normally, when a load is being hoisted, the lay or twist in wire rope causes rotation when the load becomes suspended.

OSHA Standard 29 CFR 1926.1417(w) states: "A tag or restraint line must be used if necessary to prevent rotation of the load that would be hazardous."

At no time will the operator be allowed to leave the controls while a load is suspended. Employees will be instructed to stay clear and not to pass under suspended loads.

Ballast or Counterweights

Cranes will not be operated without the full amount of ballast or counterweight in place as specified by the manufacturer, unless the load is significantly lighter than the recommended maximum weight.

Footing

Firm footing, uniformly level to within one percent (1%) should be provided. Where such footing is not otherwise supplied, it should be provided by substantial timbers, cribbing, or other structural members sufficient to distribute the load so as not to exceed the safe bearing capacity of the underlying material.

Rope Inspection and Wire Rope Requirements

All ropes will be inspected for damage each month. Any rope found to be damaged or altered due to stress will be closely monitored for the following warning signs:

- Reduction in rope diameter (stretching) or corrosion
- A few broken exterior wires
- Worn outside wires
- Corroded or broken wires at the end of connections
- Corroded, cracked, bent, worn, or improperly applied end connections
- Severe kinking, crushing, cutting, or un-stranding

It is very important to comply with the crane manufacturer's recommendations for the type of wire rope to be used for various hoist lines or pendants.

Appendix C: Hazard Prevention Requirements for Crane Safety (Continued) 5

Inspection Schedule

New and existing cranes in construction will be visually inspected each shift prior to use. In addition, all cranes will be inspected after any load is dropped or any failure in equipment occurs.

Frequent inspections will be performed monthly. This inspection will include the following items:

- All control mechanisms
- Any defect detected during operation posing a safety hazard
- All safety devices for proper function
- Leaks in all lines (hydraulic or air)
- Crane hooks
- Rope reeving for non-compliance with manufacturer's recommendations
- Electrical apparatus for malfunction or signs of deterioration

Periodic inspections will be performed on a semi-annual basis (every six months). This inspection will include the following items:

- Deformed, cracked, or corroded members in the crane structure and boom
- Loose bolts or rivets
- Worn, cracked, or distorted parts such as pins, bearings, shafts, and locking devices
- Excessive wear on brake and clutch system parts, linings, pawls, and locking devices
- Load, boom angle, and other indicators over their full range for damage
- Engines for improper performance and non-compliance
- Wear on chain drive sprockets and excessive chain stretch
- Travel steering, braking, and locking devices
- Tires

Crane inspections will be performed on cranes that have not been used or are idle or used as standby cranes under the frequent crane inspection guidelines.

A notice of the current annual inspection should be posted in the crane. Cranes that cannot be certified must be removed from service until all necessary repairs are made and the equipment is reinspected.

Appendix C: Hazard Prevention Requirements for Crane Safety (Continued) 6

Inspection Records

Inspections will be performed by the supervisor or the designated employee or operator and maintained on hand for a period of three years. These records will include the equipment inspected and the date and signature of the individual who performed the inspection.

Certification records which include the date of inspection, the signature of the person who performed the inspection, and the serial number or other identifier of the crane which was inspected shall be made monthly on critical items in use such as brakes, crane hooks, and ropes.

Transporting Cranes

The following procedures will be observed when transporting cranes from location to location:

- The boom of the vehicle will be carried in line with the direction of travel
- The superstructure will be secured against rotation
- The empty hook will be lashed or otherwise prevented from swinging
- For Digger Derricks, crane must be in the cradle when transporting. If auger cannot be cradled also it should be removed by to transporting.

Preventive Maintenance

Cranes require on-going service and preventive maintenance. Preventive maintenance programs should be documented

Overhead Cranes and Hoists SPP# 1910.179A

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to ensure all overhead cranes and hoists used by North Carolina Department of Transportation (NCDOT) employees are installed, inspected, maintained and operated in a safe manner.

2.0 Scope and Applicability

This safety policy and procedure applies to overhead cranes and hoists, including, top running or underhung bridge cranes, monorail cranes, fixed hoist and others having the fundamental characteristics of a hoisting mechanism attached to a movable bridge or trolley and traveling on an overhead runway structure or fixed structure to move loads.

This safety policy and procedure details the areas of responsibility for managers/unit heads, County Maintenance Engineer, qualified persons, supervisors, employees, Safety Engineers, and the Central Equipment Unit within NCDOT.

3.0 Reference

This safety policy and procedure is established in accordance with OSHA 29 CFR 1910.179, Overhead Cranes and the ANSI/ASME B.30 series.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. All overhead cranes and hoists covered by the scope of this policy and procedure shall be properly installed, inspected, maintained and operated in a safe manner.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on overhead cranes and hoists. It is also the responsibility of each NCDOT employee to immediately report any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific requirements required by NCDOT's safety policy and procedure for overhead cranes and hoists.

6.1. Definitions

Crane
A machine for lifting and lowering a load and moving it horizontally, with the hoisting mechanism an integral part of the machine.

Overhead crane
A crane with a movable bridge carrying a movable or fixed hoisting mechanism and traveling on an overhead fixed runway structure

Wall crane
A crane having a jib with or without trolley and supported from a sidewall or line of columns of a building. It is a traveling type and operates on a runway attached to the sidewall or columns.

Monorail Crane
A crane having a hoist attached to a trolley that moves either on the top or bottom flange of a beam runway.

Bridge Girder
A crane member, on which trolleys travel horizontally, mounted between and supported by trolleys or end trucks.

Hoist
An apparatus that lifts or lowers a load. It can be installed in a fixed location or on an overhead trolley.

Hoist chain
The load bearing chain.

Qualified person
A person who, by possession of a recognized degree in an applicable field or certificate of professional standing, or by extensive knowledge, training, and experience has successful demonstrated the ability to solve problems relating to the subject matter at hand.

Rated Load
The maximum load for which a crane or individual hoist is designed and built by the manufacturer and shown on the equipment nameplate(s).

Frequent Inspection
A monthly inspection at a minimum.

Periodic Inspection
An annual inspection at a minimum.

6.2. General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Construction, Installation and Marking
- Inspection of Overhead cranes and Hoists
- General Operation and Use

6.2.1. Construction, Installation and Marking

Overhead cranes and hoists shall be constructed using hoists, and trolleys, meeting the guidelines of OSHA 1910.179 and the ANSI/ASME B.30 series.

Overhead crane runways and supporting structures shall be designed, constructed and installed to withstand the loads and forces imposed by the crane. A qualified person familiar with structural loading shall review the support structure holding the overhead crane/hoist prior to load testing.

The overhead crane and/or hoist load rating shall be marked on each side of the girder holding the overhead crane or hoist and shall be visible from the ground. The load rating shall be marked on the trolley, hoist, load block, and hook. The **initial** load test will be 125% of the desired rating. For additional load test information see Section 6.2.2.5 Load Testing.

6.2.2. Inspection of overhead cranes and hoist

Documentation
All inspection forms will be filed by hoist number and be available for auditing/inspection as required.

Any overhead crane or hoist that does not have documented proof or has not been inspected as outlined in this Safety Policy and Procedure since its initial installation, must be taken down and inspected to ensure that the overhead crane/hoist is within manufacturer/factory specifications.

6.2.2.1. Training of Inspection Personnel

Employees inspecting and maintaining overhead cranes and hoists shall receive training specific to the type of inspection they will perform i.e. pre- use, frequent, periodic inspection, load testing, and maintenance.

This training shall be completed before an employee begins inspecting an overhead crane. It is recommended that re-training occur every three years or when equipment or job conditions change. Re-training should also occur if there is an indication or incident that suggests lack of knowledge or skill.

A qualified person shall conduct or direct this training.

6.2.2.2 Pre-use inspection

Each overhead crane or hoist shall be given a pre-operational inspection. At a minimum this inspection shall include a visual inspection of the hook for safety latch, cracks, bends or twists, and overhead crane/hoist operation that is smooth with no unusual sounds. This inspection does not need to be documented.

6.2.2.3 Frequent (Monthly) Inspection

Each overhead crane/hoist shall be given a frequent inspection. At a minimum, this inspection shall be conducted monthly and include a visual examination of the following areas:

- Operating controls
- Trolley and bridge
- Beams for damage
- Power supply
- Chain limit switch
- Hook for deformation and safety latch
- Proper lubrication

This inspection shall be documented on NC DOT Overhead Hoist Inspection "Frequent" Form CC-39. (See Appendix B: Inspection Forms)

Note: Some hoists are only used seasonally and only need inspection when in use. When used seasonally, it is recommended that overhead cranes/hoists be removed from the elements until the active season
begins. A frequent inspection must be conducted and documented prior to the first use of a seasonal hoist.

6.2.2.4 Periodic (Annual) Inspection

Each overhead crane/hoist shall be given a periodic inspection. At a minimum this inspection shall be conducted every twelve months and include an examination of the following areas:

- The items in the frequent inspection
- Measurement of the chain or wire rope and the hook.
- Inspection of the brake unit
- Electrical wiring and instructional decals
- Beam bolts and other attachment hardware
- Bent, cracked or corroded members on the bridge or runways
- Magnetic particle or dye penetrant non-destructive testing of all hooks
- Shafts, bearing, bushings and couplings
- Annual Load Test

This inspection shall be documented on NC DOT Overhead Hoist Inspection "Periodic", (Annual Form) CC-40. (See Appendix B: Inspection Forms)

6.2.2.5 Load Testing

A qualified person shall conduct all load tests. All load tests shall be conducted over the entire scope of the crane travel and shall be documented on the NC DOT Overhead Crane, Load Test Report. (See Appendix B: Inspection Forms, Load Test Report, Form CC-41.)

There are several different times when load testing is required. The following describes those circumstances:

- **Initial Load Test**
  This test is required for any existing overhead crane/hoist that does not have documented proof of previous load testing as outlined in this Safety Policy and Procedure or for any new overhead crane/hoist. The **initial load test** will be 125% of the desired rating.

- **Periodic "Annual" Inspection**
  As part of the periodic or annual inspection, each overhead crane/hoist shall be load tested at a minimum of 100% but not to exceed 125% of the rated load capacity.

- **After Load-handling component repair or replacement**
  Anytime an overhead crane/hoist load-handling component has been repaired or replaced, the overhead crane/hoist shall be load tested. The load test shall be a minimum of 100%, but shall not exceed 125% of rated capacity.

6.2.3 General Operation and Use

6.2.3.1 Training of Operators

All employees shall be trained in the proper pre-use inspection and operation of an overhead crane and hoist. This training should be completed before an employee begins using an overhead crane/hoist. It is recommended that re-training occur every three years or when equipment or job conditions change. Re-training should also occur if there is an indication or incident that suggests lack of knowledge or skill.

A qualified person shall conduct or direct this training.

6.2.3.2 Hosting Practices

The operator shall practice the following good operation practices:

- The operator shall be focused on the operation of the overhead crane/hoist and the load.

- Each operator is responsible for the load while it is under his or her control. If there is any questions as to the safety of the lift; then the operator shall stop operations until safety has been assured.
- No load shall be left unattended when not landed.
- The overhead crane/hoist shall be operated in a smooth deliberate manner and shock loading shall be avoided.
- The overhead crane/hoist shall not be loaded above the rated load limit.
- The load shall be directly under the hoist to prevent the load from swinging when lifted. (Use tag lines as needed)
- The slings shall be inspected visually for damage prior to use and shall not be overloaded.
- Slings and other lifting devices must be fully and securely seated in the hook before lifting the load.
- The load shall not be carried or positioned over personnel.
- Employees in the direction of travel should be warned to move and stay clear of the load at all times.

6.2.3.3 Handling the load

Only personnel trained in the safe operation of an overhead crane or hoist shall operate this equipment. No load will be moved until:

- All precautions have been taken to ensure that the load does not exceed the posted rated capacity of the overhead crane/hoist system.
- It has been determined that the load can be lifted, moved and lowered in a safe manner.
- All personnel are clear of pinch points.

6.2.3.4 Lockout/Tagout of Overhead Crane/Hoist

Any overhead crane/hoist that is unsafe, in need of repair or in the process of being repaired shall be:

- Rendered inoperable by disconnecting the power supply and attaching a lockout device and tag if an electric type of overhead crane/hoist or chained together with a lock and tag if a manual chain fall type hoist.
- The control panel shall be tagged with a tag that reads: Do Not Operate.

Employees should never operate an overhead crane/hoist that has been tagged with a “Do Not Operate” tag.

6.3. Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will be responsible for:

- Ensuring adequate funds are available and budgeted for the purchase of overhead cranes and hoist as well as replacement components in their areas.

6.3.2 County Maintenance Engineers, Bridge Maintenance Supervisors, Equipment Sub-shop Supervisors, Ferry Superintendents and Rail Operations Manager will be responsible for:

County Maintenance Engineers, Bridge Maintenance Supervisors, Equipment Sub-shop Supervisors, Ferry Superintendents and Rail Operations Manager will be responsible for

- Identifying the employees within their unit that are affected by this safety policy and procedure
- Coordinating the required training for the affected employees
- Coordinating the Periodic "annual" inspection of overhead cranes/hoists
- Ensuring that pre-use and "Frequent" inspections of overhead cranes/hoist are conducted.
- Consulting with a qualified person regarding overhead crane installation and inspection
- Ensuring compliance with this safety policy and procedure.

6.3.3 Qualified person

Qualified person will be responsible for:

- Solving or resolving problems relating to overhead crane systems such as the design, installation, frequent and periodic inspection and load testing.

6.3.4. Supervisors

Supervisors will be responsible for:

- Communicating appropriate needs to managers/unit heads
- Ensuring employees have been trained to operate overhead cranes

6.3.5 Employees

Employees will:

- Conduct pre-use inspection
- Each operator is responsible for the load while it is under his or her control. If there is any questions as to the safety of the lift, the operator shall stop operations until safety has been assured.
- Operate the overhead crane/hoist in a safe manner

6.3.6. Safety Engineers

Safety Engineers will:

- Provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure
- Assist in developing or securing required training

6.3.7. Safety and Loss Control

Safety and Loss Control will provide:

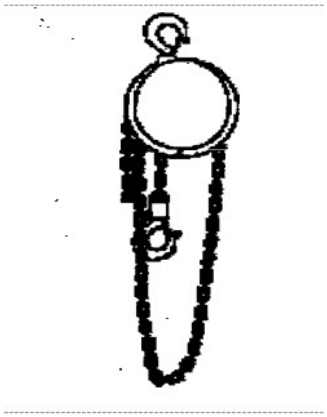
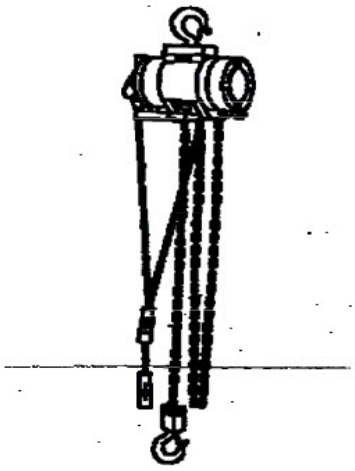
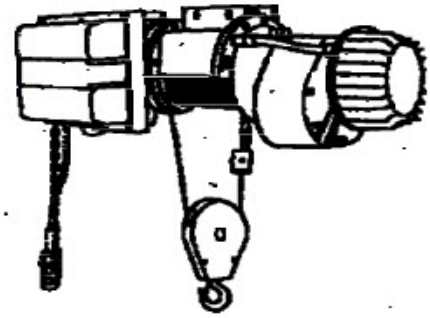
- Assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure.
- Assist in developing or securing required training.
- Assist Purchasing and Central Equipment Unit to ensure that all newly purchased overhead cranes/hoists complies with current safety regulations and this safety policy and procedure.

6.3.8. Central Equipment Unit and Division Equipment

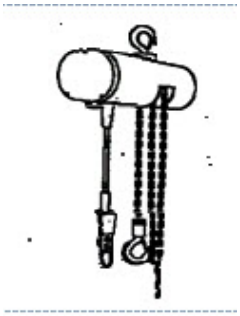
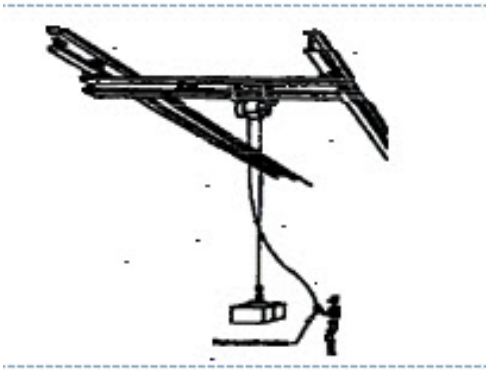
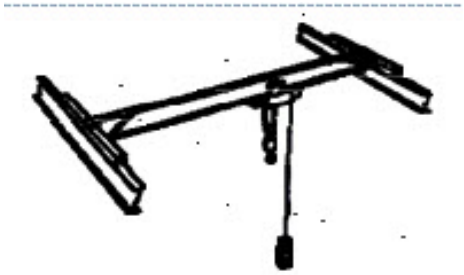
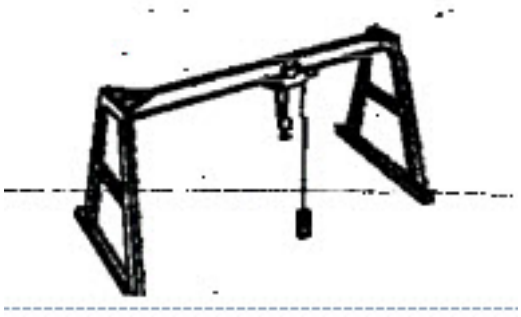
Central equipment and/or Division Equipment Sub-shops will provide:

- Qualified persons to conduct Periodic or “annual” inspections of overhead cranes/hoists

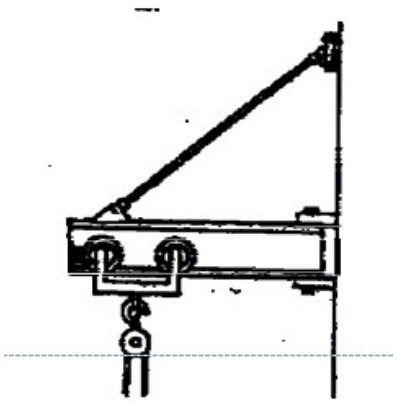
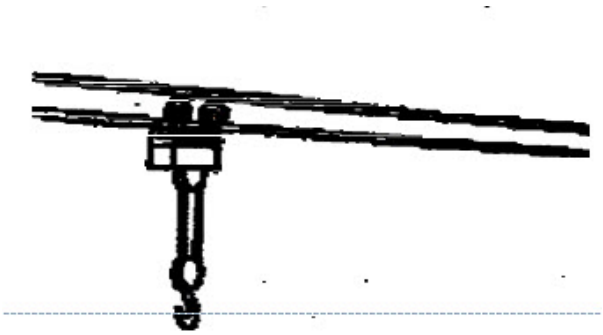
Appendix A: Types of Overhead Cranes/Hoist

Old manual chain fall type hoist	
Older electrical hoist having roller or coil chain.	
Electric wire rope type hoist with motorized travel. Most commonly found in newer shop	

Appendix A: Types of Overhead Cranes/Hoist (cont.)

Electric hoist, coil chain type.	
Underhung crane.	
Top running crane.	
"A" Frame gantry crane.	

Appendix A: Types of Overhead Cranes/Hoist (cont.)

Wall mounted crane.	
Hoist on a single runway.	

Appendix B: Overhead Crane/Hoist Inspection Forms

NCDOT OVERHEAD CRANE LOAD TEST REPORT

WO # _____ **SAP EQ. #** _____

UNIT # _____ **DATE** _____

MAX. CAPACITY _____ **HOIST S/N** _____

OSHA 1910.179 (k) (2) Test loads shall not be more than 125% of the rated load unless otherwise recommended by the manufacturer.

This report shall be placed on record and made readily available to all appointed personnel.

Test loads shall be no less than 100 % of rated capacity.

RATED CAPACITY _____ **LBS.**

TEST LOAD APPLIED _____ **LBS.**

PROBLEMS FOUND

INSPECTOR _____ **DATE** _____

This report shall certify that this overhead crane has lifted the test load in a smooth and predictable manner. All brakes, bridge trucks, and hoist trolleys are working properly at this time. Any problems resulting from this test have been repaired or defective parts replaced, and this unit is ready for service.

CC-41 9/99

NCDOT OVERHEAD HOIST INSPECTION " FREQUENT"

WO # _____ "Inspections **shall** be made monthly" **SAP EQ. #** _____

DATE _____ **UNIT #** _____

BRIDGE TRUCK S/N_____

TROLLEY S/N _____ **HOIST MAKE** _____

HOIST S/N _____

ITEM	BASELINE THROAT	REJECT AT	MEASUREMENT THROAT	SAT	UNSAT	DATE REPLACED
LOAD HOOK						

"Always follow **lock out / tag out** procedures. Utilize Warning signs and barriers in the work area before beginning inspections"

CHAIN #	BASELINE	REJECT AT	MEASUREMENT	SAT	UNSAT	DATE REPLACED
WIRE ROPE	**BASELINE**	**REJECT AT**	**MEASUREMENT**	**SAT**	**UNSAT**	**DATE REPLACED**

ITEM		SAT	UNSAT	ITEM		SAT	UNSAT
OPERATING CONTROLS				ELECTRICAL CORD & REEL	N/A		
TROLLY & BRIDGE TRAVEL				PENDANT CABLE	N/A		
LUBE CHAIN				OIL LEAKS AT HOIST	N/A		
TRUCK & TROLLEY WHEELS FOR DAMAGE				CHAIN LIMIT SWITCH OPERATION	N/A		
TRUCK & TROLLEY SIDE PLATE ADJUSTMENT				HOIST CHAIN SMOOTH OPERATION			
TRUCK & TROLLEY WHEEL LUBE	N/A			TOP HOOK VISUAL	N/A		
BEAMS FOR DAMAGE				HOOK SAFETY LATCHES			

FOR FAULTY ITEMS USE REMARK SECTION

Inspector _____ **Date** _____

All deficiencies **shall** be carefully examined and a determination made as to whether or not they constitute a safety hazard. Any hoist found to be unsafe **shall** be taken out of service until it can be repaired or defective parts are replaced.

CC-39 7/04

NCDOT OVERHEAD HOIST INSPECTION

"PERIODIC"

"Inspections **shall** be made Annually."

DATE_____ **UNIT#**_____

BRIDGE TRUCK S/N _____

TROLLEY S/N_____ **HOIST MAKE** _____

HOIST S/N _____

"Periodic inspections shall be performed in intervals of no less than one year"

You are required to read and consult the **manual** for hoist/crane that is to be inspected. This checklist is in no way intended to replace it.

ITEM	SAT	UNSAT	ITEM	SAT	UNSAT
NCDOT FREQUENT INSPECTION			BENT, CRACKED, OR CORRODED MEMBERS ON BRIDGE OR RUN WAY		
INSPECT HOIST BRAKE UNIT (refer to hoist manual)			MAG PARTICLE OR DYE PEN TEST OF BOTH HOOKS		
DAMAGED OR WORN LOAD SHEAVE			ALL PINS, SHAFTS, BEARINGS, BUSHINGS, AND COUPLINGS		
ALL WARNING AND INSTRUCTIONAL DECALS			LUBE HOIST AS PER MANUAL		
ALL ELECTRICAL CONNECTIONS AND WIRE CONDITION N/A			PERFORM OPERATIONAL AND LOAD TEST		
ALL BEAM BOLTS OR OTHER ATTACHING HARDWARE					

FOR FAULTY ITEMS USE REMARK SECTION

_____

_____

_____

_____

_____

_____

_____

SHOP SUPERVISOR

_____ **DATE**_____

INSPECTOR _____ **DATE**_____

All deficiencies **shall** be carefully examined and a determination made as to whether or not they constitute a safety hazard. Any hoist found to be unsafe **shall** be taken out of service until it can be repaired or defective parts are replaced.

CC-40, 12/99

Materials Handling SPP# 1910.176

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines to ensure the prevention of injuries when materials are handled and stored either manually or equipment-assisted.

2.0 Scope and Applicability

Materials handling injuries originate in inadequate planning, work location design, scheduling, storage, housekeeping, training, work performance, and equipment selection and use. This safety policy and procedure provides guidelines for the elimination or reduction of injuries due to manual or equipment-assisted materials handling.

This safety policy and procedure includes training provisions, manual materials handling guidelines, requirements for the use of materials handling equipment and

materials storage. Additionally, It presents guidelines on housekeeping, securing railroad cars, and requirements on labels, signs, and marking.

This document also details the areas of responsibility for the managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within the North Carolina Department of Transportation (NCDOT).

This safety policy and procedure affects any employee who as a result of his or her job duties handles materials.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.176) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.250).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, materials must always be handled such that injuries are eliminated or significantly reduced. When materials handling hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Materials Handling will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation NCDOT's safety policy and procedure on Materials Handling. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT’s safety policy and procedure on Materials Handling.

6.1 Definitions

Flammable
A material capable of being easily ignited, that burns intensely, or rapidly spreads flames.

Handling
The movement of materials either by manual lifting or mechanical means.

Mechanical Equipment
Fork lifts, cranes, front-end loaders, pallet jacks, backhoes, hand trucks, etc.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Manual Materials Handling
- Materials Handling Equipment
- Storage
- Housekeeping
- Rolling Railroad Cars
- Labels, Signs, and Markings

6.2.1 Training

Training shall be required for employees who manually handle or move materials and for employees who perform equipment assisted materials handling.

This training should be provided prior to employees' assumption of jobs requiring manual handling or equipment assisted handling tasks. This initial training should be based on the discretion of the supervisor and supplemented with refresher training.

Applicable training will include instruction in:

- Proper lifting techniques for manual materials handling
- Available equipment types for equipment assisted materials handling
- Equipment operations for applicable materials handling equipment
- Any special rules or guidelines that may cover specific types of materials handling equipment

6.2.2 Manual Materials Handing

Manual materials handling involves the handling, moving, lifting, and carrying of materials without the use of mechanical equipment. Minimizing injuries from materials handling requires forethought about these tasks. Some basic materials handling methods include:

- Inspecting materials for slivers, jagged edges, burrs, rough or slippery surfaces
- Getting a firm grip on the object
- Keeping fingers away from pinch points, especially when setting down materials
- Keeping hands away from ends of lumber, pipe, or other long objects, to prevent them from being pinched
- Wiping off greasy, wet, slippery, or dirty objects before trying to handle them
- Keeping hands free from oil and grease

In most cases, gloves, hand leathers, or other hand protectors must be used to prevent hand injuries.

Employees should be physically suited to perform jobs requiring heavy and/or frequent lifting. If a load is thought to be more than one person can handle, 2 employees should be assigned to the operation or materials handling equipment should be provided.

All employees who lift materials will be trained on the proper way to pick up and put down heavy, bulky or long objects. NCDOT's program "Back to Work" and SPP #1910.001 should be consulted for additional details.

All attempts should be made to reduce manual lifting by using mechanical equipment or rearranging the storage of materials.

6.2.3 Materials Handling Equipment

When there is excessive manual handling of materials over 50 pounds, then additional tools and equipment may be required for materials handling.

A variety of tools and equipment is available to assist in the handling of materials. These tools and equipment fall into the following categories:

- Manual Materials Handling Equipment
- Powered Industrial Trucks (rider-operated and walker-operated)
- Hoists
- Rigging

Manual materials handling equipment is used in NCDOT for a wide variety of tasks. Each of these items should be used only for its designed task and kept in good condition. Selected manual materials handling equipment in NCDOT include:

- Hooks
- Dollies
- Four wheel trucks
- Rollers
- Jacks

Figure 1

Figure 2

Figure 1 presents a illustration of a hand dolly and Figure 2 illustrates a typical four-wheel truck. Appendix A presents details on safe use of these manual materials handling equipment.

Powered industrial trucks come in two general classifications:

- Rider-operated (mostly forklifts)
- Walker-operated (motorized handtrucks)

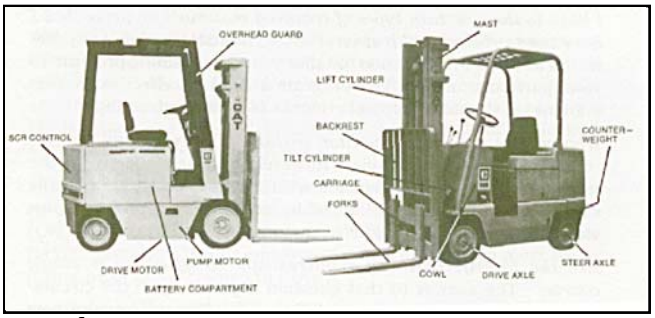


Figure 3

Figure 3 illustrates a forklift with its major components and Figure 4 illustrates a walker-operated forklift. Powered industrial trucks are versatile and efficient materials handling equipment, which have eliminated many high risk manual handling tasks.

Figure 4

However, inherent in their physical and operational design are potential hazards which can lead to accidents. Occupational injuries involving forklifts or lift trucks are commonplace.

Major reasons for forklift accidents include:

- Improper ventilation and battery charging
- Instability caused by shift in the center of gravity

- Limited visibility
- Poor communication among employees in the work area
- Inadequate vehicle maintenance
- Using trucks for unsuited tasks

Appendix B presents a checklist to help prevent forklift accidents.

Hoists are used to raise, lower, and transport heavy loads for short distances. They usually range from 1/4 to 2 tons in capacity. Figure 5 illustrates typical hoist configurations. Major factors affecting the safe use of hoists are design and operating conditions, operator skills and knowledge, and proper rigging practices.

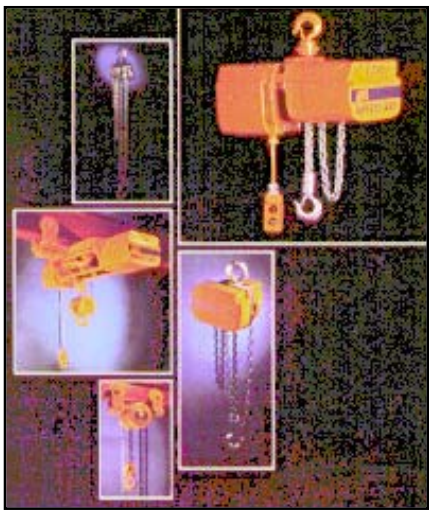


Figure 5

Accidents generally associated with hoists are:

- Failure of attachment devices during a lift, resulting in dropped loads
- Collision with persons or objects as a consequence of uncontrolled movement of the hoist or load
- Contacts to personnel in the work area while loads are being attached
- Failure of structural or mechanical parts of hoists during the lifting or moving of loads.
- Lift loads greater than the rated capacity of hoists

Appendix C presents suggestions for design and operator conditions and operator control to minimize accidents and injuries on hoists. Also, refer to SPP# 1910.184, Slings, for related information on slings and chains.

Rigging is also used to raise, lower, and transport loads. The rigging of loads must be accomplished with relative precision by trained, experienced personnel. To ensure that safe practices are followed, competent supervision must see that:

- Rigging equipment has the capacity for the job
- Rigging equipment is in safe working condition
- Loads are rigged properly
- Rigging crew and other affected personnel maintain safety practices

Refer to SPP # 1910.184, Slings, for related rigging information on slings and chains.

6.2.4 Storage

Planning for materials storage reduces the handling required to move materials and articles for processing, use, or shipment. Material movement is

facilitated by adequate storage space at receiving, processing, and shipping areas. Long-and short-term storage should be considered to reduce hazards and to facilitate the placement and removal of materials.

Storage equipment (racks, bins, pallets, etc.) should match the materials to be temporarily held or stocked. Bags, bundles, and other containers should be properly stacked, blocked, interlocked, and limited in height. For open pits, tanks, vats, etc., covers and guardrails must be provided to reduce contact and fall hazards.

Special precautions are required for the storage of hazardous and flammable materials. Refer to SPP # 1910.106, Flammable and Combustible Liquids, for additional details on hazardous and flammable storage requirements. Also see SPP# 1910.109, Explosives, for details on explosives storage requirements. The level of precaution should match the potential for injury posed by particular substances.

Appendix D presents detailed storage guidelines on:

- Warehouse Storage
- Open Yard Storage
- Lumber
- Bagged Material
- Pipe and Bar Stock
- Sheet Metal
- Brick and Masonry Blocks

6.2.5 Housekeeping

Storage areas will be free from excess materials that create hazards that result in fire, explosion, slips, trips, or infestation by insects or rodents. Weeds and other vegetation must be controlled by cutting or using herbicides when necessary.

6.2.6 Rolling Railroad Cars

Derail and/or bumper blocks will be provided on spur railroad tracks to prevent a runaway rail car from entering a work area, striking a building, or making contact with another rail car being loaded or unloaded.

6.2.7 Aisles and Passageways

Where mechanical handling equipment is used, sufficient safe clearances shall be allowed for aisles, at loading docks, through doorways and wherever turns or passage must be made. Aisles and passageways shall be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard.

Permanent aisles and passageways shall be appropriately marked. Additionally, clearance signs and warning of clearance limits shall be posted. Equipment will be marked indicating the working load it will safely support.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase and repair of materials handling equipment and storage facilities in their areas. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities associated with this safety policy and procedure.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will audit for compliance with this safety policy and procedure during their facility and jobsite audits. Appendices E and F present sample forms for performing facilities and jobsite audits.

Supervisors will ensure employees are provided with Personal Protective Equipment (PPE) as necessary for their job.

Supervisors will evaluate, note, and correct any deficiencies observed in materials storage and handling equipment and practices while conducting facility and job site audits.

Supervisors are responsible for ensuring that only employees trained and qualified will operate materials handling equipment.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

Employees are responsible for requesting/selecting the appropriate materials handling equipment for the task to be performed.

Employees are responsible for performing daily pre-shift checks to ensure the safe operation of materials handling equipment.

Employees will report all defective equipment to their supervisors.

Employees must report any observed unsafe act or condition relating to materials storage and handling to their immediate supervisor. Employees will attend training on the proper way to handle and store materials specific to their operation. This may also include mechanical equipment training.

Employees will place materials only in the area designated for such storage.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training. Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased material handling equipment complies with current safety regulations.

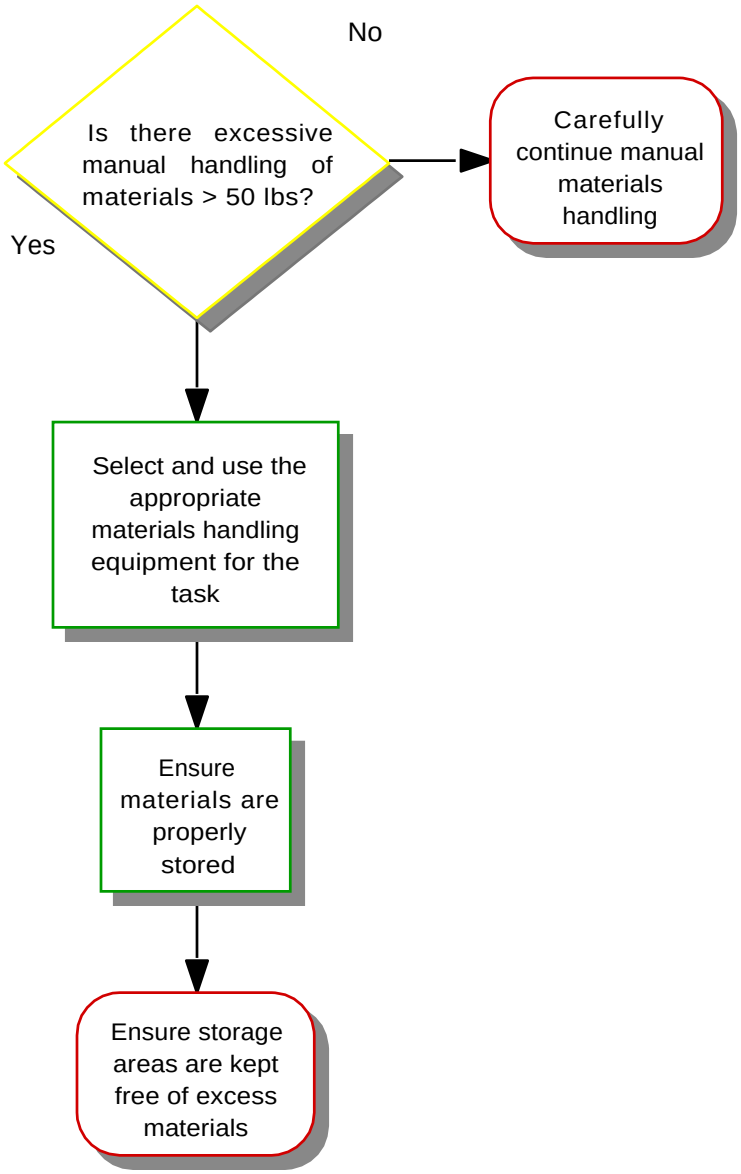
Safety and Loss Control will periodically inspect and report to supervisors any deficiencies observed that relate to material handling and storage in facilities or job sites.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Equipment Unit

Central Equipment Unit will support Divisions/Units with the selection and purchase of mechanical equipment necessary to move stored materials.

Materials Handling Flowchart



APPENDIX A: Manual Handling Equipment Guidelines

Bars
Remember to position your body to avoid materials which may slip or fall.

Dollies
Load materials evenly on dollies to prevent tipping and view obstruction. Push rather than pull dollies, unless specially designed to be pulled.

Hooks
Hooks should be used in a manner so as not to glance off hard objects. Store hooks in a safe place and maintain them in a ready to use condition.

Jacks
Use a jack properly rated for the load. Place the jack on a level, stable, and clean surface. Avoid metal-to-metal contact (jack to surface being lifted) by using wooden shims. Block the load after the jack lift.

Rollers
Keep hands and feet away from pinch points and make sure that rollers extend beyond the load.

Two wheel trucks
Select trucks with widely spaced wheels to prevent overloading. Use knuckle guards to protect hands from contact. Make sure that hand trucks are in a vertical position when not in use.

APPENDIX B: Forklift (Lift Truck) Accident Prevention Checklist

YES	NO	
		System Evaluation
☐	☐	Operators Trained?
☐	☐	Production speed evaluated?
☐	☐	Trucks properly maintained?
☐	☐	Drivers' skills/trucks matched?
☐	☐	Truck tools/attachments/accessories available?
☐	☐	Age/Condition of trucks considered?
		Operational Requirements
		Operating speed controlled?
☐	☐	Proper loading practices?
☐	☐	Alerting workers of trucks' presence?
☐	☐	Proper backing/turning?
☐	☐	Proper lifting practices?
☐	☐	Prohibiting unauthorized operators/riders?
☐	☐	Communication with co-workers while performing shared tasks?
☐	☐	General attentive operation?
☐	☐	Servicing of trucks?
☐	☐	Blocking wheels on semitrailers/railroad cars?
☐	☐	General prohibition of unsafe behavior?
☐	☐	Parking of trucks?
☐	☐	
		Worksite Characteristics
		Sufficient width of travel lanes?
		Travel lanes uncluttered?
☐	☐	Visibility/warnings at intersections/doors?
☐	☐	Environmental conditions considered (noise, fumes, gases, dusts,
☐	☐	lighting)?
☐	☐	Restriction of personnel in travel lanes?
		Traffic patterns controlled?
☐	☐	Driving on level/nonslippery surfaces?
☐	☐	
☐	☐	**Load Characteristics**
		Proper palleting?
		Weight of loads?
☐	☐	Condition of pallets and skids?
☐	☐	Stable loads/good visibilility?
☐	☐	
☐	☐	

Appendix B: Forklift (Lift Truck) Accident Prevention Checklist (Continued) 2

Truck Condition

YES	NO	
☐	☐	Are the following items in good repair, and/or in good condition, and have good design characteristics:
☐	☐	Brakes?
☐	☐	Transmission, clutch, and shift linkage?
☐	☐	Mirrors with unobstructed vision?
☐	☐	Operating controls?
☐	☐	Steering?
☐	☐	Minimal leaks (hydraulic, gas, oil, transmission, brakes)?
☐	☐	Operation of safety features?
		Acceptable emissions from truck?

APPENDIX C: Hoist Safe Use Recommendations

Design and Operating Conditions

- Supply hoists specifically designed to handle the maximum anticipated loads. Require the posting of safe load capacity charts and safe operating procedure on each hoist.
- Confirm that all hoists are properly installed and tested prior to initial use. Make certain that hoist supports have an adequate design factor for the maximum loads to be imposed (including the weight of hoists and rigging).
- Place hoists in a reasonably unobstructed area and away from personnel traffic areas. Do not allow workers under loads during any lift or movement.
- Perform regular inspection, testing, maintenance, and needed repair.
- Authorize only trained and experienced personnel to operate hoists, conduct hitching (rigging), and give load lift and movement signals.

Operator Control

- Inspect and test hoist operating systems, including transport, controls, limit switches, hoist ropes and chains, and brake functions.
- Determine the weight of the load to be lifted keeping within structural and stability limitations.
- Make sure that the hoist and load hitch are centered above the load.
- Ensure that load attachments are secure and within capacity prior to the lift.
- Select in advance the load travel path, paying particular attention to personnel and fixed obstacles.
- Check to be certain that rigging and signaling personnel and others are away from the load when it is being lifted or moved.
- Make smooth lifts and movements of loads; avoid abrupt movements which may cause a load to fall.
- Report all equipment, structural, or functional problems.
- Have regular inspections, testing, lubrication, maintenance, and repairs performed.

APPENDIX D: Materials Storage Guidelines

Warehouse Storage

When planning materials storage, make sure materials do not obstruct fire alarm boxes, sprinkler system controls, sprinkler heads, fire extinguishers, first-aid equipment, lights, and electric switches. All exits and aisles must be kept clear at all times and shall be appropriately marked.

No Smoking signs must be posted where necessary throughout the warehouses. Maximum safe load limits of floors within buildings and structures, in pounds per square foot, shall be conspicuously posted in all storage areas, except for floors or slabs on grade. Maximum safe loads shall not be exceeded.

Open Yard Storage

Plan open yard storage to have driveways between and around combustible storage piles at least 15 feet wide and maintained free from accumulation of rubbish, equipment, or other materials. Driveways should be spaced so that a maximum grid system unit of 50 feet is produced. Combustible materials must be piled with due regard to the stability of piles and no higher than 20 feet.

Lumber

For outdoor storage of lumber, firm ground without yielding soil must be selected. The area must be well-drained to remove surface water and prevent softening of the ground. A periodic check should be made to determine if there is any shifting of materials.

For long-time piling, substantial bearings or dunnage is recommended. Concrete with spread footing extending below the frost line is a good method.

For temporary piling, heavy timbers may be used to support the cross-pieces. This type of support must be inspected periodically for deterioration which may cause the pile to list dangerously.

If lumber must be moved manually to or from a higher pile, the pile must be not more than 16 feet high and safe means of access to the top, such as a ladder, must be provided. Tie pieces are needed not only to stabilize the pile, but also to provide air circulation. Tie pieces must not extend into walkways, but are to be cut flush with the pile.

APPENDIX D: Materials Storage Guideline (Continued) 2

Bagged Material

Bagged material must be cross-tied with the mouths of the bags toward the inside of the pile. When the pile is 5 feet high, it must be stepped back one row for each additional 3 feet of height. A pile of sacks must never be undermined by the removal of sacks from lower rows.

Pipes and Bar Stock

Pipes and bar stock must be stored on specially designed skills or racks and shall be safely blocked to prevent rolling or spreading. When moving these materials, employees should work from the end of the pile as much as possible. Employees must be instructed never to attempt to stop rolling or sliding pipes or bar stock.

Sheet Metal

Sheet metal must be handled with hand leathers, leather gloves or gloves with metal inserts. All bundles must be separated by strips of wood to facilitate handling when the material is needed for production and to lessen chances of shifting or sliding of the piles of material.

Brick and Masonry Blocks

Brick stacks shall not be more than 7 feet in height. When a loose brick stack reaches a height of 4 feet, it must be tapered back 2 inches in every foot of height above the 4-foot level.

Brick must never be stacked for storage purposes on scaffolds or runways. This does not prohibit normal supplies on bricklayers' scaffolds during actual bricklaying operations.

Masonry blocks should be limited to a stacked pile height of 6 feet. If blocks are stacked higher that 6 feet, the stack shall be tapered back one-half block per tier above the 6-foot level.

APPENDIX E: Facility Handling and Storage Checklist

General Requirements

Yes	No	
☐	☐	• Are fire alarm boxes, sprinklers, sprinkler system controls, fire extinguishers, first-aid equipment, lights, electrical switches and fuse boxes blocked by stored materials?
☐	☐	• Are non-compatible materials stored in separate locations? (Example: Corrosives stored away from metal containers of combustible liquids.)
☐	☐	• Are all aisles and passageways in good repair and free from obstacles that stretch across or in the path of employees or equipment?
☐	☐	• Are permanent aisles and passageways marked with white lines?
☐	☐	• Are exits free from obstacles and stored materials? (Check the exterior of the building to ensure that exit doors are not blocked by equipment or stored materials.)
☐	☐	• Are ramps available to ensure the safe movement of equipment between two working levels?

Clearances

☐	☐	• Is there a minimum clearance of 18 inches available between nonflammable stored materials and sprinkler heads?
☐	☐	• Is there a minimum clearance of 36 inches available between flammable stored materials and sprinkler heads?
☐	☐	• Are passageways and/or aisles at least 3 feet wider than the widest equipment used to move stored materials?
☐	☐	• Are material stacks over 5 feet high stepped back an additional row for each additional 3 feet in height of material?
		• Are clearance heights posted and visible to equipment operators?

Employee Behavior

- Are employees storing materials in the correct locations, using the proper equipment, and following safe operating procedures?

APPENDIX F: Job Site/Yard Evaluation Checklist

Yes	No	
☐	☐	**General**
☐	☐	• Is the jobsite neat and orderly?
☐	☐	• Are materials stored in tiers, secured by blocks, interlocking or other means suitable to prevent the stack from sliding, falling or collapsing?
☐	☐	• Are employees working in silos, hoppers, tanks or other similar areas trained in Confined Space Entry?
☐	☐	• Is vegetation controlled by mowing or by using herbicide?
☐	☐	• Is space provided between stockpiled materials to allow equipment and/or personnel to safely access materials?
☐	☐	**Pipe Storage**
☐	☐	• Are stockpiles of pipe stored in pyramid stacks? (Stack heights shall be limited to 6 feet.)
☐	☐	• Are pipe stacks secured from spreading by blocks or other similar restraining methods? (Blocking shall be done after the first course of pipe is placed.)
		• Are employees allowed to stand on the stack or around the base of the stack while equipment is placing or removing materials from the stockpile?
☐	☐	**Masonry Storage**
☐	☐	
☐	☐	• Are brick bundles stacked by mechanical equipment limited to 7 feet?
☐	☐	• Are loose brick stacked above 4 feet stepped back 2 inches for every additional 1 foot of height?
☐	☐	• Are blocks stacked above 6 feet stepped back by 1/2 block for every additional row over 6 feet?
☐	☐	• Are bricks or blocks stored for long periods on scaffolding?
☐	☐	**Lumber**
		• Are all nails removed from used lumber before being stockpiled?
		• Are lumber stockpiles below 16 feet in height?
		• Are lumber stockpiles secured by blocks or interlocking to prevent the pile from tilting or collapsing?

APPENDIX F: Job Site/Yard Evaluation Checklist (Continued) 2

Straw Bails

Yes	No	
☐	☐	• Are straw bales tiered, interlocked, and secured to prevent the materials from spreading or collapsing?
☐	☐	• Are straw bales stored in partially open or well-ventilated facilities to prevent the explosion of dust particles?
☐	☐	• Are straw bales stored at least 3 feet from any electrical outlet or light fixture?
		• Are No Smoking or Open Flame signs posted around the perimeter of the facility storing hay bales?

Rim Wheels SPP# 1910.177

Quick Reference

1.0 Purpose

The purpose of this safety and procedure is to establish guidelines and accountability for servicing Rim Wheels. Through implementation of this safety policy and procedure, injuries to North Carolina Department of Transportation (NCDOT) employees can be prevented.

2.0 Scope and Applicability

Rim wheels are an assemblage of tire, tube, and wheel components that are installed on NCDOT vehicles. If certain precautions are not followed, explosive separation or the sudden release of pressurized air may propel projectiles of rim wheel components. The number of workers exposed to tire and rim related hazards is increasing as NCDOT continues to add to its fleet of motor vehicles and rubber-tired equipment.

This safety policy and procedure provides guidelines for servicing rim wheels by identifying training, equipment, and procedures to be used by NCDOT employees who service multi-piece and single-piece rim wheels.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control, within NCDOT.

This safety policy and procedure affects employees in the equipment shops who service single or multiple rim wheels.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.177).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, all NCDOT employees who service Rim Wheels will be furnished with the equipment, tools and training necessary to safely perform their duties. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Rim Wheels will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Rim Wheels. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT’s safety policy and procedure on Rim Wheels.

6.1 Definitions

Barrier
A fence, wall, or other structure placed between a single piece wheel and an employee during tire inflation that can contain the rim wheel components in the event of sudden release of the contained air in the single piece rim wheel.

Charts
Posters that are available from the United States Department of Labor, Occupational Safety and Health Administration, titled, "Dismounting and Mounting Procedures for Truck/Bus Tires," or from the National Highway Traffic Safety Administration (NHTSA) titled, "Dismounting and Mounting Procedures Truck/Bus Tires" and "Multi-Piece Rim Matching Chart," or any other poster which contains at least the same instructions, safety precautions, and other information contained in the charts that is applicable to the types of wheels being serviced.

Installing and Removing
The transfer and attachment of an assembled rim wheel onto a vehicle axle hub. Removal means the opposite.

Multi-Piece Rim Wheel
A wheel consisting of two or more parts, one of which is a side-locking ring designed to hold the tire on the wheel by interlocking components when the tire is inflated.

Restraining Device
An apparatus such as a cage, rack assemblage of bars, and other components that will contain all rim wheel components during the sudden release of the contained air of single piece rim wheel.

Rim Manual
A publication containing instructions from the manufacturer or other qualified organization for correct mounting, dismounting, maintenance, and safety precautions specific to the type of wheel being serviced.

Rim Wheel
An assemblage of tire, tube, and liner (where appropriate) and wheel components.

Service Area
That part of an employer's premises used for the servicing of rim wheels or any other place where an employee services rim wheels.

Service or Servicing
The mounting and dismounting of rim wheels and related activities such as inflating deflating, installing, removing, and handling.

Single-Piece Rim Wheel
The assemblage of single piece rim wheel with the tire and other components.

Single Piece Wheel
A vehicle wheel consisting of one part, designed to hold the tire on the wheel when the tire is inflated.

Trajectory
Any potential path or route that a rim wheel component may travel during an explosion separation or the sudden release of the pressurized air, or an area at which

an airblast from a single piece rim may be released. The trajectory may deviate from paths which are perpendicular to the assembled position of the rim wheel at the time of separation or explosion.

Wheel
That portion of a rim wheel which provides the method of attachment of the assembly to the axle of a vehicle and also provides the means to contain the inflated portion of the assembly (i.e., the tire and/or tube).

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Tire Restraining Device (Cage)
- Air-Line Assembly
- Charts and Rim Manuals
- Tools
- Wheel Component Acceptability
- Safe Operating Procedure

6.2.1 Training

All employees who service multi-piece and single-piece rim wheels shall be trained in and be able to demonstrate the following:

- The hazards involved in servicing rim wheels
- The correct procedure to follow for the specific rim wheel type being serviced
- How to use the restraining device (cage) and inspect it for damage that would remove it from service
- The type of air line assembly required to remain outside of the trajectory

Refresher training shall be provided at the discretion of the supervisor. Appendix A presents a checklist for tire safety training.

6.2.2 Tire Restraining or Barrier Device (Cage)

A restraining device (cage) capable of withstanding 150% of the maximum tire specification pressure for the type of rim wheel being serviced will be provided. This cage will be capable of containing all parts of the tire or rim in the event of an explosion or separation. The maximum tire specification should be conspicuously posted on this equipment.

All restraining devices shall be inspected prior to each day's use or after any explosion or separation. If inspection of the cage reveals any of the following defects it must be removed from service immediately:

- Cracked welds
- Bent components that alter the structural integrity or ability of the cage to contain exploding rim or tire parts
- Pitting of components due to corrosion

Restraining devices or cages removed from service may not be used until repairs have been made and the cage has been reinspected. Component replacement or welding of structural members must be certified by the manufacturer or a Registered Professional Engineer before it may be returned to service.

6.2.3 Air-Line Assembly

An air-line assembly consisting of the following components must be used when inflating tires:

- A clip-on chuck
- An in-line valve with a pressure gauge or a pre-set regulator
- A sufficient length of hose between the clip-on chuck and the in-line valve to allow the employee to stand outside the trajectory

6.2.4 Charts and Rim Manuals

Current charts or rim manuals containing instruction for the type of wheels being serviced shall be available in the service area.

6.2.5 Tools

Only tools recommended in the rim manual for the type of wheel being serviced are to be used when servicing rim wheels.

6.2.6 Wheel Component Acceptability

Multi-piece wheel components shall not be interchanged except as provided in the charts or in the applicable rim manual.

Multi-piece wheel components and single-piece wheels shall be inspected prior to assembly. Any wheel or wheel component which is bent out of shape, pitted from corrosion, or broken or cracked shall be tagged out of service and removed from the service area. Damaged or leaky valves shall be replaced as well.

Prior to mounting and inflation the following items shall be cleaned and free from any dirt, surface rust, scale, loose or flaked rubber:

- Rim Flanges
- Rim Gutters
- Rings
- Bead seating surfaces
- Bead areas of tires

The size (bead diameter and tire/wheel widths) and type of both the tire and the wheel shall be checked for compatibility prior to assembly of the rim wheel.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of equipment, tools, and training necessary to service rim wheels in their areas. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities associated with this safety policy and procedure.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors. They are also responsible for conducting employee training and coordinating any additional training needs through their managers/unit heads.

Supervisors will audit for compliance with this safety policy and procedure during their Facility and Jobsite Audits. Supervisors will periodically inspect restraining devices, air-line assemblies, and tools as well as check for the availability of posted rim charts and rim manuals during facility and work site audits.

Supervisors will ensure that employees are provided with PPE as necessary for their job.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

Employees will attend training on safe operating procedure for servicing multi-piece and single-piece rim wheels.

Employees will wear all the required PPE when servicing rim wheels. Employees must report any suspected damage to restraining devices (cages) as well as report any tire explosion or separation within the restraining devices.

Employees must follow the safe operating procedure for servicing rim wheels.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training. Safety and Loss Control will work with Purchasing and Central Equipment Unit to ensure that all newly purchased rim wheel service equipment comply with current safety regulations and this safety policy and procedure.

Safety and Loss Control will periodically inspect and report to supervisors any deficiencies found in the restraining devices, air-line assemblies, tools, rim charts, rim manuals, and procedures for servicing rim wheels.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Equipment Unit

Central Equipment Unit will ensure that restraining devices acquired by NCDOT will meet the specifications required in this safety policy and procedure.

Central Equipment Unit will support Divisions/Units with the selection, purchase, and modification of restraining devices, air-line assemblies, and tools necessary to service rim wheels.

Central Equipment Unit will maintain training videos from tire rim manufacturers as well as rim wheel manuals for reference guides.

Central Equipment Unit will perform Rim Wheel training in conjunction with Safety and Loss Control at the request of managers/unit heads.

APPENDIX A: Checklist for Tire Safety Training Compliance

Equipment Shop:_____

Employee's Name:_____

Social Security #:_____

Has the OSHA-required training been completed in the following categories?

Topic covered under 1910.177	Completion Date	Trainer's/Supervisor's Signature	Employee's Initial
Rim Wheel Hazards			
Safety Procedures			
Procedure for Tire Wheel			
Safe Operating Procedures			
Chart Data			
OSHA Reg. 1910.177			

Employee demonstrates and maintains ability to service rim wheels and to perform the following tasks safely	Completion Date	Trainer's/ Supervisor's Signature	Employee's Initial
Dismounting tires includes deflation			
Inspect and identify rim wheel components			
Mounting tires includes inflation with restraining device and other equipment			
Use of restraining device or barrier and other equipment			
Handling of rim wheels			
Inflating a tire when a 1-piece rim wheel is mounted on a vehicle			
Installation and removal of rim wheels			
Employee demonstrates an understanding of the necessity to stand out of the trajectory both during inflation and inspection of rim wheels after inflation			

Slings SPP# 1910.184

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish the methods and guidelines for the safe use of slings throughout the North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

Slings, a component of hoisting and rigging systems, are used to lift and move loads. In NCDOT, alloy steel chain, wire rope, natural and synthetic fiber rope, and synthetic web slings are typically used. Slings are capable of lifting tremendous loads.

This safety policy and procedure provides guidelines for implementing an effective safe sling use program. It includes provisions for training, recognizing the types of slings used in NCDOT, understanding the attachments used with slings, and inspecting slings. Additionally, it presents information on sling repair requirements and subsequent removal from service.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects any employee who uses slings and sling products to lift, secure, and move loads.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.184).

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, to minimize and eliminate material lifting hazards, properly rated slings that are not damaged or defective will be used in NCDOT. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Slings will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on Slings. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition of equipment to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Slings.

6.1 Definitions

Angle of Loading
The inclination of a leg or branch of a sling measured from the horizontal or vertical plane.

Basket Hitch
A sling configuration whereby the sling is passed under the load and has both ends, end attachments, eyes or handles on the hook or a single master link.

Braided Wire Rope
A wire rope formed by plaiting component wire ropes.

Bridle Wire Rope Slings
A sling composed of multiple wire rope legs with the top ends gathered in a fitting that goes over the lifting hook.

Cable-Laid Endless Sling - Mechanical Joint
A wire rope sling made endless by joining the ends of a single length of cable-laid rope with one or more metallic fittings.

Cable-Laid Grommet - Hand-Tucked
An endless wire rope sling made from one length of rope wrapped six times around a core formed by hand-tucking the ends of the rope inside the six wraps.

Cable-Laid Rope
A wire rope composed of six wire ropes wrapped around a fiber or wire rope core.

Cable-Laid Rope Sling - Mechanical Joint
A wire rope sling made from a cable laid rope with eyes fabricated by pressing or swagging one or more metal sleeves over the rope junction.

Choker Hitch
A sling configuration with one end of the sling passing under the load and through an end attachment, handle or eye on the other end of the sling.

Coating
An elastomer or other suitable material applied to a sling or to a sling component to impart desirable properties.

Designated Person
A selected or assigned employee who is qualified to perform specific duties.

Equivalent Entity
A person or organization (NCDOT) which by possession of equipment, technical knowledge, and skills can perform with equal competence the same repairs and tests as the person or organization with which it is equated.

Female Handle
A handle with an eye and a slot of such dimension as to permit passage of a male handle thereby allowing the use of a metal mesh sling in a choker hitch.

Handle
A terminal fitting to which metal mesh fabric is attached.

Handle Eye
An opening in a handle of a metal mesh sling shaped to accept a hook, shackle or other lifting device.

Hitch
A sling configuration whereby the sling is fastened to an object or load either directly to it or around it.

Link
A single link of chain.

Male Handle
A handle with a handle eye.

Master Coupling Link
An alloy steel welded coupling link used as an intermediate link to join alloy steel chain to master links.

Master Link
A forged or welded steel link used to support all members (legs) of an alloy steel chain sling or wire rope sling.

Mechanical Coupling Link
A non-welded mechanically closed steel link is used to attach master links or hooks to alloy steel chain.

Proof Load
The load applied to test strength of equipment.

Proof Test
A nondestructive tension test performed by the sling manufacturer or an equivalent entity to verify construction and workmanship of a sling.

Rated Capacity
The working load limit or the maximum load to which equipment will be subjected.

Reach
The effective length of an alloy steel chain sling measured from the top bearing surface of the upper terminal component to the bottom bearing surface of the lower terminal component.

Selvage Edge
The finished edge of synthetic webbing designed to prevent unraveling.

Sling
An assembly which connects the load to the material handling equipment.

Sling Manufacturer
A person or organization that assembles sling components into their final form for sale to users.

Strand-Laid Rope
A wire rope made with six or eight strands wrapped around a fiber core, wire strand core, or independent wire rope core.

Vertical Hitch
A method of supporting a load by a single vertical part or leg of the sling.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Slings
- Attachments
- Inspections
- Repairs
- Removal from Service

6.2.1 Training

Employees who use slings will be trained in:

- Types of slings
- Applications and limitations of the various types of slings
- Inspection procedures for slings
- Removal of slings from service

These employees will be trained upon initial employment or upon new job assignment. Subsequent training will be determined by employee's supervisor.

6.2.2 Slings

Several types of slings are used throughout NCDOT and include:

- Alloy Steel Chain Slings
- Wire Rope Slings
- Natural and Synthetic Fiber Rope Slings
- Synthetic Web Slings

Sling selection for a particular task is based on:

- Rated capacity of the sling
- Nature of the task
- Amount of weight required to be lifted, hoisted or moved

The user should determine that the sling is being used in accordance with rated capacity as listed in the manufacturer's catalog. See Appendix A for slings' safe operating practices.

The alloy steel chain, wire rope and fiber rope slings are typically used where sling damage to the load is not critical. Synthetic web slings are ideal where sling damage to a load is not acceptable.

Alloy chain slings will have permanent identification affixed to the sling indicating the size, grade, rated capacity, and reach of the sling. Untagged slings will be removed from service. Alloy steel chains and chain slings should not be heated above 600 degrees after being received from the manufacturer.

Wire rope slings are illustrated in Figure 1. They must be proof-tested by the manufacturer to ensure quality. A certificate verifying rated capacity will accompany each wire rope sling. This certificate will be available for review.

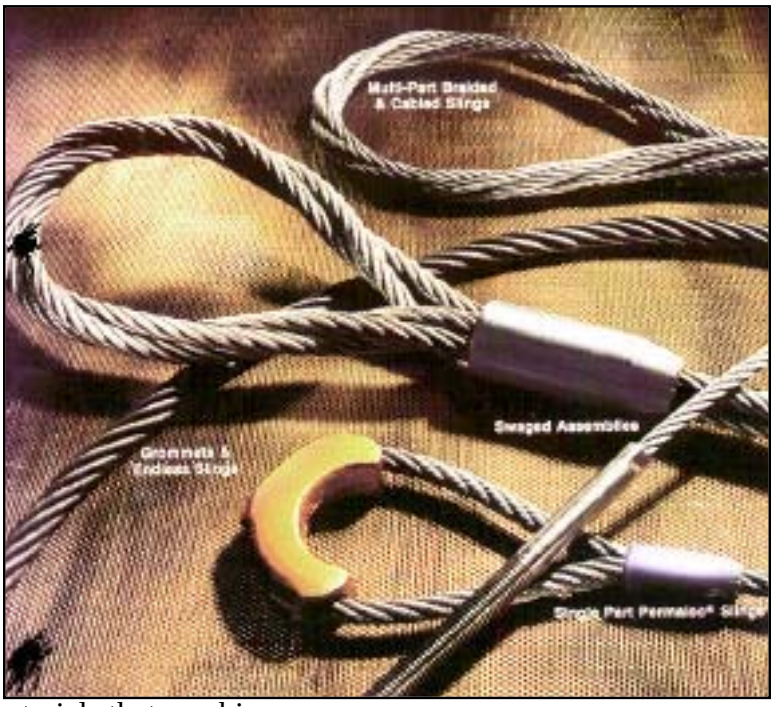


Figure 1

The natural and synthetic fiber rope slings are other alternative materials that combine strength with ease of handling. If splices are used in natural and synthetic fiber rope slings, several design requirements have to be met. See Appendix B for details.

Synthetic web slings are illustrated in Figure 2. They must be marked or coded to show the rated capacities for each type of hitch, type of web

material, and manufacturer. Additionally, synthetic web slings must not be exposed to fumes, vapors, sprays, mists, liquid acids, liquid phenolics, or liquid caustics.

Figure 2

6.2.3 Attachments

All attachments including hooks, rings, oblong links, pear shaped links, and welded link components will be rated at least at the capacity of the sling itself. Makeshift links or other shop fabricated attachments will not be used. Slings twisted more than 10 degrees from the plane of the unbent hook will not be used.

6.2.4 Inspections

Slings will be inspected each day prior to use. Any visual defect will be reported. Damaged slings will not be used. In severe conditions (e.g., temperature, corrosion, etc.), slings will be inspected throughout the day.

Alloy chain slings will be inspected every six months by a supervisor or designated employee for wear and defects in composition and welds. This inspection will consider not only the physical aspects, but also the total service life of the slings. This inspection will be recorded and maintained on file with the date of the inspection and name and signature of the employee performing the inspection.

Appendices C through F present inspection procedures and forms for wire rope, wire rope slings, chains, and chain slings. These detailed procedures and forms provide an effective way to inspect and document the condition of slings in your facilities.

6.2.5 Sling Repair

Slings must be in good condition and not damaged or defective to ensure safe and reliable use. If slings are worn, damaged or defective they shall not be used. If the slings are believed to be repairable, then those slings will be

returned to the sling manufacturer for repairs. The manufacturer must proof-test all repaired slings before they are accepted for reuse. Under no circumstances will employees attempt to repair slings for reuse.

Broken links or attachments on steel alloy chain slings will not be repaired using mechanical coupling links. Additionally, any sling with temporary repairs will not be used.

6.2.6 Removal From Service

If slings are damaged or defective, they shall not be used. Until repairs are made on defective or damaged slings, they will be removed from service. If these slings are not repairable, they will be permanently removed from service. Appendix G lists the conditions that must be present to remove any sling from service.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring adequate funds are available for the purchase of chains and slings for their areas.

They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also audit their safe sling use program to ensure effective implementation with this safety policy and procedure.

6.3.2 Supervisors

Every six months, supervisors or a designated employee will inspect all slings in their work area for wear and for defects in composition and welds. Supervisors will ensure that defective or damaged slings are removed from service.

Supervisors will also ensure that employees are provided with the appropriate Personal Protective Equipment (PPE) as necessary for their job (e.g., foot, hand, or eye protection as necessary).

6.3.3 Employees

Employees shall comply with all applicable training. Additionally, employees shall report all damaged slings and/or unsafe conditions to their supervisors.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Additionally, Safety and Loss Control will assist in developing or securing the required training.

Safety and Loss Control will work with Purchasing and Central Equipment Unit to ensure that all newly purchased slings comply with this safety policy and procedure.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure the safe use of slings.

6.3.5 Central Equipment Unit

Central Equipment unit shall maintain an adequate supply of appropriate slings. Central Equipment Unit will ensure that all components are delivered with the appropriate manufacturer's certification.

APPENDIX A: Safe Sling Operation

The following procedures will be followed when using Slings:

- Slings damaged or defective will be removed from service.
- Slings will not be shortened with knots or bolts or other makeshift devices.
- Sling legs will not be kinked.
- Slings will not be loaded beyond their rated capacity.
- Slings used in a basket hitch will have the loads balanced to prevent slippage.
- Slings will be securely attached to their loads.
- Slings will be padded or protected from the sharp edges of loads.
- Suspended loads will be kept clear of obstructions.
- All employees will be kept clear of loads about to be lifted and of suspended loads.
- Hands or fingers will be kept clear of loads and not placed between the load and the strap.
- Shock loading will not be allowed.
- Slings will not be removed while loads are resting on the sling.

APPENDIX B: Natural and Synthetic Fiber Rope Slings Splices

The use of natural and synthetic fiber rope slings utilizing splices will not be used unless the following requirements for design are met:

- In manila rope, eye splices will consist of at least three full tucks, and short splices will consist of at least six full tucks, three on each side of the splice center line.
- In synthetic rope, eye splices will consist of at least four full tucks, and short splices will consist of at least eight full tucks, four on each side of the center line.
- Strand end tails will not be trimmed flush with the surface of the rope immediately adjacent to the full tucks. This applies to all types of fiber rope and both eye and short splices. For fiber rope under one inch in diameter, the tail will project at least six inches beyond the last full tuck.
- Fiber rope slings will have a minimum clear length of rope between eye splices equal to ten times the rope diameter.
- Knots will not be used in lieu of splices.
- Clamps not designed specifically for fiber ropes will not be used for splicing.
- For all eye splices, the eye will be large enough to provide an angle of not greater than 60% at the splice when the eye is placed over the load or support.

APPENDIX C: Wire Rope and Wire Rope Slings Inspection Procedure

D presents a wire rope sling inspection form. The following information is to be used as a guide for inspecting wire rope and wire rope slings. Inspection frequency should be based on safety factors, property damage, and the cost of replacing destroyed or damaged goods and material dropped due to the use or misuse of improper or damaged wire rope and slings. Additionally, slings should be inspected at regular intervals. This interval should be determined by the user and is dependent upon the particular use of the sling and NCDOT safety requirements.

A sling should be inspected after any unusual situation that may have damaged it, such as overload, accident, or fire. It should not be returned in service until continued safe operation has been verified.

Each sling should have a serial number. If no number is available, a tag should be attached at the time of inspection. This number should be listed on the inspection report.

Inspection should be performed only by persons with sufficient experience and knowledge to properly apply the criteria for rejection.

The following should be considered criteria for rejection:

- **Randomly Distributed Broken Wires in One Rope Lay**: There should be no more than 10 broken wires in one lay for the entire length of the sling.
- **Broken Wires in One Strand of One Rope Lay:** There should be no more than five broken wires in any one strand (single wire) of any one rope lay.
- **Abrasion:** There should be no wearing, scrubbing, or preening of any outside wire causing the reduction of the diameter of a single wire by more than 1/3.
- **Kinking and/or Crushing:** There should be no kinking, crushing, or other damage that results in detrimental distortion of the rope structure.
- **Bird Caging:** There should be no opening or unlaying of the rope lays nor should the fiber core of the rope be exposed.
- **Heat Damage:** There should be no evidence of heat damage including bare electrical conductor, grounding, or welding arc.
- **Corrosion:** There should be no evidence of pitting or heavy coating of rust due to corrosion.
- **Reduced Diameter:** There should not be any reduction of the diameter of the rope along the main length or of any section (overloading or contact with sharp edges of load without permission).
- **End Attachments:** There should be no evidence of cracks, deformity, excessive corrosion, or excessive wear of the fittings forming the splice or socket.
- **Hooks and Rings:** Check for throat opening (no more than 15% stretch), twist (no more than 10%), cracks (none), and corrosion.

APPENDIX D: Wire Rope Sling Inspection Form

SLING SERIAL NUMBER:_____

Date:_____ Division:_____ Location:_____

Type:_____ Size:_____ Length:_____ Load Limit:_____

WIRE ROPE	
Randomly distributed broken wires in one rope lay (10)	
Broken wires in one strand of one rope lay (5)	
Wear or scraping of outside individual wires (one-third of original diameter)	
Kinking	
Crushing	
Bird Caging	
Heat Damage	
Corrosion	

END ATTACHMENTS	
Cracked	
Deformed	
Worn	
Corrosion	

SLING HOOKS	
Check throat opening (less than 15%)	
Check twist (less than 10%)	
Check for cracks	

A check mark indicates no fault
An "x" indicates damage

Overall condition: New:_____ Satisfactory:_____ Poor:_____ Remove:_____
Date of Last Inspection:_____ Date of This Inspection:_____
Replacement Date:_____ Signature of Inspector:_____

APPENDIX E: Chain and Chain Sling Inspection Procedure

General Inspection Guidelines

A good chain and chain sling inspection program should provide more than a physical check of the chain's condition. It should be a complete recorded history of each unit.

If conditions and/or time make it impossible to write such a history, the following requirements are minimum essentials in any type of inspection program:

- Positive identification of the chain as to the material from which it is made
- Evaluation of the condition of the chain

In recent years, some manufacturers have identified their chain links with appropriate markings to help you. Some alloy slings will have the letter "A" stamped on the hook(s), or three welded dots on the top coupling link(s). After completion of identification of the chain, a proper procedure for inspection can be conducted in the following manner:

- Clean the chain so that defects may be detected more easily.
- Hang chain in a vertical position for preliminary inspection and to measure length. When this is not possible, stretch chain out on level floor with all twists removed.
- Record the serial number, current measured length, size, type, and grade of material on your work sheet--if no serial number is available, an I.D. tag should be attached that shows the size, grade, reach rate capacity, and sling manufacturer.
- Check for localized stretch or wear. Compare the new measured length with the original I.D. tag. An increase in length may be due to stretch or wear, or to a combination of both. If the new measurement is more than the original, then:

    - Lift each link from its seat and check for grooving
    - Look for:

        - Twisted and bent links
        - Cracks and welded areas (repairs)
        - Corrosion pits
        - Burned links caused by welding "stings," buss bar, or ground contacts

- Check for gouges and nicks.
- Check master links and hooks for the above faults.
- Complete inspection.
- Store chains and chain slings.

The remaining pages of Appendix E provides specific details on the chain and chain sling inspection procedure.

APPENDIX E: Chain and Chain Sling Inspection Procedure (Continued) 2

Check for Localized Stretch or Wear

It is important that an inspector realize the difference between stretch and wear. A chain with long service and frequent use will increase in length even if not overloaded. This increased length caused by wear should not be confused with stretch. It is also possible to get increased length due to stretch with little or no wear. At times there will be a combination of both conditions.

Remember that increased length due to wear is normal for a chain that has been in service for a long period of time. However, increased length due to stretch, with little or no wear, indicates a serious error in the lifting procedure.

An accurate method to check stretch or percent elongation is to evaluate the following expression:

$$E_p = \frac{(L_m - W_B) - L_i}{L_i} \times 100$$

Where:

E_p = Percent elongation

L_m = Measured inside link length

W_B = Measured bearing point wear for both ends of the link

L_i = Original (when new) inside length

Example:

L_i = 1.55"; 1/2" Alloy (when new) inside length

L_m = $1\ ^{11}/_{16}$" or 1.68" = measured inside link length

W_B = $^{1}/_{32} \times 2 = {}^{1}/_{16}$ or 0.06" = measured bearing point wear for both ends of the link

The Percent elongation = $E_p = \frac{(1.68 - 0.06) - 1.55}{1.55} \times 100 = 4.5\ \%$

Although this method will provide you with the most accurate results, difficulties may be encountered because all manufacturers vary slightly in their link lengths. This method of computation should be followed when the original length is known. Therefore, when establishing your original inspection record cards, link lengths should be recorded after measurement for all new chains placed into service. A similar procedure should be conducted on any chain added after it has been repaired.

APPENDIX E: Chain and Chain Sling Inspection Procedure (Continued) 3

Normally wear will occur primarily at the bearing points, the inside ends of the links where the adjoining links are seated. Where wear is evident, measure the cross section of the link(s) at each end. Table E-1 presents the maximum allowable wear for chain slings. If the amount of wear equals or exceeds the maximum allowable wear for that chain size, the chain should be removed.

Table E-1: Maximum Allowable Wear for Chain Slings (In Inches)

Chain Size Inches	Maximum Allowable Wear	Chain Size Inches	Maximum Allowable Wear
1/4	3/64	1	3/16
3/8	5/64	1- 1/8	7/32
1/2	3/32	1- 1/4	1/4
5/8	9/64	1- 3/8	9/32
3/4	5/32	1- 1/2	5/16
7/8	11/64	1- 3/4	11/32

Go/no-go gauges may be used to determine maximum allowable wear, but a set of calipers will enable you to obtain accurate wear figures to record on the sling history chart.

Chains that show signs of stretch or wear can be divided into four categories:

- Stretch throughout the entire length of the chain
- Localized stretch
- Combination of stretch and wear
- Wear only

Stretch Throughout the Entire Length of Chain

This can only be caused by overload. If chain is multi-legged, there is the possibility that extremely low angle lifts caused overloading. If at all possible, the angle between the chain branch and the horizontal should be no less than 30 degrees. Check the rigging handbook for applicable safe load limits for other degree of angles. Chances are that by increasing the size of your sling by one size, you will be able to avoid stretching the sling.

Localized Stretch

This differs from stretch throughout the entire length of chain because the initial load was probably below the weight which would cause permanent deformation. This condition is often caused by either choking a load at low angles or using wrapped slings on sharp corners without proper padding or other means of protection. Chains wrapped around sharp corners can cause stress to be applied to one or very few links rather than the entire length of chain. The angles of lift should be checked with applicable load figures. Efforts should be made to protect chains or sharp corners.

APPENDIX E: Chain and Chain Sling Inspection Procedure (Continued) 4

Combination of Stretch and Wear
Prime attention when considering the worn portion of the chain should be given to the length of time that the sling has been in service. If usage has been over a prolonged period of time, worn portions are probably normal and stretched links should be investigated as stated in previous paragraphs.

Wear Only
This should be investigated on the basis of severity of service, time in service, and size of sling. For very severe wear applications, it is often more economical to change to a sling made from a large diameter material.

Check for Gouges and Nicks

These chains and chain slings should be evaluated as in "Localized Stretch." There are possibilities that the chains were used on sharp corners and that padding or other means of chain protection would help. The hardness of the chain should also be checked.

Check Master Links

Check for wear and correct style. If a pear-shaped master link is used on a larger crane hook it may not seat properly if inverted. The pear-shaped master link is normally used only with a single chain sling. In most instances an oblong master link is desirable with multi-legged slings.

Completion of Inspection

Review the inspection record sheets. Information should now be available that could help reduce the number of future rejections.

Storage of Chains and Chain Slings

Chains and slings should be hung on racks in the shop. Slings must be stored properly. Short slings should be hung from adequate fixtures so that there is no possibility of kinking or corrosion from contact with the ground. Longer slings should be rolled and tied and also hung to prevent contact with the ground and to eliminate tripping hazards. If at all possible, the slings should be stored indoors. Good storage facilities will demonstrate the importance of chains and slings receiving proper care at all times.

APPENDIX F: Chain Sling Inspection Form

CHAIN SERIAL NUMBER:_____

Date:_____ Division:_____ Location:_____

Sling Type:_____ Size:_____ Reach :_____ Load Limit:_____

CHAIN	
Localized Stretch or Wear	
Grooving	
Twisted or Bent Links	
Cracks	
Gouges	
Corrosion Pits	
Burns	

MASTER LINKS AND HOOKS	
Check Master Links and hooks for any of the above faults	
Check Hook Throat Opening (less than 15%)	
Check Hook Twist (less than 10%)	

A check mark indicates no fault
An "x" indicates damage

Overall condition: New:_____ Satisfactory:_____ Poor:_____ Remove:_____
Date of Last Inspection:_____ Date of This Inspection:_____
Replacement Date:_____ Signature of Inspector:_____

APPENDIX G: Slings Removal from Service

Wire Rope Slings

Wire rope slings will be removed from service when the following conditions are present:

- Ten randomly distributed broken wires in one rope lay or five broken wires in one strand in one rope lay
- Wear or scraping on one-third the original diameter of outside individual wires
- Kinking, crushing, bird caging,or any other damage resulting in distortion of the wire rope structure
- Evidence of heat damage
- Hooks opened more than 15% of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook
- Corrosion of the rope or end attachments

Natural and Synthetic Fiber Rope Slings

Natural and synthetic fiber rope slings will be removed from service when any of the following conditions are present:

- Abnormal wear
- Powdered fiber between strands
- Broken or cut fibers
- Variations in the size or roundness of strands
- Discoloration of hardware in the sling

Synthetic Web Slings

Synthetic web slings will be removed from service when any of the following conditions are present and as shown in Figure 3 (next page):

- Acid or caustic burns
- Melting or charring of any part of the sling surface
- Snags, punctures, tears, or cuts
- Broken or worn stitches
- Distortion of fittings

APPENDIX G: Slings Removal from Service (Continued) 2

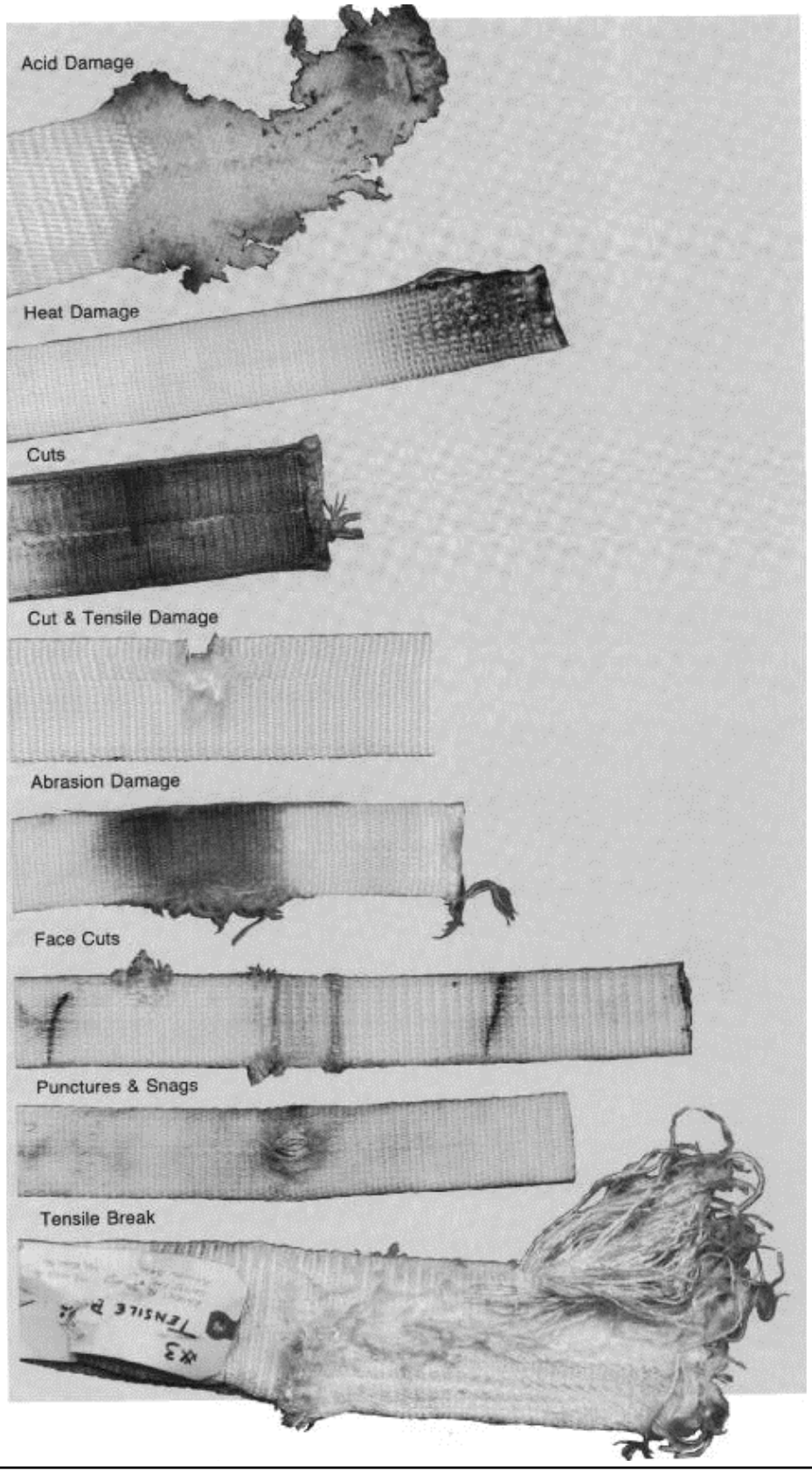


Figure 3

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Author:	Paul Roberts	Revision #:	3
Approved By:	Bobby Lewis	Date Revised:	March 2020

Select this Link to view latest Revision changes

SAFETY POLICY & PROCEDURE

Emergency Action Plan SPP# 1910.38

Quick Reference

Select this Link to view
latest Revision changes

SAFETY POLICY & PROCEDURE

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures for developing and implementing Emergency Action Plans.

2.0 Scope and Applicability

This safety policy and procedure provides guidelines to be followed when Emergencies related to medical, fire, explosion, severe weather, toxic fumes, electrical, structural failure, or threat including Active Shooter occur at any NCDOT facility.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Risk Management within NCDOT.

This safety policy and procedure affects every NCDOT employee.
Equipment Unit within NCDOT.

3.0 Reference

This safety policy and procedure is established in accordance with the Occupational Safety and Health Standard for General Industry (29CFR 1910.38) and Occupational Safety and Health Standards for Construction Industry (29 CFR1926.35) for Emergency Action Plans.

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Each NCDOT facility shall have an Emergency Evacuation and Exit Route Plan posted for fire emergency showing primary and secondary egress routes out of the facility in the event of fire. Some Units or Facilities may want to develop a formal Emergency Action Plan addressing all emergency scenarios which will be covered in this policy and procedure.

Appendix C contains an Emergency Action Plan template that may be used.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure for Emergency Action Plans at their respective facility. It is also the responsibility of each NCDOT employee to report any safety related issues to their supervisor.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure for an Emergency Action Plan.

6.1 Definitions

Area/Floor Monitors
Assigned individuals responsible for helping coordinate an orderly Evacuation Process and assisting all physically challenged employees.

Designated Responsible Officials
Individuals responsible for the personnel working at the facility.

Emergency Coordinator
Individual responsible for administering the Emergency Action Plan at the facility.

Emergency Evacuation Plan
Plan describing procedures required for employee protection from fire or other emergencies at the facility.

Exit
That portion of a means of egress from a building, structure, or worksite.

Exit Access
That portion of a means of egress which leads to an entrance to an exit.

Means of Egress
A continuous and unobstructed way of exit travel from any point in a building, structure, or worksite to a public way.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Medical Emergency
- Fire Emergency
- Bomb Threat
- Suspicious Package
- Severe Weather and Natural Disasters
  - Tornado
  - Earthquake
  - Flood
  - Hurricane
  - Blizzard
- Active Shooter
- Responding to Pandemic Exposure in the Workplace
- Training

6.2.1 Medical Emergency

Call 911 for medical emergency and provide the following information:

- Nature of medical emergency
- Location of emergency
- Your name and phone number from which you are calling
- Do not move the victim unless it is necessary.
- Have personnel trained in First Aid and CPR provide required medical assistance until arrival of EMS.

- If personnel trained in First Aid are not available, as a minimum, attempt to provide the following assistance:
    - Stop the bleeding with firm pressure on the wounds (note: avoid contact with blood or other bodily fluids).
    - Clear the air passages using back blows and abdominal thrusts in case of choking.
- In case of rendering assistance to personnel exposed to hazardous materials, consult the Safety Data Sheet (SDS) in the 3E system.
    - Wear the appropriate personal protective equipment.
    - Attempt first aid ONLY if trained and qualified.

6.2.2 Fire Emergency

When fire is discovered:

- Activate the nearest fire alarm.
- Notify the local fire department by calling 911.
- If the fire alarm is not available, notify the site personnel about the fire emergency by the following means:
    - Voice Communication
    - Phone
    - Radio
    - Any Other Means Availably at the Facility

Fight the fire ONLY if:

- The fire department has been notified.
- The fire is small and is not spreading to other areas.
- Available fire extinguishers are rated for the type of fire encountered.
- Escaping the area is possible by backing up to the nearest exit.
- Fire extinguishers are in working condition.
- Personnel are trained to use them.

Upon being notified about the fire emergency, occupants shall:

- Leave the building using the designated evacuation routes. Know your primary exit and your alternate exit. If you are away from your normal work area, go to the nearest exit.
- Assemble in the designated area for your unit
- Remain outside until the competent authority announces that it is safe to reenter.

Supervisors and/or Area/Floor Monitors shall:

- Coordinate an orderly evacuation of personnel closing all doors as you go.
- Perform an accurate head count of personnel reported to the designated area.
- Determine a rescue method to locate missing personnel.
- Provide Fire Department personnel with the necessary information about the facility.
- Ensure that all employees have evacuated the area/floor.
- Report any problems to the Fire Department at the assembly area.

- Provide assistance to all physically challenged employees in emergency evacuation.

6.2.3 Extended Power Loss

In the event of extended power loss to a facility certain precautionary measures should be taken:

Electrical equipment:

Electrical equipment and appliances should be turned off. If power restoration would surge causing damage and possibly fire to electronics and effecting sensitive equipment, equipment should be placed in the "Off" or "Standby" positions.

Facilities experiencing freezing temperatures: (Coordinate with the landlord)

- Coordinate with Facilities Maintenance personal.
- For leased facilities, contact the Landlord.

Upon Restoration of heat and power:

- Electronic equipment should be brought up to ambient temperatures before energizing to prevent condensate from forming on circuitry.
- For NCDOT facilities, fire and potable water piping should be checked for leaks from freeze damage after the heat has been restored to the facility and water turned back on.

Elevator mishap:

- If someone gets stuck in the elevator, call 911 and then the landlord, to get them free.
- Do not attempt to pry doors open and rescue occupants! A fall to a lower level could result in a fatality.

6.2.4 Telephone Bomb Threat

Person receiving call should:

- Listen – Do not interrupt caller. Keep caller on the phone if possible.
- If possible, alert Site Coordinator by a prearranged signal while the caller is on the line.
- Notify supervisor immediately after completing the call.
- **Complete bomb threat checklist, Appendix A.**

Site Supervisors:

- **Notify police department using 911.**
- **Notify:**
  - NCDOT Security
  - Building landlord if at leased facility
- Assist responding police officials.
- Coordinate a search of the premises.
- Do not turn on or off any electrical machine switch.

6.2.5 Suspicious Package

Person receiving the package shall:

- Not open the package.
- Not bend, squeeze or drop the package.
- Put the package in a safe secure place, away from other personnel.
- Call 911.
- Notify supervisor, Safety & Risk Mgmt. & Security.

Things to look for:

- Foreign mail, air mail and special delivery
- Restrictive markings such as: "Confidential" or "Personal"
- Excessive postage
- Handwritten or poorly- typed addresses
- Incorrect titles
- Titles, but no names
- Misspelling of common names
- Oily stains or discoloration
- No return address
- Excessive weight and unevenly distributed or lopsided
- Rigid envelope less flexible than normal letters
- Protruding wires or tin foil
- Excessive securing material such as masking tape, string, etc.
- Visual distractions, misleading statements as being "Official"
- Edges are normally sharp, not rounded
- **See Appendix B: Suspicious Package Handout**

6.2.6 Severe Weather and Natural Disasters

Supervisors shall perform weather assessment and coordinate office emergency closing procedures.

Tornado:

- When a warning is issued seek inside shelter. DO NOT LEAVE THE BUILDING OR GO OUTSIDE FOR A TORNADO.
- Consider the following:
  - Small interior rooms on the lowest floor and without windows,
  - Hallways on the lowest floor away from doors and windows, and
  - Rooms constructed with reinforced concrete, brick, or block with no windows.
- Stay away from outside walls and windows.
- Use arms to protect head and neck.
- Remain sheltered until the tornado threat is announced to be over.

Earthquake:

- Stay calm and await instructions from the Emergency Coordinator or the designated official. DO NOT TRY TO RUN TO ANOTHER ROOM just to get under a table. DO NOT LEAVE THE BUILDING AND GO OUTSIDE DURING AN EARTHQUAKE.
- Keep away from overhead fixtures, windows, filing cabinets, and electrical power.
- Assist people with disabilities in finding a safe place.
- Evacuate as instructed by the Emergency Coordinator and/or the designated official.
- Specifically use: Drop, Cover and Hold On under table or desk.

Flood:

If indoors:

- Be ready to evacuate as directed by the Emergency Coordinator and/or the designated official.
- Follow the recommended primary or secondary evacuation routes.

If outdoors:

- Climb to high ground and stay there.
- Avoid walking or driving through flood water.
- If car stalls, abandon it immediately and climb to a higher ground.

Hurricane:

The nature of a hurricane provides for more warning than other natural and weather disasters. A hurricane watch issued when a hurricane becomes a threat to a coastal area. A hurricane warning is issued when hurricane winds of 74 mph or higher, or a combination of dangerously high water and rough seas are expected in the area within 24 hours.

Once a hurricane watch has been issued:

- Stay calm and await instructions from the Emergency Coordinator or the Designated official.
- Continue to monitor local TV and radio stations for instructions.
- Move early out of low-lying areas or from the coast, at the request of officials.
- If you are on high ground, away from the coast and plan to stay, secure the building, moving all loose items indoors and boarding up windows and openings.
- Collect drinking water in appropriate containers.

Once a hurricane warning has been issued:

- Be ready to evacuate as directed by the Emergency Coordinator and/or the designated official.
- Leave areas that might be affected by storm tide or stream flooding.

During a hurricane:

- Remain indoors and consider the following:
  - Small interior rooms on the lowest floor and without windows,
  - Hallways on the lowest floor away from doors and windows, and
  - Rooms constructed with reinforced concrete, brick, or block with no windows.

Blizzard:

If indoors:

- Stay calm and await instructions from the Emergency Coordinator or the designated official.
- Stay indoors!
- If there is no heat:
  - Close off unneeded rooms or areas.
  - Stuff towels or rags in cracks under doors.
  - Cover windows at night.
- Eat and drink. Food provides the body with energy and heat. Fluids prevent dehydration.
- Wear layers of loose-fitting, lightweight, warm clothing, if available.

If outdoors:

- Find a dry shelter. Cover all exposed parts of the body.
- If shelter is not available:
  - Prepare a lean-to, wind break, or snow cave for protection from the wind.
  - Build a fire for heat and to attract attention. Place rocks around the fire to absorb and reflect heat.
  - Do not eat snow. It will lower your body temperature. Melt it first.

If stranded in a car or truck:

- Stay in the vehicle!
- Run the motor about ten minutes each hour. Open the windows a little for fresh air to avoid carbon monoxide poisoning. Make sure the exhaust pipe is not blocked.
- Make yourself visible to rescuers.
  - Turn on the dome light at night when running the engine.
  - Tie a colored cloth to your antenna or door.
  - Raise the hood after the snow stops falling.
- Exercise to keep blood circulating and to keep warm.

6.2.7 Active Shooter

An active shooter is a person or group of persons determined to engage in killing or attempting to kill people. Active shooter situations are unpredictable and evolve quickly.

The threat of indiscriminate violence hasn't diminished in recent times. That's why active shooter preparedness is vital to limit the casualties resulting from an individual or group who is intent on killing or harming as many as possible.

The perpetrator(s) may be familiar to you, such as a disgruntled employee or strangers, such as terrorists. Many times, they are unconcerned with their own safety and may even seek their own death to show their commitment to their cause.

Follow these simple steps to be safe:

6.2.8 Responding to Pandemic Exposure in the Workplace

Notification (Telework Appropriate)

1. Supervisor notified of potential / confirmed diagnosis
2. Supervisor notifies immediate staff. Email should contain:
    a. Instructions mandating all sick employees to work from home or use applicable leave outlined in OSHR communicable disease policy
    b. Recommendations for all healthy but potentially exposed employees to work from home
    c. Recommendations that employees seek testing if symptoms are present
3. Supervisor notifies appropriate cleaning staff / contractor of exposure so that appropriate cleaning and precautions can be taken.
4. Supervisor notifies their superior of exposure
5. Supervisor creates log to track employee availability

B. Notification (Not Telework Appropriate)

1. Supervisor notified of potential / confirmed diagnosis
2. Supervisor notifies immediate staff. Memo should contain:
    a. Instructions mandating all sick employees to work from home or use applicable leave outlined in OSHR communicable disease policy

   b. Assignment of suitable work related to single-person operations; e.g. checking roads for maintenance, checking signage, performing equipment inspections, performing repair/upkeep work at facilities, cleaning, acting as flagger for unexposed workgroup
   c. Recommendations that employees seek testing if symptoms are present
3. Supervisor notifies appropriate cleaning staff / contractor of exposure so that appropriate cleaning and precautions can be taken
4. Supervisor notifies their superior of exposure
5. Supervisor creates log to track employee availability

C. Cleaning Procedures for Facilities

The following steps should be carried out on a regular basis and emphasized during pandemic.

1. Cleaning personnel should wear disposable gloves that as recommended by the manufacturer of the detergent/disinfectant used while cleaning or handling cleaning and disinfecting solutions. The use of sterile gloves is not required. Never wash or reuse disposable gloves. Avoid activities that generate infectious aerosols. Eye protection, such as a face shields or goggles, may be required if splashing is expected.
2. Use only EPA-registered disinfectants (including detergent/disinfectants) with label claims for influenza A virus effectiveness. Clean the surface first with detergent and water, and then apply the disinfectant as instructed by the manufacturer. Ensure adequate contact time for effective disinfection. Adhere to any safety precautions or other label recommendations as directed (e.g. allowing adequate ventilation in confined areas such as lavatories and proper disposal of unused product or used containers). Avoid product application methods that cause splashing or generate aerosols. Use only EPA-registered food-contact products on areas where consumable food products are placed and stored such as in kitchens and restaurants.
3. Cleaning activities should be supervised and inspected periodically to ensure correct procedures are followed to minimize the risk of cross-contamination from “dirty” to “clean” areas.
4. Cleaning and disinfection procedures should cover all areas, including restrooms, lounges, employee-only areas, and public locations/lobbies.
5. Procedures should include cleaning and disinfection of all nonporous general hand contact surfaces, for example:
   - Door handles
   - Handrails
   - Elevator buttons
   - Telephones
   - Keyboards
   - Tabletops
   - Chair arms, handrails
   - Toilet flush handles
   - Faucet handles
   - Equipment handles

- Water Fountains
- Binoculars

6. Bodily fluids such as emesis (vomit), blood, or feces should be immediately covered with an absorbent such as vermiculite.
7. Since disinfectants are not registered for use on porous surfaces, removable porous upholstery, rugs, and carpeting should be laundered in accordance with the manufacturer's instructions or disposed of as described below. Porous upholstery and carpeting that can't be removed may be initially cleaned with water and detergent. The material should then be allowed to air dry.
8. When cleaning is completed, collect soiled material and gloves in a sturdy, leak-proof (e.g., plastic) bag that is tied shut and not reopened.
9. When cleaning is completed and gloves have been removed, immediately clean hands with soap and water or an alcohol-based hand gel. Avoid touching the face with gloved or unwashed hands.
10. Do not use compressed air and/or water under pressure for cleaning, or any other methods that can cause splashing or which might re-aerosolize infectious material. Vacuum cleaners should only be used after disinfection has taken place. Vacuum cleaners should be maintained to minimize dust dispersal in general and equipped with High Efficiency Particulate Air (HEPA) filters.

6.2.9 Training

Training will be required for designated employees and emergency/fire prevention plan coordinators. This training will include elements for both the evacuation and fire prevention plans. This training will qualify the emergency/fire prevention coordinator and the designated employees to fulfill any element of the emergency and/or fire prevention plans. This training will consist of:

- Means of reporting fires and other emergencies
- Evacuation procedures
- Familiarization with evacuation routes
- Review of employee accountability procedures
- Identification of workplace fire hazards
- Fire prevention practices
- Alarm systems
- Proper housekeeping procedures

This training will include initial training and retraining when responsibilities or conditions/surroundings change. In addition, these employees will assemble semi-annually to discuss changes in the current methods or plans.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funding is available for the purchase of proper equipment, supplies and training for the Emergency Action Plan for

their Unit. Managers/Unit Heads will appoint individuals to serve as Emergency Action Plan coordinators, alternate (backup) coordinators, and designated employees to serve as Area/Floor Monitors to assist in an orderly execution of Evacuation Plan.

They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will be responsible for ensuring that the emergency evacuation plan is posted in a conspicuous location and that employees are trained at the start of employment, upon reassignment, and yearly thereafter.

Supervisors are responsible for ensuring new and existing employees are familiar with building layouts and are instructed in the most efficient evacuation methods.

Supervisors are also responsible to ensure that all fire extinguishers and other related equipment are in good working condition. If any indication of damaged or outdated equipment is present, the equipment will be removed from service and repaired/replaced. (Fire extinguishers must be replaced if sent out for service.)

6.3.3 Emergency Coordinator

The Emergency Coordinator will serve as the primary contact and the administrator of the Emergency Action Plan. The requirements of the Emergency Action Plan can be coordinated by one individual or by two individuals as determined by the managers/unit heads.

The coordinator will keep the emergency action plan and the elements of those plans current. A backup (alternate) coordinator will also be identified and be capable of administering the requirements of these plans.

6.3.4 Employees

It is the responsibility of each employee to ensure they are familiar with the Emergency Action Plan. Each employee should also be familiar with posted exits and evacuation routes. Employees will report suspected hazards to their supervisor immediately.

6.3.5 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety Engineers will provide consultative and audit assistance on Emergency Action Plan. Additionally, Safety and Risk Management will assist in developing of or in the securing of required training.

Appendix A: Bomb Threat Checklist

Date:	Time:	Location:
Questions to ask caller:		
Exact location of bomb?		
Time set for detonation?		
What is the explosive?		
What does bomb look like?		
Why was it placed?		
Is caller bomber? □ Yes □ No	If not, who is bomber?	
Inform caller detonation could cause injury and death.		
Characteristics of caller:		
Sex:	Accent:	
Age:	Background Noises:	
Is he/she familiar with DOT: □ Yes □ No		
Message:		
Call Security at (919) 707-4854	Notify Supervisor	Call 911
Evacuate facility		

Appendix B: Suspicious Package Handout

EMERGENCY ACTION PLAN

Template

*Department*_____

Last Review Date_____

Plan Coordinator_____

Preamble

1. All personnel shall evacuate the_____Complex during an emergency such as fire, explosion, threat, flood, toxic fumes, electrical or structural failure, exceptions as noted in Numbers 3 & 4 below. All evacuations shall proceed as rapidly and safely as possible during an emergency.

2. Area/Floor Monitors shall account for all employees in their units by sight or conference with supervisors and verify all personnel have safely exited the building. They will then report this status to the incident commander. Emphasis shall be placed on ascertaining the whereabouts of "missing" employees.

3. In the event of an active shooter, all personnel shall follow the "FLEE, FREEZE and FIGHT" protocol, remaining within the building or fleeing, as appropriate.

4. In the event of a tornado or earthquake all personnel shall follow the "DROP, COVER and HOLD ON" protocol, remaining within the building.

5. Under no circumstances should elevators be used during any emergency except by firefighting personnel.

6. This plan is developed to ensure the safety and well-being of all building occupants during an evacuation from natural or man-made emergencies. Each employee is urged to become familiar with the Emergency Evacuation procedures for his/her own safety and protection.

7. ___is required to dial out on desk phones.

8. Fire extinguishers and emergency radios are checked monthly by S&RM staff.

Emergency Personnel Names and Phone Numbers

Designated Responsible Officials:

Name: Phone: _____

Name: Phone: _____

Emergency Coordinator:

Name: Phone: _____

Area/Floor Monitors and Assistants to the Physically Challenged:

Name: Phone:_____

Name: Phone: _____

Name: Phone_____

Name: Phone: _____

Evacuation Routes

- Evacuation route maps have been posted in each work area. The following information is marked on evacuation maps:
  - Emergency exits
  - Primary and secondary evacuation routes
  - Locations of fire extinguishers
  - Fire alarm pull station locations
  - Assembly points

- Site personnel should know at least two evacuation routes.

- When the alarm has been activated, leave the building and proceed to the designated assembly area outside. Evacuate to the nearest X

Place Arial MAP HERE

Emergency Phone Numbers

FIREDEPARTMENT: 911

PARAMEDICS: 911

AMBULANCE: 911

STATE CAPITOL POLICE: 911

SECURITY: (919) 707-4854

BUILDING MANAGER:

Medical Emergency

- Call medical emergency phone number (check applicable):
  - Paramedics & Ambulance
  - NCDOT Security
  - Fire Department
  - Other
- Provide the following information:
  - Nature of medical emergency,
  - Location of the emergency (address, building, room number), and
  - Your name and phone number from which you are calling.
- Do not move victim unless absolutely necessary.
- Call the following personnel trained in CPR and First Aid to provide the required assistance prior to the arrival of the professional medical help:

Name:_Phone:_____

Name:_Phone: _____

Name:_Phone_____

Name:_Phone: _____

If personnel trained in First Aid are not available, as a minimum, attempt to provide the following assistance:

  - Stop the bleeding with firm pressure on the wounds (note: avoid contact with blood or other bodily fluids).
  - Clear the air passages using back blows and abdominal thrusts in case of choking.
- In case of rendering assistance to personnel exposed to hazardous materials, consult the Safety Data Sheet (SDS) in the 3E system.
  - Wear the appropriate personal protective equipment.
  - Attempt first aid ONLY if trained and qualified.

Fire Emergency

When fire is discovered:

- Activate the nearest fire alarm.
- Notify the local fire department by calling 911.
- If the fire alarm is not available, notify the site personnel about the fire emergency by the following means (check applicable):
    - Voice Communication
    - Phone
    - Radio
    - Other (specify)

Fight the fire ONLY if:

- The fire department has been notified.
- The fire is small and is not spreading to other areas.
- Available fire extinguishers are rated for the type of fire encountered.
- Escaping the area is possible by backing up to the nearest exit.
- Fire extinguishers are in working condition.
- Personnel are trained to use them.

Upon being notified about the fire emergency, occupants shall:

- Leave the building using the designated escape routes. Know your primary exit and your alternate exit. If you are away from your normal work area, go to the nearest exit.
- Assemble in the designated area for your unit:
- Remain outside until the competent authority announces that it is safe to reenter.

Supervisors and/or Area/Floor Monitors shall:

- Coordinate an orderly evacuation of personnel closing all doors as you go.
- Perform an accurate head count of personnel reported to the designated area.
- Determine a rescue method to locate missing personnel.
- Provide Fire Department personnel with the necessary information about the facility.
- Ensure that all employees have evacuated the area/floor.
- Report any problems to the Fire Department at the assembly area.

Assistants to Physically Challenged shall:

- Assist all physically challenged employees in emergency evacuation.

Extended Power Loss

In the event of extended power loss to a facility certain precautionary measures should be taken:

Electrical equipment:

- Electrical equipment and appliances should be turned off. If power restoration would surge causing damage and possibly fire to electronics and effecting sensitive equipment, equipment should be placed in the "Off" or "Standby" positions.

Facilities experiencing freezing temperatures: (Coordinate with the landlord)

- Should turn off and drain the following lines in the event of a long-term power loss:
  - Potable water lines
  - Toilets
- Add propylene-glycol to drains to prevent traps from freezing.

Upon Restoration of heat and power:

- Electronic equipment should be brought up to ambient temperatures before energizing to prevent condensate from forming on circuitry.
- Fire and potable water piping should be checked for leaks from freeze damage after the heat has been restored to the facility and water turned back on.

Elevator mishap:

- If someone gets stuck in the elevator, call 911 and then the landlord, to get them free.
- Do not attempt to pry doors open and rescue occupants! A fall to a lower level could result in a fatality.

Telephone Bomb Threat

Person receiving call should:

- Listen – Do not interrupt caller. Keep caller on the phone if possible.
- If possible, alert Site Coordinator by a prearranged signal while the caller is on the line.
- Notify supervisor immediately after completing the call.
- Complete bomb threat checklist, Appendix A.

Site Supervisors:

- Notify police department using 911.
- Notify:
  - Security
  - Building landlord for Leased Facilities
- Assist responding police officials.
- Coordinate a search of the premises.
- Do not turn on or off any electrical machine switch.

Suspicious Package

Person receiving the package shall:

- Not open the package.
- Not bend, squeeze or drop the package.
- Put the package in a safe place, away from other personnel.
- Call 911.
- Notify supervisor, Safety & Risk Mgmt. & Security.

Things to look for:

- Foreign mail, air mail and special delivery
- Restrictive markings such as: “Confidential” or “Personal”
- Excessive postage
- Handwritten or poorly- typed addresses
- Incorrect titles
- Titles, but no names
- Misspelling of common names
- Oily stains or discoloration
- No return address
- Excessive weight and unevenly distributed or lopsided
- Rigid envelope less flexible than normal letters
- Protruding wires or tin foil
- Excessive securing material such as masking tape, string, etc.
- Visual distractions, misleading statements as being “Official”
- Edges are normally sharp, not rounded

See Appendix B: Suspicious Package Handout

Severe Weather and Natural Disasters

Supervisors shall perform weather assessment and coordinate office emergency closing procedures.

Tornado:

- When a warning is issued seek inside shelter. DO NOT LEAVE THE BUILDING OR GO OUTSIDE FOR A TORNADO.
- Consider the following:
  - Small interior rooms on the lowest floor and without windows,
  - Hallways on the lowest floor away from doors and windows, and
  - Rooms constructed with reinforced concrete, brick, or block with no windows.
  - Specifically: Workforce Solutions designated areas:
  - 1st Floor (Piedmont Room, Cardinal Conference Room, in front of elevator and restrooms)
  - 2nd Floor (Dogwood Conference Room, Break Room and restrooms)
  - Basement (Appalachian Conference Room and restrooms)
- Stay away from outside walls and windows.
- Use arms to protect head and neck.
- Remain sheltered until the tornado threat is announced to be over.

Earthquake:

- Stay calm and await instructions from the Emergency Coordinator or the designated official. DO NOT TRY TO RUN TO ANOTHER ROOM just to get under a table. DO NOT LEAVE THE BUILDING AND GO OUTSIDE DURING AN EARTHQUAKE.
- Keep away from overhead fixtures, windows, filing cabinets, and electrical power.
- Assist people with disabilities in finding a safe place.
- Evacuate as instructed by the Emergency Coordinator and/or the designated official.
- Specifically use:

Flood:

If indoors:

- Be ready to evacuate as directed by the Emergency Coordinator and/or the designated official.
- Follow the recommended primary or secondary evacuation routes.

If outdoors:

- Climb to high ground and stay there.
- Avoid walking or driving through flood water.
- If car stalls, abandon it immediately and climb to a higher ground.

Hurricane:

- The nature of a hurricane provides for more warning than other natural and weather disasters. A hurricane watch issued when a hurricane becomes a threat to a coastal area. A hurricane warning is issued when hurricane winds of 74 mph or higher, or a combination of dangerously high water and rough seas are expected in the area within 24 hours.

Once a hurricane watch has beenissued:

- Stay calm and await instructions from the Emergency Coordinator or the Designated official.
- Continue to monitor local TV and radio stations for instructions.
- Move early out of low-lying areas or from the coast, at the request of officials.
- If you are on high ground, away from the coast and plan to stay, secure the building, moving all loose items indoors and boarding up windows and openings.
- Collect drinking water in appropriate containers.

Once a hurricane warning has been issued:

- Be ready to evacuate as directed by the Emergency Coordinator and/or the designated official.
- Leave areas that might be affected by storm tide or stream flooding.

During a hurricane:

- Remain indoors and consider the following:
    - Small interior rooms on the lowest floor and without windows,
    - Hallways on the lowest floor away from doors and windows, and
    - Rooms constructed with reinforced concrete, brick, or block with no windows.

Blizzard:

If indoors:

- Stay calm and await instructions from the Emergency Coordinator or the designated official.
- Stay indoors!
- If there is no heat:
  - Close off unneeded rooms or areas.
  - Stuff towels or rags in cracks under doors.
  - Cover windows at night.
- Eat and drink. Food provides the body with energy and heat. Fluids prevent dehydration.
- Wear layers of loose-fitting, lightweight, warm clothing, if available.

If outdoors:

- Find a dry shelter. Cover all exposed parts of the body.
- If shelter is not available:
  - Prepare a lean-to, wind break, or snow cave for protection from the wind.
  - Build a fire for heat and to attract attention. Place rocks around the fire to absorb and reflect heat.
  - Do not eat snow. It will lower your body temperature. Melt it first.

If stranded in a car or truck:

- Stay in the vehicle!
- Run the motor about ten minutes each hour. Open the windows a little for fresh air to avoid carbon monoxide poisoning. Make sure the exhaust pipe is not blocked.
- Make yourself visible to rescuers.
  - Turn on the dome light at night when running the engine.
  - Tie a colored cloth to your antenna or door.
  - Raise the hood after the snow stops falling.
- Exercise to keep blood circulating and to keep warm.

Active Shooter

An active shooter is a person or group of persons determined to engage in killing or attempting to kill people. Active shooter situations are unpredictable and evolve quickly.

The threat of indiscriminate violence hasn't diminished in recent times. That's why active shooter preparedness is vital to limit the casualties resulting from an individual or group who is intent on killing or harming as many as possible.

The perpetrator(s) may be familiar to you, such as a disgruntled employee or strangers, such as terrorists. Many times, they are unconcerned with their own safety and may even seek their own death to show their commitment to their cause.

Follow these simple steps to be safe:

Continuity of Operations

During some emergency situations, it will be necessary for the_____Group to remain at work areas to perform critical operations.

Please refer to the_____Continuity of Operations Plan and the Pandemic Annex for further guidance.

Responding to Pandemic Exposure in the Workplace

A. Notification (Telework Appropriate)

6. Supervisor notified of potential / confirmed diagnosis
7. Supervisor notifies immediate staff. Email should contain:
    a. Instructions mandating all sick employees to work from home or use applicable leave outlined in OSHR communicable disease policy
    b. Recommendations for all healthy but potentially exposed employees to work from home
    c. Recommendations that employees seek testing if symptoms are present
8. Supervisor notifies appropriate cleaning staff / contractor of exposure so that appropriate cleaning and precautions can be taken.
9. Supervisor notifies their superior of exposure
10. Supervisor creates log to track employee availability

D. Notification (Not Telework Appropriate)

6. Supervisor notified of potential / confirmed diagnosis
7. Supervisor notifies immediate staff. Memo should contain:
    a. Instructions mandating all sick employees to work from home or use applicable leave outlined in OSHR communicable disease policy
    b. Assignment of suitable work related to single-person operations; e.g. checking roads for maintenance, checking signage, performing equipment inspections, performing repair/upkeep work at facilities, cleaning, acting as flagger for unexposed workgroup
    c. Recommendations that employees seek testing if symptoms are present
8. Supervisor notifies appropriate cleaning staff / contractor of exposure so that appropriate cleaning and precautions can be taken
9. Supervisor notifies their superior of exposure
10. Supervisor creates log to track employee availability

E. Cleaning Procedures for Facilities

The following steps should be carried out on a regular basis and emphasized during pandemic.

1. Cleaning personnel should wear disposable gloves that as recommended by the manufacturer of the detergent/disinfectant used while cleaning or handling cleaning and disinfecting solutions. The use of sterile gloves is not required. Never wash or reuse disposable gloves. Avoid activities that generate infectious aerosols. Eye protection, such as a face shields or goggles, may be required if splashing is expected.
2. Use only EPA-registered disinfectants (including detergent/disinfectants) with label claims for influenza A virus effectiveness. Clean the surface first with detergent and water, and then apply the disinfectant as instructed by the manufacturer. Ensure adequate contact time for effective disinfection. Adhere to any safety precautions or other label recommendations as directed (e.g. allowing adequate ventilation in confined areas such as lavatories and proper disposal of unused product or used containers). Avoid product application methods that cause splashing or generate aerosols. Use only EPA-registered food-contact products on areas where consumable food products are placed and stored such as in kitchens and restaurants.
3. Cleaning activities should be supervised and inspected periodically to ensure correct procedures are followed to minimize the risk of cross-contamination from "dirty" to "clean" areas.
4. Cleaning and disinfection procedures should cover all areas, including restrooms, lounges, employee-only areas, and public locations/lobbies.
5. Procedures should include cleaning and disinfection of all nonporous general hand contact surfaces, for example:
    - Door handles
    - Handrails
    - Elevator buttons
    - Telephones
    - Keyboards
    - Tabletops
    - Chair arms, handrails
    - Toilet flush handles
    - Faucet handles
    - Equipment handles
    - Water Fountains
    - Binoculars
6. Bodily fluids such as emesis (vomit), blood, or feces should be immediately covered with an absorbent such as vermiculite.

7. Since disinfectants are not registered for use on porous surfaces, removable porous upholstery, rugs, and carpeting should be laundered in accordance with the manufacturer's instructions or disposed of as described below. Porous upholstery and carpeting that can't be removed may be initially cleaned with water and detergent. The material should then be allowed to air dry.
8. When cleaning is completed, collect soiled material and gloves in a sturdy, leak-proof (e.g., plastic) bag that is tied shut and not reopened.
9. When cleaning is completed and gloves have been removed, immediately clean hands with soap and water or an alcohol-based hand gel. Avoid touching the face with gloved or unwashed hands.
10. Do not use compressed air and/or water under pressure for cleaning, or any other methods that can cause splashing or which might re-aerosolize infectious material. Vacuum cleaners should only be used after disinfection has taken place. Vacuum cleaners should be maintained to minimize dust dispersal in general and equipped with High Efficiency Particulate Air (HEPA) filters.

Training

The following personnel have been trained to ensure a safe and orderly emergency evacuation:

Name	Title	Responsibility	Date

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

First Aid / CPR / AED SPP# 1910.151

Select this Link to view latest Revision changes

Contents

1.0 Purpose

The purpose of this safety policy and procedure is to establish first aid, CPR (cardiopulmonary resuscitation), and AED (automated external defibrillator) requirements for North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

Prompt medical attention in case of injury on the job is critical to ensure the health and well-being of NCDOT employees. Having provisions for timely access to first aid, CPR, and AED if available helps to minimize the extent of injury to affected employees and fosters a caring attitude among the NCDOT organization.

This safety policy and procedure provides guidelines to determine what first aid, CPR, and AED requirements are applicable for the various operations in NCDOT. It includes provisions for training, discussion on posting requirements for first aid kit and AED locations.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, first aid/CPR/AED trained employees, employees, and Safety and Risk Management within NCDOT.

This document affects all NCDOT Units.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.151) and (29CFR 1910.266) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.50).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Because hazards may exist, NCDOT will train adequate numbers of employees in First Aid and provide first aid equipment to ensure that employees receive prompt assistance in case of injury.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure for First Aid, CPR and AED. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on First Aid.

6.1 Definitions

AED
An **AED (Automated External Defibrillator)** is a portable electronic medical device that automatically analyzes and administers an electric shock through the chest wall to the heart for sudden cardiac arrest victims. Built-in computers assess the patient's heart rhythm and determine if defibrillation is needed; the AED then advises if administering of shock is necessary.

CPR
Cardiopulmonary Resuscitation (CPR) is an emergency procedure in which the heart and lungs are made to work by compressing the chest overlying the heart and forcing air into the lungs. CPR is used to maintain circulation when the heart has stopped pumping on its own.

First Aid
The immediate, temporary care given to the injured or suddenly ill until proper medical attention can be given.

Sudden Cardiac Arrest
Sudden cardiac arrest occurs when ventricular fibrillation takes place or when the heart stops beating altogether.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Posting Requirements
- First Aid Access for Buildings
- First Aid Access for Field Personnel
- First Aid Kits
- AED
- Eyewash & Flushing Station

6.2.1 Training

The employees designated to be trained in first aid, CPR and AED will be trained upon their initial designation. This training must certify those in the American Red Cross First Aid, American Heart Association, and/or equivalent first aid, CPR and AED training. Red Cross-approved refresher training must be done every two years to retain their first aid, CPR and AED certification.

6.2.2 Posting Requirements

Information will be posted throughout buildings and on jobsites advising employees where the first aid kits are located and AED's if available on site are located.

6.2.3 First Aid Access for Buildings

All buildings shall have access to first aid supplies and/or 25-unit first aid kits.

- 25-unit wall-mounted first aid kits should be located on all floors or locations throughout the facility so they can be accessed within 3 – 4 minutes. Common areas such as break rooms or bulletin boards would be good locations. Security office or reception area may be another alternative.
- Lavatory with hot and cold water should be available.
- Automated external defibrillators (AEDs) should be considered for large office buildings or facilities especially those that provide services for the Public.
- In addition to first aid supplies, NCDOT will ensure that an adequate number of office employees are trained in first aid/CPR and AED if available in the building. It is recommended that at least one person trained in First Aid/CPR/AED for every (50) employees at each location.

6.2.4 First Aid Access for Field Personnel

All field employees will have access to first aid supplies. This will be achieved by ensuring each location/operation is equipped with a first aid kit. This kit will be adequate to service the number of employees normally found on a job site.

In addition to first aid supplies, NCDOT will ensure that an adequate number of field employees are trained in first aid/CPR/AED. Each work crew in the field should have at least one person trained in First Aid/CPR.

6.2.5 First Aid Kits

The 25-unit first aid kit will consist of the following items:

- 1-4"x4" Bandage Compress
- 1-Box 3"x3" Sterile Gauze Pads (4 per box)
- 1-Triangular Bandage (40"x40"x40")
- 1-2"x 4 yards Gauze Bandage
- ½" x 2.5 yards Adhesive Tape (2 per box)
- 1-Boxes of 1"x3" Adhesive Bandages (16 per box)
- 1-Sterile Buffered Isotonic Eyewash Kit (1 oz.) with 2 eye pads, 2 adhesive strips
- 1-Instant Cold Pack
- Hand Sanitizer (1/32 oz. pks 6 per box)
- Antiseptic Wipes (10 per box)
- Triple Antibiotic Ointment (1/57 oz. pks 10 per box)
- Sting Relief Swabs (10 per box)

- 1-Eye/Skin Wash 1oz.
- 1-CPR Breather Barrier
- Disposable Nitrile Gloves (2 per box)
- Burn Treatment (10 per box)
- 1-Burn Dressing (4”x4”) gel soaked
- 2–Trauma Pads (5”x9”)
- 1-Scissors
- First Aid Guide

Due to the potential severity of injury and excessive bleeding to a body part from a chainsaw cut, Loggers First Aid Kit should be available which includes additional and larger (8”x10” Gauze Pads) meeting OSHA 1910.266 requirements for logging operations.

First aid kits should be periodically inspected and replenished with any depleted items or at a minimum once per year.

6.2.6 AED (Automated External Defibrillator)

Automated external defibrillators (AEDs) are an important lifesaving technology and play a role in treating workplace cardiac arrest. Most sudden cardiac deaths occur outside of the hospital. It is estimated that 5 percent or less of victims of sudden cardiac arrest are successfully resuscitated and discharged alive from the hospital. Chances of survival from sudden cardiac death diminish by 7 – 10 percent for each minute without immediate CPR or defibrillation. After 10 minutes, resuscitation rarely succeeds.

AED’s should be considered facilities with more than (50) employees or if you serve the General Public. If your location has one or more AED’s, ensure that your personnel trained in First Aid and CPR are also trained in AED use. The placement of the AED is critical for adequate response time to reach a victim of sudden cardiac arrest.

The following procedure should be followed:

1. Have someone call 911 immediately to request emergency medical services.
2. Immediately begin CPR.
3. Have someone retrieve the AED stored at your facility.
4. If CPR has not revived the victim, attach the AED pads to the victim and follow prompts.

6.2.7 Emergency Eyewash, Shower, and Flushing Station

Where the eyes or body of any person may be exposed to injurious corrosive chemicals, suitable facilities for flushing of the eyes and body shall be provided within the work area for immediate emergency use. Stations should be located within 10 second access (approximately 50’ from possible exposure to corrosive chemicals). Corrosive chemicals cause damage to living tissues such as eyes and skin. Some other material used for NCDOT operations may involve chemicals which may be an irritant to eye or skin exposure, but not classified as corrosive. Review SDS (Safety Data Sheet) for chemicals being used to determine if corrosive or an irritant.

NCDOT Operations which may require eyewash, shower, or flushing stations based on Hazard Assessments for each activity include the following:

1. Fork lift battery charging stations are primarily where NCDOT employees have a potential exposure hazard to corrosive electrolyte (acid) in batteries and would require eyewash, shower, or flushing stations. If a plumbed eyewash station or gravity fed eyewash station capable of providing flushing fluid for 15 minutes is not practical, a portable eyewash station may be used to initially flush skin exposure until access to plumbed sink, shower, or other water source for further flushing.
2. Calcium chloride mixing / storage stations for snow/ ice operations has been determined to be an eye and skin irritant based on SDS where eyewash, shower, or flushing station should be considered. .
3. Pesticide/herbicide storage or dispensing locations have been determined to be an eye and skin irritant based on SDS's for chemicals used where eyewash, shower, or flushing station should be considered.
4. Any other activities where chemicals used may be an eye or skin irritant based on SDS's where eyewash, shower, or flushing station should be considered.

6.2.7.1 Plumbed Eyewash or Shower Station

The following are requirements for Plumbed Eyewash Stations:

- Mounted with water flow pattern between 33" – 53" from floor
- Located 6" from closest wall or obstruction
- Plumbed w/ tepid water
- Hands free after activating push handle
- Located within 55' of corrosive exposure hazard
- Eyewash station must be maintained in sanitary condition

The following are requirements for Plumbed Shower Stations:

- Height of water column between 82" – 96" from floor
- Center of water pattern at least 16" from any obstruction
- Plumbed w/ tepid water
- Hands free after activating lever at maximum height of 69" from floor
- Located within 55' of corrosive exposure hazard
- Safety shower must be maintained in sanitary condition

6.2.7.2 Portable Eyewash Station

Gravity fed eyewash stations for splashes or spills where only the eyes are likely affected require flushing of 0.4 gallons per minute at 30 PSI for 15 minutes.

Eyewash bottle stations may be used for immediate use if a lavatory or other eyewash station is readily available to continue flushing eyes or other affected body parts.

- Saline solutions used for portable eyewash stations have a shelf-life and should be replaced accordingly. These stations shall be kept in sanitary conditions. Follow manufactures instructions for inspection and replacement of saline solution.

6.2.7.3 Inspection

Follow manufactures instructions for periodic inspection and replacement of saline solution to ensure proper operation, sanitary condition, and accessibility Weekly inspection of Emergency Eyewash/Shower/Flushing Stations is recommended per manufacturer ANSI Z358.1-2014 provides recommended guidelines.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of first aid equipment and related supplies. They will designate which employees receive first aid, CPR and AED training. They will also obtain and coordinate the required training for the affected employees.

6.3.2 Supervisors

Supervisors will assist managers/unit heads as needed. Additionally, they will assist first aid-trained employees as needed.

6.3.3 First Aid Trained Employees

First aid trained employees will administer first aid, CPR and AED if available as conditions and circumstances dictate. They will also be responsible for ensuring that first aid supplies are replenished when used

6.3.4 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

6.3.5 Safety and Risk Management

Safety and Risk Management shall provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or providing First Aid and CPR/AED training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure

6.3.6 Central Inventory Unit

The Central Inventory Unit or MRO contract supplier will be responsible for maintaining an inventory of first aid kits and supplies.

Appendix A: Inspection of Emergency Eyewash/Shower/Flushing Stations

NCDOT Eyewash/Safety Shower/Drenching Hose Inspection Checklist					
Date:	**Location:**				**ID:**
Inspection Conducted By:	**Rating**			**Observations/Corrective Actions**	**Abatement Date**
Inspection Items (If Applicable)	**S**	**U**	**N/A**	**S=Satisfactory, U=Unsatisfactory, N/A=Not Applicable**	**If corrective action required**
Eyewash Station(15 Minutes Minimum Flow)					
Sanitary, Free of Accumulated Dirt and Debris					
Located Within 20' of Hazard					
Visible Eyewash Sign Present					
Eyewash Station Readily Accessible; Not Blocked					
For Plumbed Eyewash; Activate for Proper Operation					
For Plumbed Eyewash; Tepid Water Used (60-100 Degrees F) Recommended					
For Portable Eyewash Station; Check for Proper Level of Sterile Eyewash Solution					
For Portable Eyewash Station; Check Expiration Date of Sterile Eyewash Solution					
Eyewash Bottles (Emergency Immediate Use)					
For Portable Eyewash Bottle Station; Check Expiration Date of Sterile Eyewash Solution					
Eyewash Bottle Station Readily Accessible; Not Blocked					
Visible Eyewash Sign Present					
Located Within 20' of Hazard					
Eyewash, Safety Shower, Combination, Drenching Hose					
Sanitary, Free of Accumulated Dirt and Debris					
Located Within 20' of Hazard					
Visible Eyewash & Shower Sign Present					
Eyewash Shower or Drenching Hose Station					
For Plumbed Station; Activate for Proper Operation					
For Plumbed Eyewash; Tepid Water Used (60-100 Degrees F) Recommended					

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Illumination SPP# 1926.56

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for illumination for North Carolina Department of Transportation (NCDOT) facilities and activities.

2.0 Scope and Applicability

Lighting or lack of lighting can contribute to accidents and to visual strain. Employees and the general public need to see what they are doing and where they are going.

This safety policy and procedure provides guidelines to assist NCDOT management in ensuring that proper and adequate lighting exists in NCDOT facilities and on jobsites. It includes provisions for training, discussion on lighting hazards, recommended illumination levels, night-time construction illumination requirements, and illumination measurement equipment.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT. This safety policy and procedure affects all NCDOT facilities and jobsites.

3.0 Reference

This safety policy and procedure is established in accordance with the Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926.56).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, all NCDOT facilities and construction sites will be properly and adequately lighted to minimize accidents. Where poor lighting exists or there is inadequate lighting for the job tasks, NCDOT will provide sufficient lighting for the task. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Illumination. It is also the responsibility of each NCDOT employee to report immediately any unsafe conditions to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Illumination.

6.1 Definitions

Illumination
Light falling on a surface measured in foot candles.

Luminance
Light emitted or reflected from a surface unit area measured in foot/lambert.

Reflectance
Portion of arriving light on a surface that is reflected, measured in percent.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Hazards
- Recommended Illumination Levels for NCDOT Facilities
- Illumination for Night-Time Construction
- Illumination Measurement

6.2.1 Training

Employees will be trained to recognize improper and inadequate lighting in their workplaces. Employees will be trained at the time of their initial employment or assignment.

6.2.2 Light Sources

Light sources are daylight and artificial light. The types of artificial light in NCDOT include:

- Incandescent
- Fluorescent
- High intensity discharge (mercury and sodium vapor)

Each type of artificial light provides a different spectrum of wavelengths and are used in NCDOT based on lighting needs.

Lighting is also classified as general or supplemental. General lighting provides lighting to a large area. A form of supplementary lighting is task lighting. Task lighting provides additional targeted lighting for a particular task or activity.

6.2.3 Hazards

The major hazards associated with lighting include:

- Illumination levels
- Changes in illumination levels
- Glare
- Luminous contrast

Illumination levels can either be too little or too much light. If there is too little light, employees or the public cannot see well. This could result in an error occurring because a dangerous situation may not be recognized with a corresponding decrease in an individual's reaction time.

Extremely bright light can injure receptor cells in the eye. Also, extremely bright light can cause afterimages that can obscure an individual's visual field until their receptor cells can recover. (The afterimage from a camera flashbulb or similar bright light is a common example.) Until an individual can recover from a bright light, the bright light may interfere with one's ability to detect an object.

Changes in illumination levels interfere with the ability of the eye to adjust quickly enough to permit seeing without error. Examples of changing light levels are the transition from bright outdoor light to dark interiors or from a bright area of a building to a dark one. Another example is looking at a brightly lighted task, then moving the eye to a location that is darker.

Glare is the presence of a bright light in the visual field. Direct glare occurs when the light in the visual field is a source light. An example of direct glare is the headlights of an oncoming car at night. Reflected glare occurs when a bright light reflects from a surface. Glare can lead to errors in perception and detection that result in accidents and may produce afterimages or delay visibility due to adaptation.

Luminous contrast refers to the changing light levels of an environment. For example, one may look at work on a desk that has a certain illumination. Shifting the eyes to a wall presents a much darker or lighter level of illumination. When there is too much difference between the two surfaces, the eyes have difficulty adapting, which may lead to visual errors.

6.2.4 Recommended Illumination Levels

Appendix A presents minimum illumination intensities for construction areas, ramps, runways, corridors, offices, shops, and storage areas.

The values in Appendix A should be used as minimum guidelines. Actual environmental conditions and lighting needs may dictate higher illumination levels. However, higher illumination levels have to be balanced against the hazards of that lighting level (See section 6.2.2).

6.2.5 Illumination for Night-Time Construction

Specifications for night-time construction lighting are found in Section 1412 of NCDOT *Standard Specifications for Roads and Structures*. Night-time construction lights consist of tower lights and machine lights.

Tower lights consist of mercury vapor, metal halide, high pressure sodium or low pressure sodium fixtures mounted on a tower approximately 30 feet in height. The lights should be aimed and positioned to illuminate the area for construction work with no disabling glare to the motorist.

Machine lights are mercury vapor, metal halide, high pressure sodium, or low pressure sodium. They are typically conventional roadway enclosed fixtures mounted on supports attached to the construction machine at a height of approximately 13 feet above ground. Machine lights are installed in addition to conventional automotive type head lights.

Night-time construction lighting must meet all the specifications, provide adequate lighting for the construction work being performed, and sufficiently identify the work zone to motorists. Night-time illumination must be approved by the Resident Engineer.

6.2.6 Illumination Measurement

Illumination is measured in foot-candles. The illumination meter is a convenient piece of equipment that measures illumination of any specified location. This instrument is useful in quantifying your facility's lighting area deficiencies.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted to ensure that adequate illumination levels are maintained in their facilities and jobsites. Managers/Unit Heads will obtain and coordinate the required training for employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will identify areas with inadequate or improper illumination through their facility and jobsite audits. They will also communicate these illumination deficiencies to managers/unit heads.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure. Additionally, they shall report any unsafe illumination conditions to their supervisor.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Safety and Loss Control will provide technical guidance on illumination problems in the workplace. (NCDOT Design Services will provide technical guidance on night-time illumination problems.)

Safety Engineers and the Industrial Hygienist will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Minimum Illumination Intensities

Area of Operation or Task	Foot-Candles
General construction area lighting	10
General construction areas, concrete placement, excavation and waste areas, access ways, active storage areas, loading platforms, refueling, and field maintenance areas	3
Indoors: warehouses, corridors, hallways, and exit ways	20
Tunnels, shafts, and general underground work areas: (Exception: minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling. Bureau Mines approved cap lights shall be acceptable for use in the tunnel heading)	5
General construction plant and shops (e.g., batch plants, screening plants, mechanical and electrical equipment rooms, carpenter shops, rigging lofts and active store rooms, barracks or living quarters, locker or dressing rooms, mess halls, and indoor toilets and workrooms) First Aid	30
stations, infirmaries, and offices Working with	100
very small sized objects	200
Working with very small sized objects over a prolonged period	200 - 500
Performance of very prolonged and exacting tasks	500 - 1000

Author:	Mark Scott, Jim Sawyer (RSO-M&T)	Revision #:	New
Approved By:	Bobby Lewis	Date Revised:	July 2020

SAFETY POLICY & PROCEDURE

Ionizing Radiation SPP# 1910.1096

Quick Reference

Select this Link to view latest Revision changes

Contents

Select this Link to view
latest Revision changes

Special Notice:

SPP# 1910.96 Ionizing Radiation and revisions are cancelled as of this date. Appropriately destroy all hard copies which shall be replaced with SPP# 1910.1096 Ionizing Radiation in accordance with OSHA General Industry Standards.

Information Security. N.C.G.S.104E-9(a)(4) outlines authority to withhold information from public disclosure as defined by this and other N.C.G. Ss, except to individuals with a need to know. The Materials and Test (M&T) Unit, Radiation Safety Officer (RSO), Director, Safety and Risk Management (SRM) and Communication, NCDOT will coordinate and forward request by public for agency radioactive material information to the Radiation Protection Section, North Carolina Department of Health and Humans Services, (RPS-NCDHHS)for approval to release information and/or directed response from RPS-NCDHHS.

1.0 Purpose

The purpose of this Safety Policy and Procedure (SPP) is to establish guidelines for radiation protection and safety of North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Radiation is a form of energy. Ionizing radiation has very damaging effects on skin tissue and can serve as a precursor to several forms of cancer. Materials and Test Unit's Nuclear Density gauges are the primary radiation source in NCDOT.

This SPP provides guidelines for the safe handling of Ionizing Radiation. It includes provisions for training, description of ionizing equipment used in NCDOT, and the necessity of warning signs for restricted areas. Additionally, it includes discussion on the monitoring of personnel for ionizing radiation exposure and the reporting of ionizing radiation overexposure.

This document also details the areas of responsibility for M&T Unit, managers/unit heads, supervisors, employees, SRM, and Division Safety Staff within NCDOT.

The M&T Unit, NCDOT is the designated custodian of nuclear density gauges for this Agency responsible for Program Management, Security, Recordkeeping, Training, Leak Testing, Personnel Monitoring, Exposure Reporting Procedure, Emergency Procedures, Loss/Theft/Damage/Misplacement Reporting, Inspections, Compliance, Etc.… .

This SPP affects any employee who because of their job duties will handle and operate equipment producing or containing ionizing radiation sources. Specifically, this safety policy and procedure affects Materials and Tests Unit employees who use, maintain, and transport nuclear density gauges and field construction employees assigned to projects as nuclear gauge operators.

3.0 Reference

This SPP is established in accordance with Occupational Safety and Health Standards for General Industry and the below listed standards, regulations, guidelines, applicable statutes, laws, manufactures Instructions, this should not be considered an all-inclusive list.

10 CFR 20	Standards for Protection Against Radiation	Nuclear Regulatory Commission
29 CFR 1910.1096	Ionizing Radiation	Occupational Safety and Health Administration (OSHA)
29 CFR 1926.53	Ionizing Radiation	OSHA
N.C.G.S. Chapter 104E	North Carolina Radiation Protection Act	NC General Assembly
13 NCAC 07	Office of Occupational Safety and Health	NC Department of Labor (NCDOL)

10 NCAC 15	Radiation Protection Section	NC Department of Health and Human Service (NCDHHS)
Regulations/Guidelines/ Information	Radioactive Materials Section http://www.ncradiation.net	Radioactive Materials Section (RMS)-NCDHHS
Radioactive Materials License	092-0104-1	Division of Highways, NCDOT and RMS-NCDHHS
Manufacture Instructions and Manuals	Item/s by Manufacture	Specific Manufactures Guidance

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, unauthorized handling of radiation sources is strictly prohibited. When radiation hazards exist that cannot be eliminated, then engineering practices, administrative practices, Personal Protective Equipment (PPE), safe work practices, and proper training regarding Ionizing Radiation will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's policy on Ionizing Radiation. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to their supervisor. Specific responsibilities are in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's policy on Ionizing Radiation.

6.1 Definitions

Dose
The quantity of ionizing radiation absorbed, per unit of mass, by the body or by any portion of the body.

Film Badge or Dosimetry
Uses optically stimulated luminescence technology with an aluminum oxide- based detector. Radiation exposure is measured by scanning the dosimetry.

Ionizing Radiation
Electromagnetic or particulate radiation capable of producing ions, directly or indirectly, by interaction with matter.

Nuclear Density Gauge
A piece of equipment with a radioactive source used for density measurements of asphalt, aggregate base course and concrete.

Radiation
Includes alpha, beta, gamma, x-rays, neutrons, electrons, protons, and other atomic particles. This term does not include sound or radio waves, or visible light, or infrared or ultraviolet light.

Radioactive Material
Any material which emits, by spontaneous nuclear disintegration, corpuscular or electromagnetic emanations.

Restricted Area
Any area to which access is controlled by M&T Unit, NCDOT for purposes of protection of individuals from exposure to radiation or radioactive materials.

Radiation Safety Officer (RSO)
An RSO is an individual appointed in writing by the licensee (NCDOT), to be responsible for implementing the radiation protection program. The licensee, through the RSO, shall ensure that radiation safety activities are being performed in accordance with licensee-approved procedures and regulatory requirements. A licensee's management may appoint, in writing, one or more Associate RSOs (ARSO) to support the RSO. The RSO, must assign the specific duties and tasks to each ARSO which are restricted. The RSO may delegate duties and tasks to the ARSO but shall not delegate the authority or responsibilities for implementing the radiation protection program.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Equipment
- Warning Signs
- Personnel Monitoring
- Recordkeeping
- Exposure Reporting Procedure
- Emergency Procedures
- Equipment Security, Damage, Loss, Theft, Misplacement Reporting
- Audits and Inspections

6.2.1 Training

Materials and Tests Unit shall train employees affected by this SPP. The M&T Unit shall certify as nuclear gauge operators those affected employees and will train other employees who handle nuclear gauge equipment. Nuclear gauge operators and other employees may be required to complete other training on associated equipment and other job-related duties. Successful completion of the following classroom and field training is required to become a certified nuclear gauge operator:

Topic	COURSE #	Course Covers
Initial Course	MAT-250 Nuclear Safety and Hazardous Materials	Initial Training Awareness and Information Training
Base Course Type Materials (i.e. ABC, CTBC, FDR, etc.)	MAT 370 - Nuclear Density Testing	Base, FDR, and Select Materials
Field Certification	Field Certification	M&T staff provides one-on-one field training and observation
Asphalt Materials	MAT 380 - Density Gauge Operator	Equipment use and information
Field Certification	Field Certification	M&T staff provides one-on-one field training and observation

Material & Testing Unit staff is responsible for all radiation safety training and training documentation. Future training packages and additional recordkeeping may be included in the Learning Management System (LMS).

Nuclear Gauge Refresher Training **is required every** ***three years (triennially)*** **for any DOT employee actively receiving a film badge, unless directed to be conducted sooner.**

Additional information regarding training classes is provide at the following M&T website: https://connect.ncdot.gov/resources/materials/Pages/default.aspx

6.2.2 Equipment

Nuclear Gauge are the primary piece of ionizing equipment used within NCDOT. Nuclear Gauges are used to determine the density of asphalt and aggregate base course. The radioactive material used to perform these tests is in pellet-form, encapsulated inside the equipment.

Nuclear Gauges must be leak tested every 12 months in accordance with our licensing agreement with the North Carolina Radiation Protection Section.

Materials and Tests Unit will maintain records of all NCDOT Nuclear Gauges in receipt of/transferred to or from/ Disposed of/Procured/Leak Testing/Repairs regardless, of how acquired Owned/ Rental/ Lease. Records must be maintained 5 years after appropriate disposal.

Figures 1, 2, and 3 – Sample Nuclear Gauges Photos

Figure 1 - Humboldt Nuclear Gauge

Figures 2 & 3 - Toxler Nuclear Gauges

6.2.3 Warning Signs/Employee Notice Posters

Any facility storing Nuclear Gauges ***shall*** have signs outside the restricted area notifying employees of the potential dangers. These signs shall contain the standard radiation symbol with the conventional radiation caution signage. When storing in magazines magnetic signs are permitted.

Notice to Employee Poster (Appendix A) must be posted in a sufficient number of places in every establishment where employees perform activities regulated by NC Radiation Protection; to permit employees working in or frequenting any portion of a restricted or controlled area to observe a copy on their way to or from their place of employment.
Figure 4 shows sample Radiation Caution Sign and Notice to Employee Poster.

Figure 4

6.2.4 Personnel Monitoring

All employees who use the Nuclear Gauge will always wear film badges to monitor the amount of radiation to which they may be exposed. Film badges are assigned to a specific person and cannot be shared among individuals. These badges are part of a continuous monitoring program and are replaced quarterly.

Materials and Tests Unit will maintain records of the replacement/testing result of all film badges. See Figure 5 – Sample Film Badge Photo.

Figure 5 – Film Badge

6.2.5 Recordkeeping

Materials and Tests Unit, NCDOT shall maintain records of exposures for employees who are required to wear film badges. Materials and Tests Unit shall disclose exposures to employees upon request from the employee. These records of exposures shall be maintained for a period not less than 30 years from the termination of employment with NCDOT.

6.2.6 Exposure Reporting Procedure

For employees not protected by the NRC, all exposures over the allowable threshold limits shall be reported to the NC Commissioner of Labor or their duly authorized representative. In addition, exposure notification in writing shall be submitted to the NC Commissioner of Labor or the duly authorized representative within 30 days of the original exposure date. A record of all radiation exposures must be made available to future employers at the request of former NCDOT employees. The Director, SRM shall be notified in these cases.

6.2.7 Emergency Procedures

Written emergency procedures for nuclear equipment accidents are maintained by M&T Unit as required by license issued by North Carolina Radiation Protection Section (NCRPS). The Director, SRM shall be provided a copy of these emergency procedures.

6.2.8 Security and Reporting Damage, Loss, Theft, Misplacement

Key control is limited to individuals authorized by the RSO.

Nuclear gauge storage facilities must be secure with access limited to authorized personnel. The following individuals should have access to nuclear gauge storage: Certified nuclear gauge operators, M&T Staff, and Resident Engineer.

Field offices assigned a nuclear gauge must designate a certified nuclear gauge operator to perform a weekly security check on assigned nuclear gauge(s). This process requires visually verifying a nuclear gauge is secure and properly stored.

Each security check must be documented on the utilization log sheet (including name and date). A legible copy of the log sheet(s) must be sent to the M&T Unit with the film badge package when returning used badges.

Immediately report evidence of any issues or security concerns to the M&T Staff listed on the emergency procedures, supervisor, and Director, SRM.

6.2.9 Audits and Inspections

Weekly security check noted on daily utilization log sheet must be maintained for three (3) years after a copy is submitted to the M&T Unit. Scanning and maintaining logs electronically is permissible provided the scanned copy is legible.

Announced audits/inspections may be conducted by RSO, NCDOL, NPS-DHHS, and NRC. Safety Staff should accompany inspectors to learn process. Copy of inspections record to Director, SRM.

Unannounced audits/inspections may be conducted by RSO, NCDOL, NPS-DHHS, and NRC. Safety Staff should accompany to learn process. May be conducted without RSO presence. Copy of inspections record to Director, SRM.

Properly trained and assigned M&T Staff will perform semi-annual physical inventories of all nuclear gauges during June and December per the RADIOACTIVE MATERIALS LICENSE. During the inventory process, storage locations are inspected to verify compliance. The Radioactive Materials License requires completion of a documented physical inventory of all every 6 months.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will be responsible for identifying the employees affected by this SPP. Managers/ Unit Heads will also ensure compliance with this SPP through their auditing process.

The licensee shall institute the provisions of 10A NCAC 15 .1610 when an occupationally exposed woman voluntarily informs her supervisor, in writing, of the pregnancy and the estimated date of conception. The Supervisor's response and actions must be appropriately documented. Both the individual's voluntary information disclosure and Supervisor's response/s must be protected from unauthorized disclosure/release since potentially they may contain Protected Health Information under HIPAA (Health Insurance Portability and Accountability Act). Additionally, this is a personal matter.

6.3.2 Supervisors

Supervisors will ensure that affected employees are trained in the safe use and handling of equipment, instruments or sources which contain ionizing radioactive materials.

The licensee shall institute the provisions of 10A NCAC 15 .1610 when an occupationally exposed woman voluntarily informs her supervisor, in writing, of the pregnancy and the estimated date of conception. The Supervisor's response and actions must be appropriately documented. Both the individual's voluntary information disclosure and Supervisor's response/s must be protected from unauthorized disclosure/release since potentially they may contain Protected Health Information under HIPAA (Health Insurance Portability and Accountability Act). Additionally, this is a personal matter.

Due to added safety concerns and restrictions during pregnancy, M&T requires reassignment of job duties regarding use of a nuclear gauge when a woman declares a pregnancy. Radiation exposure to an unborn fetus must be strictly monitored and controlled. A temporary job duty reassignment for the duration of the pregnancy is the most effective control method.

6.3.3 Employees

Employees shall not operate any equipment without the proper training. Employees shall not operate any equipment or instrument which is damaged or in any other way malfunctioning. Employees will immediately inform their supervisor if any unsafe condition occurs (e.g., leaks, damage, theft, loss, or misplacement).

Additionally, employees shall not remove or otherwise modify any part of any instrument except to perform allowed routine maintenance or service. Employees shall wear film badges as prescribed.

The licensee shall institute the provisions of 10A NCAC 15 .1610 when an occupationally exposed woman voluntarily informs her supervisor, in writing, of the pregnancy and the estimated date of conception.

6.3.4 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this SPP.

Additionally, NCDOT assign Safety Engineers, Consultants, or Officers will provide consultative and audit assistance to ensure effective implementation of this SPP.

6.3.5 Materials and Test Unit

Materials and Tests Unit will provide guidelines for the safe transport of nuclear gauges or other related equipment containing radioactive materials. Materials and Tests Unit will coordinate all training with the North Carolina Radiation Protection Section for the affected employees.

Materials and Test's Radiation Safety Officer must be designated in writing and is responsible for maintaining and updating the radiation license from the Radiation Protection Section with copy forwarded to Director, SRM.

6.4 Reporting Safety Concerns

ANYRISK is a safety reporting tool for NCDOT personnel. NCDOT Employees may report safety concerns anonymously, if desired (24/7/365) to:

1. https://connect.ncdot.gov/anyrisk
2. 1-866-361-1818

Appendix A: Radiation Notice to Employees Poster

NC DEPARTMENT OF HEALTH AND HUMAN SERVICES
Division of Health Service Regulation

NOTICE TO EMPLOYEES

Standards for Protection Against Radiation; Notices; Instructions and Reports to Workers; Inspections

NORTH CAROLINA RADIATION PROTECTION

EMPLOYEE'S RESPONSIBILITY AS A WORKER:
Familiarize yourself with the provisions of the radiation protection regulations and operating procedures that apply to the work in which you are engaged. Observe those provisions for your own protection, the protection of your co-workers and others. If you observe conditions which may lead to violations or have a safety concern, promptly report them to your supervisor.

WHAT IS COVERED BY THESE REGULATIONS?

1. Limits on exposure to radiation and radioactive materials in restricted and unrestricted areas;
2. Measures to be taken after accident exposure;
3. Personnel monitoring, surveys, and equipment;
4. Caution signs, labels and safety interlock equipment; and
5. Exposure records and reports.

YOUR EMPLOYER'S RESPONSIBILITY:

1. Comply with the requirements of North Carolina Regulations for Protection Against Radiation 10A NCAC 15 pertaining to work involving sources of radiation; departmental orders and registration or licensing conditions;
2. Post or otherwise make available to you a copy of the North Carolina Regulations for Protection Against Radiation 10A NCAC 15, certificates, registrations or licenses and the operating procedures that apply to the work you perform, and explain those provisions to you;
3. Post Notices of Violation involving radiological working conditions and orders.
4. Provide adequate radiation safety training to you, including the use of radiation producing devices or radioactive materials you may be expected to use.
5. Keep your radiation exposure as far below the maximum allowable limits as is "reasonably achievable."
6. Provide you with information on your exposure to radiation.

REPORTS ON YOUR RADIATION EXPOSURE HISTORY
Your employer is required to maintain records of your exposure to radiation as required by 10 CFR 20.2106. Your employer is required to provide you with written notification or a report of your exposure history under 10 CFR 19.13 if:

1. Your dose exceeds 100 millirem TEDE or 100 millirem to any organ or tissue over the monitoring year, or if you request your annual dose.
2. You receive an exposure in excess of the annual dose limits. Your employer is required by 10 CFR 20.2205 to give you this report within 30 days of the discovery of the exposure exceeding the dose limits. The exposure limits for occupational workers are found in 10 CFR 20.1201.
3. You are no longer employed by the licensee, and you request your exposure history from your former employer. 10 CFR 19.13(e) requires your former employer to provide you with this report within 30 days of your request, or 30 days after your dose is determined, whichever is later.

POSTING REQUIREMENT
Copies of this notice must be posted in a sufficient number of places in every establishment where employees perform activities regulated by NC Radiation Protection; to permit employees working in or frequenting any portion of a restricted or controlled area to observe a copy on their way to or from their place of employment.

INSPECTIONS
All licensed or registered activities are subject to inspections by representatives of the NC Department of Health and Human Services. During inspections, agency inspectors may confer privately with workers; and workers may bring to the attention of the inspectors any past or present condition which they believe contributed to or caused any violation as described above. The employer must not prevent you from talking with an inspector. If you believe your employer has not corrected violations involving radiological working conditions, you may request an inspection. The request must specify exactly what is wrong and must be signed by the worker or worker representative. The agency will make all reasonable efforts to protect your identity where appropriate and possible.

REPORTING SAFETY CONCERNS
Inquiries dealing with the matters outlined above are to be made to the Radiation Protection Section. Agency representatives may be reached during normal weekday work hours (8 a.m. – 5 p.m.) **by phone at (919) 814-2250 or by mail to: Section Chief, NC Radiation Protection, 5505 Creedmoor Road, Suite 100, 1645 Mail Service Center, Raleigh, NC 27699-1600.**

RADIOACTIVE MATERIALS BRANCH INCIDENT 24 HOUR EMERGENCY LINE:
(919) 602-7151.
After normal hours, calls may be directed to the NC Emergency Management Operation Center at
(800) 858-0368.

EMPLOYMENT DISCRIMINATION
The North Carolina Employment Discrimination Bureau (EDB) enforces the Retaliatory Employment Discrimination Act (REDA). Employees who have questions about the application of REDA or employees who believe they have been discriminated or retaliated against, should contact the EDB information officer. They will advise you of the proper procedures to file a complaint. You may contact them by sending mail to N.C. Department of Labor, Employment Discrimination Bureau, 1101 Mail Service Center, Raleigh, NC 27699-1101 or by fax at (919) 807-2824 or by phone at (800) 625-2267 or fax (919) 807-2856 That website is **http://www.nclabor.com.**

www.ncdhhs.gov • N.C. DHHS is an equal opportunity employer and provider. • 5,000 copies of this public document were printed at a cost of $320.30 or $.06406 per copy. 9/19

Non-Ionizing Radiation SPP# 1910.97

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for non-ionizing radiation protection and safety of North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Radiation is a form of energy. Non-ionizing radiation has various effects on parts of the human body and can penetrate into the human skin. Certain pieces of equipment in NCDOT have the potential to expose employees to non-ionizing radiation.

This safety policy and procedure provides guidelines for the safe use of equipment and devices that are sources of non-ionizing radiation. It includes provisions for training, brief discussion of general hazards of non-ionizing radiation, and a listing of some of the common non-ionizing radiation equipment and devices used in NCDOT. Additionally, it presents the requirements for non-ionizing radiation recordkeeping.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure affects NCDOT employees in DMV Enforcement, Traffic Engineering, Highway Maintenance, Construction, Ferry, Aviation, and employees in any other operation who as a result of their job duties are exposed to non-ionizing radiation.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.97) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.200).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, non-ionizing radiation sources in NCDOT will be managed to minimize non-ionizing radiation exposure to employees. When non-ionizing radiation hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Non-Ionizing Radiation will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Non-Ionizing Radiation. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined under Section 6.3.

6.0 Procedure

This section provides definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Non-Ionizing Radiation.

6.1 Definitions

Electromagnetic Radiation
The portion of spectrum commonly defined as the radio frequency (RF) region, which includes high frequency (HF), very high frequency (VHF), ultra-high frequency (UHF), and the microwave frequency regions.

Non-Ionizing Radiation
Electromagnetic radiation in the radio frequency (RF) region between 30 MHz and 30 GHz. This radiation has sufficient energy to cause excitation of electrons, atoms, or molecules, but insufficient energy to cause the formation of ions.

Partial Body Irradiation
Exposure of a body part to the incident electromagnetic energy.

Radiation Protection Guide
Provides guidelines for radiation exposures. These radiation exposures can be continuous or intermittent and can pertain to either whole body or partial body irradiation.

Whole Body Irradiation
Exposure of the entire body to the incident electromagnetic energy.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- General Hazards
- Equipment Used in NCDOT
- Training Requirements
- Recordkeeping

6.2.1 Training

Employees who may be assigned to duties where they may be exposed to hazardous levels of non-ionizing radiation shall be instructed in the recognition and avoidance of hazards associated with non-ionizing radiation.

Special training is required for operators, users, installers, and repairmen of speed detection devices and other types of radar equipment such as weather or navigational radar. Those employees must be properly trained in the procedures for the safe performance of their assigned duties.

6.2.2 General Hazards

Employee radiation levels should not exceed those levels specified in the Radiation Protection Guide. The greater hazards are associated with the higher frequencies. It has been shown that some parts of the human body (e.g., brain, eyes, testicles) may be harmed by exposure to significantly excessive levels of non-ionizing radio frequency (RF) radiation.

6.2.3 Equipment Used in NCDOT

Some common equipment and devices used in NCDOT with varying levels of non-ionizing radiation include:

- Hand held radios (Walkie Talkies), cellular and portable phones
- Mobile radios
- Base stations
- Radar guns
- Navigational systems and weather radar

Appendix A presents detailed safety information on these equipment and devices.

6.2.4. Recordkeeping

NCDOT will maintain a record of employee exposures for employees that are required to wear personal monitoring equipment. Exposures will be disclosed to employees on an annual basis by his or her supervisor.

These records will be maintained for a period of not less than 30 years.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure that the necessary radio frequency energy emitting equipment and supplies are budgeted for and acquired. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

Managers/Unit Heads will ensure that supervisors are capable of recognizing and taking steps to avoid the exposure of any employee to non-ionizing radiation hazards.

6.3.2 Supervisors

Supervisors will ensure that all operators, users, installers, and repairmen of speed detection devices and other types of radar equipment, such as weather or navigational radar, have received the required training prior to performing any duties.

Supervisors will ensure that energy emitting equipment and test instruments are maintained in good repair for their intended use. Supervisors shall be thoroughly familiar with methods of recognizing and avoiding non-ionizing radiation hazards.

6.3.3 Employees

It is the responsibility of each employee to identify potential hazards when required to work with or near sources of non-ionizing radiation. It is also the responsibility of each employee to refrain from work involving exposure to potentially hazardous radiation levels without instruction/training specific to the hazards of the tasks involved. Additionally, close guidance by a responsible party trained in the recognition and avoidance of non-ionizing radiation hazards is also required for employees.

Employees will report suspected hazards to their immediate supervisor and are required to follow instructions by the trained responsible party in all matters of work with or near non-ionizing radiation sources.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure. The consultative and audit assistance may consist of surveys of RF emitting equipment and procedures.

APPENDIX A: Important Safety Information

General Information

- Fixed (base) and mobile radio (including aircraft and water vessel radios) station components, transmission lines, and antennas should be installed and maintained so as to confine RF radiation to antenna radiating elements themselves.
- All covers should be tightly installed and kept in place.
- Good grounding and tightly fitting transmission line (coaxial cable) connectors are essential in preventing potentially harmful levels of radiation leakage from transmission lines and other components of the system.
- Loose or damaged covers, loose cable or wiring connections, or crushed or damaged transmission line should be repaired immediately to prevent hazardous exposure.

Hand Held Radios (Walkie Talkies), Cellular and Portable Telephones

- Be sure to maintain an inch or more between your head and any part of the antenna when using these devices when power levels are greater than 2 or 3 watts.
- Always keep the tip of the antenna away from your head regardless of power level.
- Use remote antennas (roof, trunk, window mount, etc.) when and where possible.
- Never use hand held radios or telephones with damaged cases, damaged antennas, loose or missing components.

Mobile Radios

- Remain seated in the vehicle or maintain a safe distance (5 feet or more) from the antenna when transmitting.
- Never transmit if someone is in close proximity to or is touching the antenna.

Base Stations and Similar Moderate to High Power Installations (i.e., Ferry)

- Stay away from base station antennas and supporting structures.
- Never transmit if someone is near the antenna or working on the supporting structure.
- Personnel should never be within 15 feet of the station antenna or on the supporting structure when the radio is transmitting.

Fixed and Hand Held Speed Detection Devices (Radar Guns)

- Follow the manufacturer’s instructions for the safe use of these devices.
- Do not look into or point the antenna end of a radar gun toward people or animals.
- Avoid placing yourself in the path of a radar beam.
- Always turn off the power to a radar gun when not in use.
- Devices not in use should be stored in the manner prescribed by the manufacturer, never placed on your lap, between your legs, or otherwise in contact with or in close proximity to any part of your body.

APPENDIX A: Important Safety Information (Continued) 2

- All NCDOT employees that supervise the work of employees using hand held or stationary radar guns will inform those employees of the hazards associated with prolonged exposure to operation.

Speed Detection Device (Radar Gun) Maintenance

- All hand held or stationary radar guns will be maintained at 100% performance of operation.
- Devices suspected of malfunctioning in any fashion or with visible damage shall be immediately taken out of service and tagged as unserviceable.
- Supervisors are responsible for obtaining repair services, whenever required, and for scheduling annual service to ensure proper operation.

Special Training Required for Speed Detection Equipment Use

- Supervisors will ensure each employee whose job duties require the use of speed detection devices will be properly trained in the safe use, care, and storage of equipment.

Navigational Systems and Weather Radar

- Stay away from antennas. Never attempt to work on antennas during transmission.
- Use and maintain these systems according to the manufacturer's instructions.
- Follow all the requirements of the sections on high power stations and all radar safety information above.

Recordkeeping and Disclosure

- NCDOT will maintain a record of employee exposures for employees that are required to wear personal monitoring equipment.
- Exposures will be disclosed to employees on an annual basis by his or her supervisor.
- These records will be maintained for a period of not less than 30 years.

Hearing Conservation Program SPP# 1910.95

Select this Link to view latest Revision changes

Quick Reference

1.0 Purpose

This safety policy and procedure establishes the methods and responsibility for implementing the North Carolina Department of Transportation (NCDOT) Hearing Conservation Program (HCP) to prevent hearing impairment of NCDOT employees in accordance with OSHA regulations.

Exposure to noise levels equal to or greater than 90dBa can be permanent and may be compensable under North Carolina Workers' Compensation (WC). The risk to noise can have a personal and an economic consequence as well as permanent health consequence.

2.0 Scope and Applicability

This safety policy and procedure provides guidelines for implementing the HCP. The program includes the identification and control of noise within work areas through engineering means and administrative control of employee noise exposure along with the selection and use of hearing protectors. It also details the areas of responsibility for managers/unit heads, supervisors and employees within NCDOT. Additionally, this safety policy and procedure sets forth requirements for noise exposure surveys, audiometric testing, recordkeeping, employee training in the use of hearing protection, and an evaluation of program effectiveness. The HCP is integrated with NC WC requirements.

Specific applicability for employee enrollment in the program shall be determined based on noise exposure levels: Employees with noise exposures that equal or exceed an 8-hour Time Weighted Average (TWA) sound level of 85 dBA or experience a noise level 90 dBA or greater.

3.0 Reference

This safety policy and procedure is established in accordance with OSHA standards 29 CFR 1910.95, 29 CFR 1915.95, 29 CFR 1926 parts .21, .52 and .101.

4.0 Policy

It is the policy of the NCDOT to provide a safe working environment without exposure to excessive noise levels. NCDOT shall take measures to reduce workplace noise to acceptable levels. Where such measures fail to reduce sound levels adequately, employees will be provided hearing protection and enrolled in the HCP at no cost to the employee.

NCDOT shall implement engineering, administrative controls or provide personal protective equipment to reduce noise exposure below 85 dBA.

5.0 General Responsibilities

It is the responsibility of each individual within NCDOT who supervises the work of others to ensure implementation of NCDOT's HCP.

It is the responsibility of each employee included in NCDOT's HCP to follow the HCP guidelines to reduce the exposures to noise.

6.0 Procedure

This section provides applicable definitions, general provisions and responsibilities required by HCP.

6.1 Definitions

Action Level (OSHA)
An exposure to an 8 hour time weighted average (TWA) of 85 decibels.

Administrative Controls
Procedures that limit the daily exposure to noise by controlling an employee's work schedule in a high noise environment.

Area Monitoring
The monitoring of noise levels in any particular area, without regard to employee occupation of the area.

Audiogram
A chart, graph, or table showing an individual's hearing threshold levels as a function of frequency. Frequencies that will be tested are: 0.5k, 1k, 2k, 3k, 4k, 6k and 8k.

Audiometric Zero
This term is in the appendix and could be defined there, but it needs to be defined. Audiometric Zero is the baseline for considering a Standard Threshold Shift.

Baseline Audiogram
The audiogram used as a reference for comparing hearing acuity with future audiograms. This may also be called a reference, pre-placement or entrance audiogram.

dBA
Decibels, A-weighted - A sound level reading in decibels made on an A-weighted network of a sound level meter (SLM) set to slow response.

Dose
The cumulative amount of noise exposure a person receives over a specified period of time.

Engineering Controls
A mechanical device or physical barrier that reduces exposure to sound from a noise source.

Hierarchy of Controls
Controls used to reduce noise exposure should follow the hierarchy in sequence as follows: engineering controls, administrative controls and PPE (hearing protection)

Hearing Conservation Program (HCP)
A program that includes noise exposure evaluation, periodic audiometric testing, and development and implementation of controls to prevent permanent hearing loss.

Noise Dosimeter
An electronic instrument that integrates a function of sound pressure over a time period such that it indicates a noise dose for that time period.

Permissible Exposure Limit (PEL)
The maximum permissible noise exposure level, defined by OSHA as 90 decibels, time weighted average, on an A weighted scale.

Personal Monitoring
Monitoring noise exposure using instruments that continuously record noise levels as the employee performs routine tasks.

Sound Level Meter
An electronic instrument for the measurement of sound levels.

Standard Threshold Shift
An average hearing threshold shift of 10 dB or more in one ear or both ears at the 2k, 3k and 4k hertz octave. This shift may be temporary or permanent.

Time Weighted Average
The sound level which, if constant over an 8 hour (TWA) workday exposure, would result in the same noise dose as measured.

6.2 General Provisions

The general elements of a HCP (HCP) are identified in the OSHA standard, 29 CFR 1910.95. These elements, as they pertain, are adopted for NCDOT as follows:

6.2.1 Monitoring Employee Exposure

Unless an employee is included in the Hearing Conservation Program, Exposure Monitoring shall be conducted whenever it is suspected that an employee's exposure routinely equals or exceeds a Time Weighted Average of 85 dBA or 90 dBA for any length of time. Noise monitoring may include personal monitoring and area sampling of continuous, intermittent, and impulse sound levels.

Personnel conducting noise monitoring shall be trained to conduct noise surveys. All sound level measuring instruments will be of the appropriate type and will be calibrated before and after use to assure accuracy.

Personal monitoring should be repeated whenever a change occurs in the work that increases the exposure levels, e.g.: exposure for a longer time or exposure to higher noise levels.

Employees routinely exposed to noise levels at or above the action level shall be included in the HCP. Employees with noise exposure below the action level but have a history of exposure above the action level shall be included in the HCP for periodic monitoring.

6.2.2 Employee Rights

Employees shall be notified in writing whenever their monitored exposures are at or above the 85 dBA TWA.

Once enrolled in the HCP, employees shall receive an initial baseline audiogram and shall be retested annually for as long as they remain exposed to noise levels at or above the action level. These tests shall be conducted at no charge to the employee.

Employees may choose from a variety of styles of hearing protection and shall be instructed in how to wear and maintain the protection selected.

Employees shall have access to their monitoring and audiometric testing records.

Employees shall be allowed to observe area noise monitoring relative to their noise exposure.

6.2.3 Audiometric Testing

If it is suspected that an employee is routinely exposed at or above the action level, has any exposure at or above 90 dBA, or has a history of exposure above the action level, the employee shall be included in the HCP. and a baseline audiometric test shall be conducted as soon as is practicable, but at least within 6 months of exposure.

Audiometric testing shall be conducted by properly certified or licensed audiologists, otolaryngologists, physicians or technicians.

Audiometric tests must not be conducted until the employee has at least 14 hours without exposure to workplace noise (such as over a weekend) or has been furnished and has worn hearing protection for this period.

Annual testing shall be conducted if an employee continues to be routinely exposed to an 8 hour TWA of 85 dBA or more and/or is exposed to 90 dBA or higher at any time during the employee work shift.

Annual testing shall include a comparison of an employee's baseline audiogram with the annual audiogram to determine if a threshold shift has occurred.

If a standard threshold shift is indicated, the employee shall be notified in writing by Division/Unit management within 21 days from receipt of testing results. A retest audiogram should be taken within 30 days and the results of the retest may be accepted as the annual audiogram.

6.2.4 Standard Threshold Shift (STS)

Any STS must be considered work-related unless the case is evaluated by a physician or other licensed professional and determined to be not work-related. This evaluation shall be paid for by the Division/unit.

An employee who experiences a STS, and who is already wearing hearing protection shall be refitted and retrained on its use.

Any employee who has experienced a STS, whom the audiologist suspects has or has had a medical problem causing or affecting the STS, may be referred to a physician for additional clinical audiometric testing or ontological examination at no cost to the employee. This includes medical problems caused or aggravated by the use of hearing protection.

When a work related STS is indicated, it must be recorded on the OSHA 300 log as a hearing loss case. The date listed for the case shall be the date that the STS is first diagnosed.

Cases that are determined, by a licensed professional to be not work related need not be recorded or can be stricken from the OSHA 300 log.

If initial testing indicates an employee has experienced a STS, a confirmatory follow-up audiometric test should be conducted. If the retest also indicates a STS, the date of the confirmation shall be the date listed on the OSHA log.

REFER TO APPENDIX A; Decision Tree for Hearing Loss OSHA Recordable

6.2.5 Hearing Protection

Employees shall be provided with and required to wear hearing protection when exposed to 85 dBA or greater averaged over an 8-hour workday. A variety of hearing protectors shall be available for employee selection.

All hearing protection devices shall be properly fitted to the employee and their use shall be supervised. Employees shall be trained on the use and care of hearing protection.

Replace hearing protection whenever it becomes too worn to effectively protect the employee.

Hearing protection must be adequate to reduce employee exposure to 90 dBA or below if no STS has occurred, or to 85 dBA or below if a STS has occurred.

All equipment and work areas identified as louder than 85 dBA or above shall be placarded or posted that hearing protection is required. Figure 1 shows examples of Hearing Protection Required signage.

Figure 1

6.2.6 Training Program

Training programs shall include information on NCDOT's HCP, the effects of noise on hearing, purpose of hearing protection, advantages, disadvantages and the characteristics of various types of hearing protection.

Training includes the proper selection, fitting, use and care of different varieties of hearing protection.

Training includes an explanation on the purpose and methods of audiometric testing. Refresher training shall be given annually for all employees included in the HCP.

Employees experiencing a STS shall be retrained on the use of hearing protection.

6.2.7 Recordkeeping

1. Records of area noise monitoring shall be accurately maintained for (5) years.

2. All employee audiometric test records shall be maintained for the duration of employment plus 5 years. Records shall then be handled according to the records retention policy.

3. Audiometric test records shall include:
   a) Name and job classification
   b) Date of the audiogram
   c) Results of audiogram
   d) Examiner's name
   e) Date of audiometer calibration
   f) Employee's most recent noise exposure assessment
4. Records shall be provided on request to employees, former employees, and OSHA compliance officers.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for supporting the costs of baseline audiometric testing and routine annual audiometric testing.

Managers/Unit Heads shall ensure that engineering or administrative control alternatives are evaluated and implemented before including employees in the HCP.

Managers/Unit Heads are responsible for budgeting for annual audiometric testing, and employee training, and hearing protection.

6.3.2 Supervisors

Supervisors are responsible for requesting and coordinating noise monitoring in their area with Safety staff.

Supervisors shall ensure employees included in the HCP have baseline and annual audiometric testing done and attend training. Supervisors should coordinate testing and training with Safety staff.

The supervisor shall ensure that employee audiometric test records are maintained in the unit personnel files.

Supervisors are responsible for enforcing the use of hearing protection.

Supervisors shall ensure that an adequate supply and variety of hearing protection is maintained in their inventory.

Supervisors shall conduct an incident investigation for any STS case to determine the causes and to identify and implement corrective action.

The supervisor is responsible for ensuring a confirmed STS is recorded as a hearing loss case on the OSHA 300 log.

The supervisor is responsible to ensure employees are notified of their audiogram results within 21 days of receiving the report on their hearing tests and the results of noise monitoring. See Section 6.2.3 for details.

6.3.3 Employees

Employees must inform their supervisor if a change occurs in the workplace that results in increased noise exposure, e.g.: noise levels are higher or exposure is longer.

Employees shall use noise control measures or shall wear and maintain hearing protection as required.

Employees shall attend training on noise exposure and the requirements of the HCP.

Employees included in the HCP shall have medical evaluations and follow-up audiograms as scheduled by NCDOT as a condition of employment.

Employees are to report any complicating medical problems to their supervisor as soon as possible.

6.3.4 Division/Unit Safety

1. Division/Unit Safety are responsible for HCP training. Training programs shall include:
    a. The effects of noise on hearing.
    b. The purpose, care, selection, fitting, and maintenance of hearing protectors.
    c. The results of any noise tests conducted in the work area.
    d. The purpose and methods of audiometric testing.

2. Division/Unit Safety are responsible for enrolling and maintaining a list of employees in the HCP, as required.

3. Division/Unit Safety are responsible for monitoring areas or jobs for high noise exposures, as identified by supervisors, and for recommending corrective action to address possible over-exposures.

4. Division/Unit Safety shall ensure employees are notified of their audiogram results within 21 days of receiving the report on their hearing tests and the results of noise monitoring.

5. Division/Unit Safety shall record on the OSHA log 300 all occurrences of STS.

6. Division/Unit safety staff shall ensure an incident investigation for any STS case is conducted to determine the causes and to identify and implement corrective action.

7. Division/Unit safety shall post all high noise areas and equipment.

8. Division/Unit safety shall maintain records of work area noise testing for 5 years.

6.3. 5 Safety and Risk Management

Safety and Risk Management shall provide oversight, general administration, and monitoring of NCDOT's Hearing Conservation Program.

Safety and Risk Management shall have the responsibility of selecting and contracting with the audiometric testing provider.

Safety and Risk Management shall recommend the most effective hearing protection available.

Safety and Risk Management shall review audiometric test data for trends and develop plans for reduction in hearing loss.

Safety and Risk Management shall ensure the Audiometric testing Contractor coordinates and conduct annual audiometric tests with the Division/Unit safety staff.

Safety and Risk Management shall ensure the NCDOT Audiometric Contractor evaluates baseline and annual audiograms to establish a hearing threshold and annual retests for comparison to the baseline to determine if a STS has occurred.

Safety and Risk Management shall evaluate the NCDOT Audiometric Contractor for compliance with all requirements of the OSHA standard on hearing conservation including test location, equipment calibration, and recordkeeping requirements.

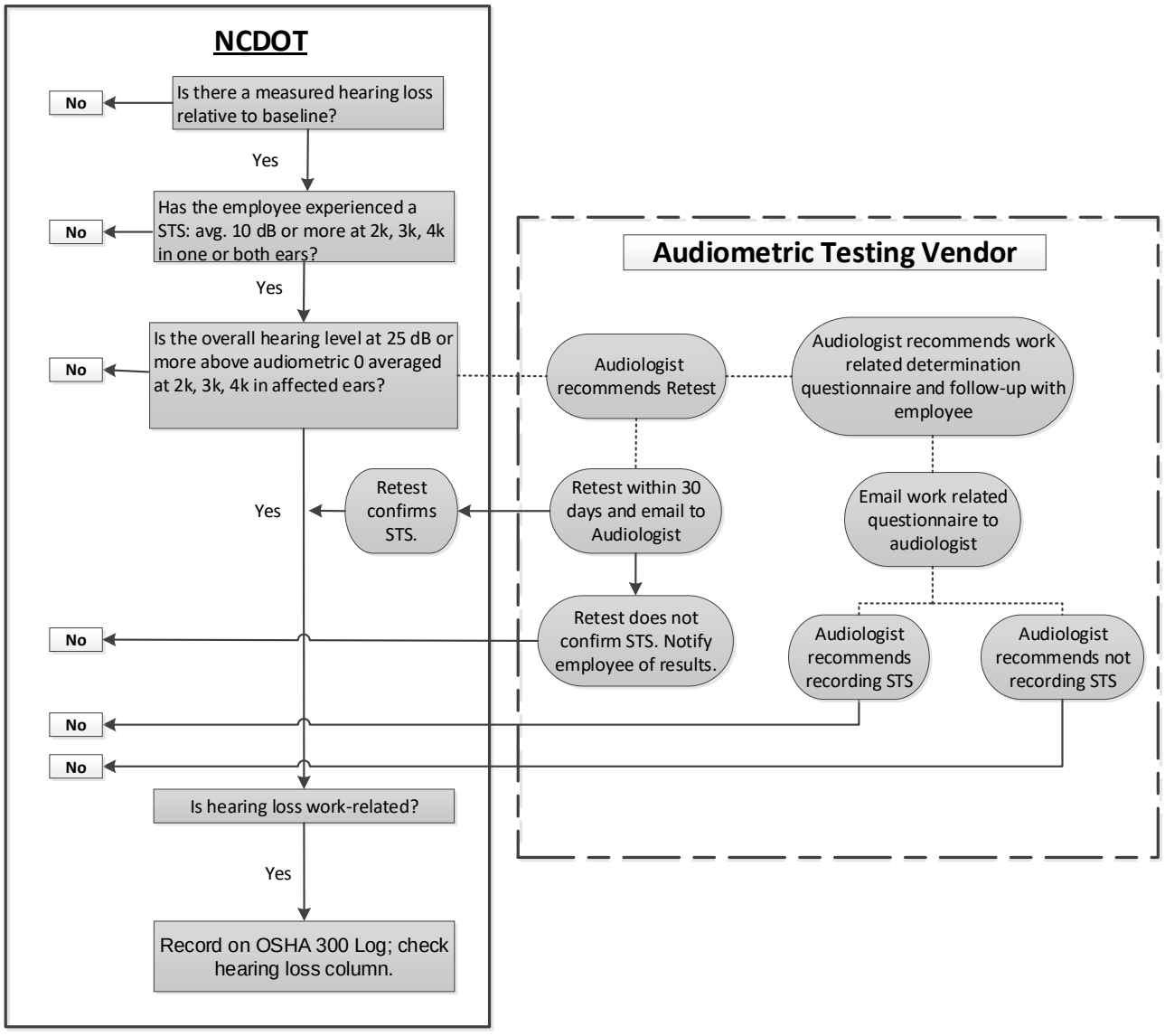
Safety and Risk Management shall ensure the NCDOT Audiometric Contractor provides a written letter to the employee with the results of the audiometric testing and any further testing that may be required. The letter template shall be approved by S&RM before it is used by the contractor.

6.3.5 Central Equipment Unit

Central Equipment Unit shall support Divisions/Units with the selection and purchase of equipment and/or modification of equipment as required to reduce employee exposure to noise. Specifications for new equipment should include maximum noise exposure of 85 dBA inside the cab of equipment if applicable.

APPENDIX A: DECISION TREE TO DETERMINE IF A HEARING LOSS IS RECORDABLE

DECISION TREE TO DETERMINE IF HEARING LOSS IS RECORDABLE



Ventilation SPP# 1910.94

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to provide guidelines for general and workplace ventilation to protect North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Certain indoor workplace operations in NCDOT can degrade the air quality such that it may have an adverse effect on employee health and productivity. However, good ventilation can supply or remove air to contribute to the comfort and efficiency of employees.

This safety policy and procedure provides guidelines for general and workplace ventilation to protect NCDOT employees who may be exposed to poor air quality in their workplace. It provides provisions for training, a discussion on general ventilation requirements, local exhaust ventilation requirements, and a detailed discussion of NCDOT workplace ventilation applications.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure applies but is not limited to the following operations in NCDOT:

- Welding
- Confined Spaces
- Abrasive Blasting
- Grinding, Polishing, and Buffing
- Spray Finishing
- Vehicle Maintenance Shops
- Materials and Tests Chemical Lab

This safety policy and procedure also applies to all NCDOT employees affected by poor air quality due to ventilation and workplace conditions.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.94).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, adequate ventilation must be in place and operating properly wherever there is confirmed poor air quality in the workplace. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Ventilation will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's policy on Ventilation. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT’s safety policy and procedure on Ventilation.

6.1 Definitions

Clean Air
Air of such purity that it will not cause harm or discomfort to an individual if it is inhaled for extended periods of time.

Abrasive Blasting
The forcible application of an abrasive to a surface by pneumatic pressure, hydraulic pressure, or centrifugal force.

Exhaust Ventilation System
A system for removing contaminated air from a space.

Fan
Mechanical device that is used to move air.

Air Inlet
Opening through which outside air enters an enclosed space or building.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- General Ventilation
- Local Exhaust Ventilation
- NCDOT Workplace Ventilation Applications

6.2.1 Training

Employees who work in the workplace covered by this safety policy and procedure shall receive basic awareness training of:

- The importance of ventilation
- How to recognize poor air quality
- How the ventilation system(s) works in their job area

This training shall be done upon initial employment or job reassignment. Refresher training shall be at the discretion of the supervisor.

6.2.2 General Ventilation

General ventilation refers to the ventilation processes that provide thermal comfort and dilution. Thermal comfort ventilation is used to provide cooling and heating. Dilution ventilation is the process of using clean air to reduce the level of concentration of contaminants in a building or space.

Thermal comfort ventilation is usually installed in NCDOT's office spaces, office buildings, and various other buildings and structures where no specific workplace activity is generating and introducing air contaminants into the indoor air space. Thermal comfort ventilation treats the air to control its temperature, humidity, cleanliness, and distribution.

Dilution ventilation moves contaminated air away from employees and moves fresh air by occupied areas toward contaminant sources. Dilution ventilation is normally used when local exhaust ventilation is impractical.

Dilution ventilation does not always reach local sites in a space where contaminant concentrations may exceed safe levels. If contaminants are highly toxic or very flammable, then dilution ventilation is not a good choice for contaminant control. Dilution ventilation works best where contaminant generation is uniform and the rate of generation is low. Figure 1 presents poor, fair, good, and best locations for fans and air inlets for dilution ventilation.

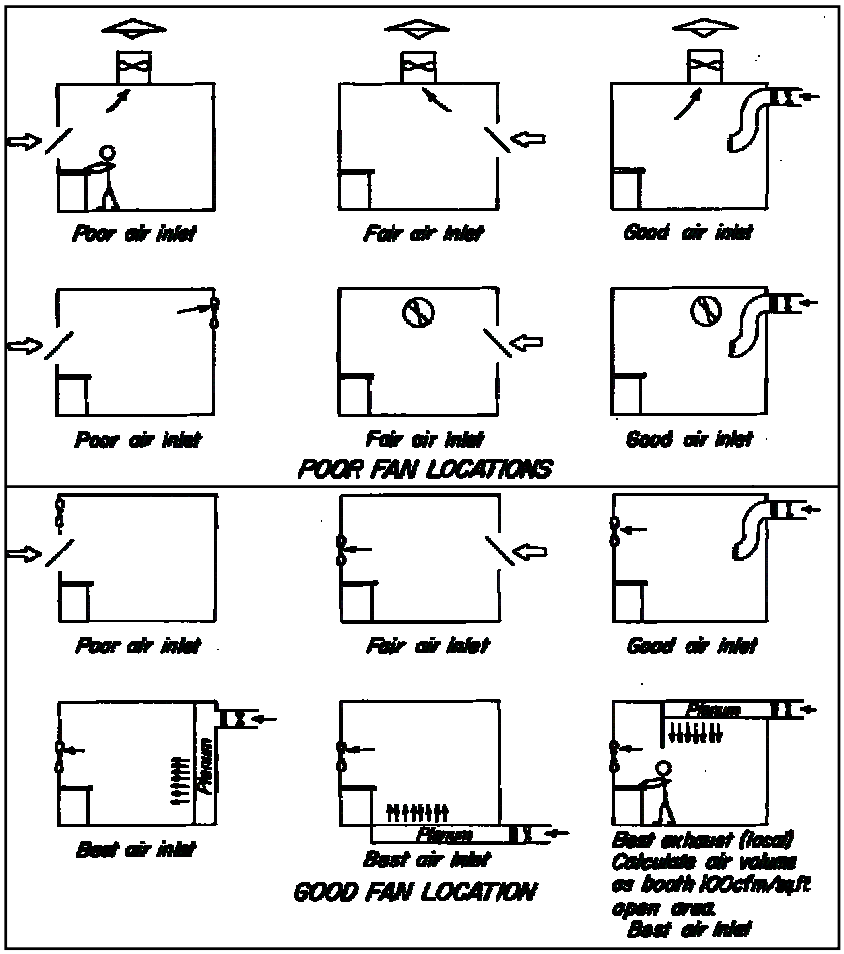


Figure 1

6.2.3 Local Exhaust Ventilation

Local exhaust systems operate on the principle of capturing a contaminant at or near its source.

Local exhaust systems are comprised of five basic components:

- The hood
- The duct system
- The air cleaning device
- The fan
- The stack

Figure 2 presents a typical local exhaust system configuration. The hood collects the contaminant in an air stream directed toward the hood. The duct system transports the contaminated air to the air cleaning device, if present, or to the fan. The stack disperses any remaining air contaminants. Figure 3 presents the types of hoods that are typically used with local exhaust systems.

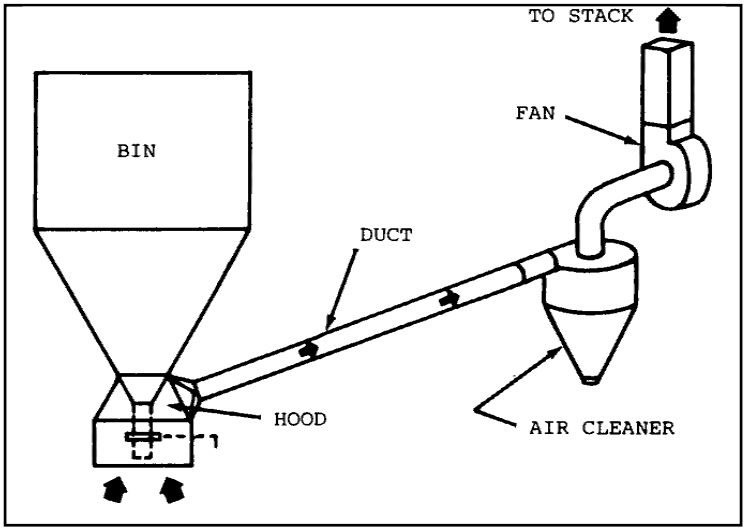


Figure 2

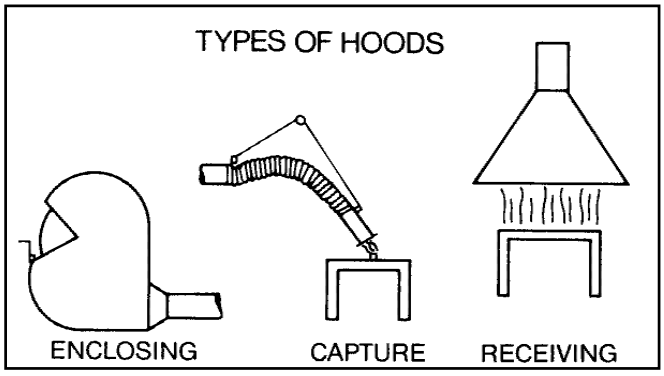


Figure 3

6.2.4 NCDOT Workplace Ventilation Applications

The NCDOT workplace ventilation applications include:

- Welding
- Confined Spaces
- Abrasive Blasting
- Grinding, Polishing, and Buffing
- Spray Finishing Operations
- Vehicle Maintenance Shops
- Materials and Tests Chemical Labs

Welding activities require ventilation if all of the following conditions exist:

- The welding space is less than 10,000 cubic feet (ft^3) per welder
- The ceiling height is less than 16 feet
- The welding space contains partitions, balconies, or other structural barriers that obstruct cross-ventilation

Welding ventilation options include local exhaust, local forced, or dilution ventilation. Local exhaust ventilation is preferred. Dilution ventilation is usually not satisfactory but if it is used, it should be at a rate of 2,000 cubic feet (ft^3) per minute per welder. Local exhaust hoods should be freely movable and be placed as near as practical to the work being welded. See SPP # 1910.252, Welding, for related information.

Natural ventilation is sufficient for welding if all the following conditions exist:

- The welding space is more than 10,000 cubic feet (ft^3) per welder
- The ceiling height is greater than 16 feet
- The welding space contains no partitions, balconies, or other structural barriers

Confined spaces can have a variety of hazards. Therefore, ventilation measures should match the hazards that are present. Typically air flushing (purging or replacement) is first performed to lower any toxicity, flammability, and/or threshold limit values to safe levels.

Figure 4 illustrates a typical ventilation flush and purge operation for a confined space. Figure 5 illustrates recommended duct positions for uniform dilution and elimination of hazardous atmospheres. If the flush and purge ventilation is not successful in lowering the toxicity, flammability and/or threshold limit values, then PPE with air supplied or self contained air respirators should be specified to match the hazard. See SPP# 1910.146, Confined Space Entry for related information.

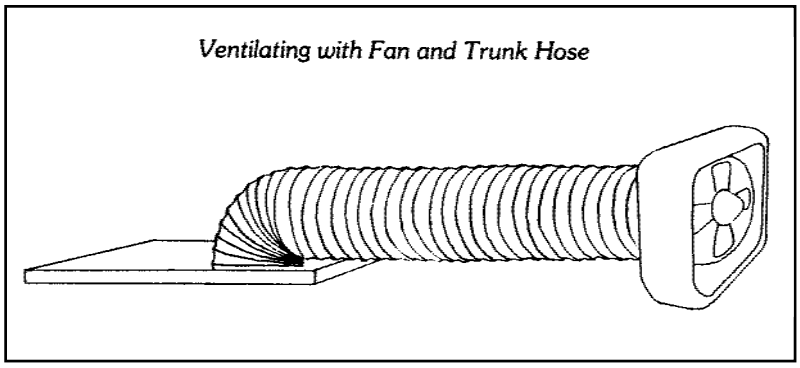


Figure 4

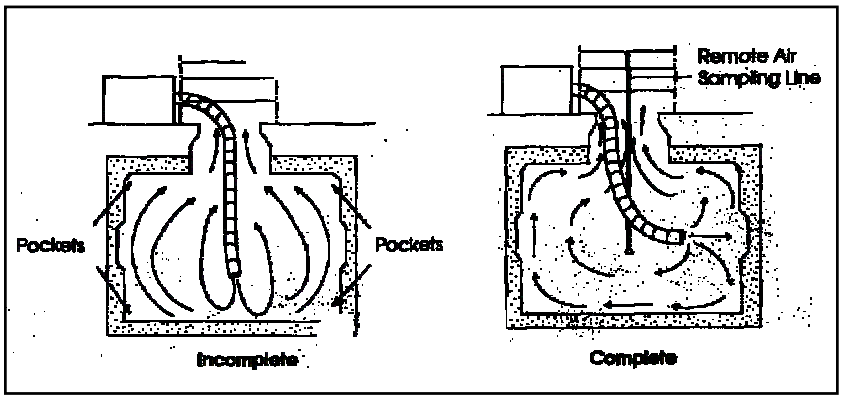


Figure 5

Abrasive blasting operations pulverize and shatter materials into fragmented material pieces and respirable size dusts. Therefore, this operation should be performed in an enclosure (e.g., room, etc.) with exhaust ventilation that will promptly capture the abrasive dust particles.

The exhausted air from the abrasive blasting operation shall be discharged through dust collecting equipment or any type of air cleaning device. The accumulated dust should be periodically emptied and removed without contaminating other work areas.

Grinding, polishing, and buffing equipment can include several types of equipment in various configurations. Grinding, polishing, and buffing configurations used in NCDOT include:

- General grinding wheel
- Horizontal single-spindle disc grinder
- Horizontal double-spindle disc grinder
- Swing-frame wheel grinder
- Vertical spindle disc grinder
- Polishing and buffing wheels

Each of these configurations have minimum required exhaust volumes based on wheel or disc diameter size. Exhaust ventilation systems will be required on these configurations whenever employee exposure to an air contaminant exceeds its threshold limit value or permissible exposure level. All hoods that are connected to the exhaust system shall be located such that all dirt and dust particles shall fall and be projected into the hoods away from the operator's breathing zone.

Spray finishing operations in NCDOT include spray booths and spray rooms. Spray rooms include those areas where spray finishing operations are performed in an enclosed separated area. Both spray booths and spray rooms are used to enclose or confine all spray finishing operations. Spray finishing application configurations include:

- Electrostatic
- Automatic airless
- Air-operated guns, manual or automatic

An adequate air replacement system inside the spray booth or spray room shall be in place to introduce replacement air upstream or above the object being sprayed.

Exhausted air from the spraying operation shall dilute the solvent vapor to 25 percent of the lower explosive limit of the solvent being sprayed. Appendix A presents the lower explosive limits of common solvents and a formula to determine the cubic feet air volume required to dilute a vapor to 25 percent of the lower explosive limit. See SPP# 1910.107, Spray Finishing, for related information.

Vehicle maintenance shops in NCDOT include areas where vehicles are parked while maintenance is being performed. Flexible exhaust hoses shall be available to install on vehicle tailpipes. These flexible exhaust hoses should exhaust to a common duct and eventually exhaust to the outside air at roof level. This practice minimizes the buildup of carbon monoxide emissions in the vehicle maintenance shop. All flexible exhaust hoses should be in good condition and contain no punctures.

Materials and Tests Chemical laboratory has a number of chemicals that can present health hazards when used. Flammable gases, toxic, or noxious odor chemicals should be handled under a laboratory fume hood.

The laboratory fume hood should be designed and located such that an adequate air capture velocity will draw all hazardous vapors out of employee's breathing zones. Cross and room drafts across the hood may alter its effectiveness. These cross and room drafts should be minimized.

A narrow strip of tissue paper can be used to indicate that the hood is operating properly. The paper should be lowing (bent) towards the air intake. See SPP# 1910.1450, Exposure to Hazardous Chemicals in Laboratories, for related information.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of ventilation equipment and related supplies. They will also be responsible for identifying the employees and workplaces affected by this safety policy and procedure and will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that proper and adequate ventilation configurations are installed for the workplace applications outlined in this safety policy and procedure. They will also ensure that employees are not allowed to work in these workplace applications if proper and adequate ventilation is not in place.

6.3.3 Employees

Employees shall report workplace conditions requiring ventilation to their immediate supervisor. Additionally, employees shall comply with all the applicable guidelines contained in this safety policy and procedure.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training.

Safety and Loss Control will work with Purchasing and Central Equipment Unit to ensure that all newly purchased ventilation equipment comply with this safety policy and procedure and current safety regulations.

The Industrial Hygienist will provide technical guidance on:

- Existing ventilation system configurations to ensure they are designed and operating properly
- Design of new ventilation systems prior to installation

The Industrial Hygienist and Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Lower Explosive Limit of Commonly Used Solvents

Solvent	Cubic feet per gallon of vapor (V_{CF}) of liquid at 70° F.	Lower explosive limit (LEL) in percent by volume of air at 70° F.
Acetone	44.0	2.6
Amyl Acetate (iso)	21.6	1.0
Amyl Alcohol (n)	29.6	1.2
Amyl Alcohol (iso)	29.6	1.2
Benzene	36.8	1.4
Butyl Acetate (n)	24.8	1.7
Butyl Alcohol(n)	35.2	1.4
Butyl Cellosolve	24.8	1.1
Cellosolve	33.6	1.8
Cellosolve Acetate	23.2	1.7
Cyclohexanone 1,1	31.2	1.1
Dichloroethylene 1,2	42.4	5.9
Dichloroethylene	42.4	9.7
Ethyl Acetate	32.8	2.5
Ethyl Alcohol	55.2	4.3
Ethyl Lactate	28.0	1.5
Methyl Acetate	40.0	3.1
Methyl Alcohol	80.8	7.3
Methyl Cellosolve	40.8	2.5
Methyl Ethyl Ketone	36.0	1.8
Methyl n-Propyl Ketone	30.4	1.3
Naphtha (VM&P) (76° Naphtha)	22.4	0.9
Naphtha (100° Flash) Safety Solvent	23.2	1.0
Propyl Acetate (n)	27.2	2.8
Propyl Acetate (iso)	28.0	1.1
Propyl Alcohol (n)	44.8	2.1
Propyl Alcohol (iso)	44.0	2.0
Toluene	30.4	1.4
Turpentine	20.8	0.8
Xylene	26.4	1.0

APPENDIX A: Lower Explosive Limit of Commonly Used Solvents (Continued) 2

To determine the volume of air in cubic feet necessary to dilute the vapor from 1 gallon of solvent to 25 percent of the lower explosive limit, use the following equation:

$$V_D = \frac{4(100 - LEL)(V_{CF})}{LEL}$$

Where: V_D = Dilution volume required per gallon of solvent

LEL = Lower explosive limit for a given solvent

V_{CF} = Cubic feet of vapor per gallon

Example:

Using toluene as the solvent:

LEL of toluene is 1.4 percent

V_{CF} of toluene is 30.4 cubic feet per gallon

Then,

$$V_D = \frac{4(100 - 1.4)(30.4)}{1.4} = 8{,}564 \text{ cubic feet}$$

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Electrical Protective Devices SPP# 1910.137

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish the guidelines for the use of Electrical Protective Devices within North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

Selected NCDOT employees work around electrical energy in the performance of their jobs. Electrical Protective Devices are a special class of Personal Protective Equipment (PPE). This special class of PPE provides a nonconductive barrier for employees who work near and around hazardous electrical energy sources.

This safety policy and procedure includes provisions for training, discussion on the importance of using and testing rubber insulating gloves, requirements on rubber matting, and conditions for rubber matting replacement.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure affects all Traffic Services Technicians, Bridge Maintenance, and Electrical employees who as a result of their job duties work on energized equipment. In addition, it covers employees who could possibly be exposed to energized equipment.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.137).

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, work will not be performed around hazardous electrical energy sources without the proper electrical protective devices. When energy hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Electrical Protective Wear will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Electrical Protective Devices. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Electrical Protective Devices.

6.1 Definitions

Breakdown
The electrical discharge or arc occurring between the electrodes and through the equipment being tested.

Electrical Devices
Any equipment or device that is charged or operated by electrical current and has the potential for release of energy while repairs or maintenance are being performed.

Flashover
The electrical discharge or arc occurring between electrodes and over or around, but not through, the equipment being tested.

Ozone
A very active form of oxygen which may be produced by corona, arcing, or ultraviolet rays.

Personal Protective Equipment (PPE)
In reference to this policy, PPE will include isolation equipment such as insulating rubber gloves and insulating rubber matting.

Rubber
A generic term that includes elastomers and elastomeric compounds, regardless of origin.

Voltage, Maximum Use
The AC voltage rating of the protective equipment that designates the maximum nominal design voltage of the energized system that may be safely worked.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Use of Rubber Insulating Gloves
- Testing of Rubber Insulating Gloves
- Use of Rubber Matting
- Rubber Matting Replacement

6.2.1 Training

Employees who work around hazardous electrical energy shall be trained in:

- Hazards associated with electrical energy
- Use of electrical protective equipment
- Limitations of electrical protective equipment

6.2.2 Use of Rubber Insulating Gloves

Two types of rubber insulating gloves will be used by NCDOT as a portable device for protecting employees from contact with live electrical conductors:

- Low voltage, Type I (being non-resistant to ozone breakdown), Class 0 (capable of withstanding 5,000 volts)
- High voltage, Type I (being non-resistant to ozone breakdown), Class 1 (capable of withstanding 10,000 volts)

Insulating rubber gloves are required to prevent employee electrocution from accidental contact with energized equipment. *(Traffic Signal Technicians are not required to wear rubber gloves when servicing single phase, 120 volt source traffic signal cabinets.)* They shall not be used as primary protection. Primary protection measures include grounding and deactivation. Rubber gloves must be visually inspected prior to each use to verify integrity and electrical continuity tests. Each glove must be conspicuously marked with last test date and expiration date.

In addition to rubber gloves, leather gloves will be worn over rubber gloves to ensure they are not punctured or damaged during their use.

6.2.3 Testing of Rubber Insulating Gloves

Rubber insulating gloves will be tested annually to ensure that their protective ability against shock has not been compromised. This testing will be performed by Safety Test Co., located in Shelby, North Carolina. The gloves will be approved and stamped for use or replaced when necessary.

6.2.4 Use of Rubber Matting

Employees working on energized or potentially dangerous equipment will be provided with rubber matting on which to stand. *(An exception to this occurs when Traffic Signal Technicians are servicing traffic signal cabinets that reside on concrete pads.)* This matting will be capable of withstanding an electrical charge of 30,000 volts.

6.2.5 Rubber Matting Replacement

Rubber matting will be replaced on an annual basis (without testing) to ensure its capability to eliminate injury.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure that adequate funds are available and budgeted for the purchase of electrical protective devices in their areas. They will also identify the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities associated with this safety policy and procedure.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will ensure that employees are provided with the proper PPE for their jobs.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training. Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased electrical protective equipment complies with current safety regulations.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Personal Protective Equipment SPP# 1910.132

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to eliminate or minimize North Carolina Department of Transportation (NCDOT) employee exposure to work hazards.

2.0 Scope and Applicability

The use of Personal Protective Equipment (PPE) to eliminate injuries is an important component of NCDOT's safety program. PPE includes all clothing and accessories designed to create a barrier against workplace hazards. PPE should be considered a means of controlling hazards only after engineering controls, administrative controls, and safe work practices have been implemented.

This safety policy and procedure establishes the methods and accountability for

implementing the NCDOT Personal Protective Equipment (PPE) Program. It provides guidelines for selecting PPE based on the hazard. It includes provisions for training and discussion on the need for hazard assessments. It also presents PPE requirements for the head, eye and face, ear, hand, foot and leg, body and respiratory system. Additionally, this safety policy and procedure presents discussion on fall protection requirements and the use and maintenance of PPE.

This document details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects any employee who is exposed to hazards that require PPE.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.132-137) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.95-107).

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. PPE shall be specified, appropriate to the hazard, only after engineering practices, administrative practices, and safe work practices have been implemented to control the hazard(s). Proper training regarding PPE will also be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on PPE. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

It is the responsibility of NCDOT to provide and maintain equipment that is adequate and is safe in design and construction.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT's policy on PPE.

6.1 Definitions

ANSI
American National Standards Institute.

PPE
Personal Protective Equipment.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Hazard Assessment
- Head Protection
- Eye and Face Protection
- Ear Protection
- Hand Protection
- Foot and Leg Protection
- Body Protection
- Respiratory Protection
- Fall Protection
- Use and Maintenance

6.2.1 Training

Training will be provided in the use of PPE.

Employees will be trained in:

- Hazard awareness
- When PPE is necessary
- How to don, remove, adjust, and wear PPE
- Limitations of PPE
- Proper care, maintenance, useful life, and disposal of PPE

Refresher training will be given annually. All employees must be trained before the specific PPEs are put into use. No employee shall be at risk at any time without knowledge of the proper PPEs to reduce the risk. Additionally, supervisors will be trained in conducting hazard assessments to ensure the appropriate PPE is matched to the hazard.

6.2.2 Hazard Assessment

A hazard assessment will be performed in the workplace to determine and identify all hazards that would necessitate PPE.

Typically, the hazard assessment will consist of:

- A walk-through survey to identify hazard sources based on general hazard categories
- Observation of the sources
- Organizing data from the survey
- Analyzing data from the survey

The basic hazard categories that should be considered in the walk-through survey are:

- Impact
- Penetration
- Compression (roll-over)
- Chemical
- Heat
- Harmful dust
- Light (optical radiation)

Appendix A presents a hazard assessment form for use throughout NCDOT. This hazard assessment form can provide the user with a formal and accurate assessment of worksite hazards. This form focuses on head, eye and face, hand and arm, and foot and leg hazards. Forms of hazard assessments are already in place in NCDOT's Hearing Conservation Program (noise hazards), SPP# 1910.95, and Respirator Program (respiratory hazards), SPP# 1910.134. Keys to hazard assessment are recognizing, evaluating, and controlling hazards. During the assessment a determination will be made if the hazard can be eliminated.

Wherever possible, engineering and administrative controls should be used first to eliminate or reduce employees' exposure to any workplace hazard.

If hazards are present, then a hazard analysis shall be done so NCDOT can:

- Select the types of PPE that will protect the affected employee from the identified hazards
- Communicate selection decisions to each affected employee
- Select PPE that properly fits each affected employee

Appendix B presents hazard analysis forms which determine the highest overall hazards and helps select the appropriate PPE for those hazards. The hazard analysis provides a convenient format and methodology for organizing and analyzing data from the hazard assessment.

6.2.3 Head Protection

Hard hats protect employees from head injuries caused by falling or flying objects, bump hazards in close or confined spaces, and electrical shocks or burns. The hard hat should be easily adjustable so employees will wear the hat properly.

NCDOT hard hats should:

- Resist a reasonable impact force without breaking or collapsing the shell or damaging the internal suspension
- Dissipate and/or absorb as much impact force as possible to avoid transmitting the force to the head, spinal column, or other parts of the body
- Resist impact penetration
- Provide electrical protection as applicable

NCDOT hard hats are designated either as Class A or Class B hard hats. Class A hard hats provide protection against impact and falling or flying objects. Class B hard hats protect the head against high voltage electricity. All NCDOT hard hats should be disposed of whenever the helmet has received impact or shows signs of detoriation.

It is mandatory that hard hats be worn in all construction areas, including roads, shops, and outlying work areas where there is the potential exposure to falling or flying material. Additionally, Class B hard hats shall be worn where employees are exposed to overhead electrical conductors which could contact their heads.

6.2.4 Eye and Face Protection

Eye injuries are caused by flying particles, cuts, chemicals, injurious light, heat rays, and blows to the face and eyes. To prevent such injuries, many types of eye and face protection devices are available in NCDOT.

There are three basic types of eye and face protection used in NCDOT. These are :

- Safety glasses (with or without side shields)
- Goggles
- Face shields

Eye and face protection devices should protect against the intended hazard and be:

- Reasonably comfortable
- Fit properly
- Durable
- Capable of being disinfected
- Easy to clean
- In good repair

The eye and face protection required will depend upon the potential hazards. Appendix C presents an Eye and Face Protection selection chart for use within NCDOT.

All NCDOT employees must use appropriate eye or face protection when exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

6.2.5 Ear Protection

Exposure to high noise levels can cause hearing loss or impairment. There is no cure for noise-induced hearing loss, so the prevention of excessive noise exposure is required to avoid hearing damage.

Types of ear protection devices used in NCDOT include:

- Ear plugs
- Ear muffs

There are a variety of earplugs available from NCDOT inventory. For specific requirements of information on NCDOT's hearing conservation program, see SPP# 1910.95.

6.2.6 Hand and Arm Protection

Hand and arm injuries are a significant component of workplace injuries. Hands and fingers are used to accomplish nearly all workplace activities and must be protected from injury. The types of hand and arm protective wear used in NCDOT include:

- Cut-Resistant
- High and Low Temperature
- Splinters, Cuts, and Abrasions

- Electrical Protection
- Repetitive Motion and Vibration
- Chemical Resistant

The required hand and arm protective wear will be based upon the hazard of the risk.

Appendix D presents details on the types of hand and arm protective wear used in NCDOT. Also, see SPP # 1910.137, Electrical Protective Wear, for further details on electrical protection gloves.

NCDOT will select and require the use of hand protection against skin absorption of harmful substances, severe abrasions, punctures, chemical burns, thermal burns, and harmful temperature extremes.

6.2.7 Foot and Leg Protection

Safety shoes are used to protect the feet against injuries from heavy falling objects, rolling objects, objects piercing the soles, electrical hazards, against crushing or against lacerations. They are required for employees whose job duties require the lifting, carrying, or moving of objects weighing more than fifteen pounds.

NCDOT employees who are required to wear safety shoes will be reimbursed for a pair for safety shoes. Contact Safety and Loss Control to request reimbursement forms and further details.

There are many styles of shoes available as well as different materials and construction. Special safety shoes without laces or eyelets and with leather or heat and flame resistant material can be obtained for protection where molten metal and/or welding sparks are a hazard. Where there is a hazard from protruding nails or sharp objects on the walking surface, safety shoes should be equipped with metal inner soles. For electrical workers and those who have to work in classified locations, nonmetal toe guards, eyelets, and other shoe construction components are available (see definitions of classified locations in Appendix D, SPP# 1910.301, Electrical Related Safe Work Practices).

Lightweight metal or plastic toe and/or instep shoe caps offer protection where marginal foot hazards exist. These devices can be quickly slipped on over safety or street shoes. They are not intended to replace safety shoes. Storm rubbers that slip over the safety shoe provide a non-skid tread for fall protection on slippery walking surfaces. Storm rubbers also provide excellent protection for inside or outside work where water, oil, or chemicals could damage the safety shoe outer shell.

Over-the-sock or over-the-safety shoe boots are available. Boot outer shell materials include PVC, rubber, butyl, and neoprene. Temperature, abrasion, and chemical exposures in the workplace must be considered in the selection of the material.

Protective spats and leggings offer protection against high heat, flame, molten metal splashes, hot sparks, and chainsaw cuts. Material construction includes leather, flame retardant duck, aluminized rayon, and other aluminized fabrics. Quick release legging velcro closures should be used when any emergency would require the legging to be quickly removed.

NCDOT employees shall use appropriate footguards, safety shoes, or boots and leggings for protection of feet and legs from falling or rolling objects, sharp objects, molten metal, hot surfaces, and wet slippery surfaces.

6.2.8 Body Protection

Protective clothing is used to protect the body from potential exposures associated with work.

Personal protective vests, aprons, coats, pants, coveralls, and suits are available in a wide range of materials and shall be worn consistent with the workplace hazard. Protective clothing shall include but not be limited to cooling vests and suits, foul weather gear, knife cutting protection, high visibility vests flotation vests, welding and high heat protective clothing.

NCDOT will require the use of protective clothing for those employees who are exposed to body hazards. Examples include employees in laboratories, welders, employees in special processing areas or employees exposed to other body hazards.

6.2.9 Respiratory Protection

The workplace can present hazards to the lungs. Some of the most common hazards are the lack of oxygen and the presence of harmful dust, fogs, smokes, mists, fumes, gases, vapors, or sprays. Respirators prevent the entry of harmful substances into the lungs during breathing. Some respirators also provide breathable air so work can be performed where there is inadequate oxygen.

The prevention of atmospheric contamination at the worksite should be accomplished as far as feasible by engineering control measures (such as enclosing or confining the contaminant-producing operation, exhausting the contaminant, or substituting with less toxic materials). However, when engineering controls are not feasible, appropriate respirators must be used.

Respirators have their limitations and are not substitutes for effective engineering controls. No employee shall wear a respirator until he or she has completed the Respiratory Control Program. Refer to SPP #1910.134, Respiratory Protection, for further details.

6.2.10 Fall Protection

Fall Protection devices are those devices and systems designed to catch and hold a person after an accidental fall from height. When a person does fall, the proper fall arrest safety system can protect the worker.

The following fall protection devices are used in NCDOT:

- Safety Belts and Harnesses
- Safety Nets
- Lanyards, Deceleration Devices, and Lifelines
- Ladder Climbing Safety Devices

Figure 1 illustrates a typical safety harness. Safety belts or harnesses attached to a structure or lifeline are primary lifesaving devices for employees who work at high elevations. For work at low elevations, such as in confined spaces, the safety belt and lanyard system can be used to retrieve an injured or incapacitated person as shown in Figure 2.

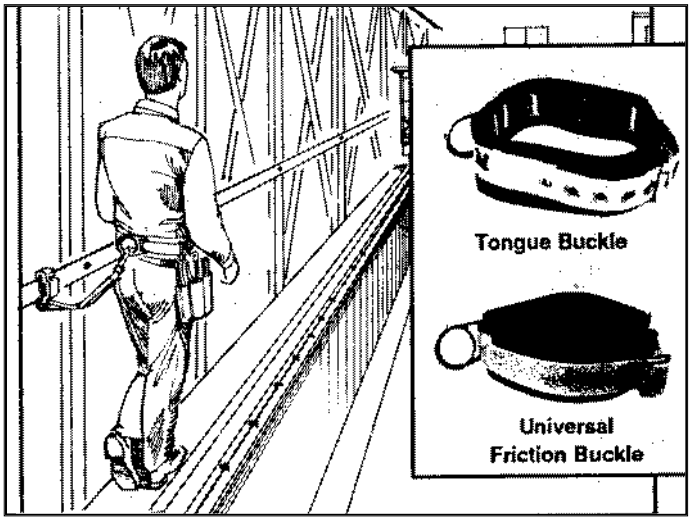


Figure 1

The types of safety belts and harnesses used in NCDOT include:

- Waist belt (2 feet or less free fall)
- Chest-waist harness
- Full body harness (free fall between 2 to 6 feet)
- Suspension belts (independent work support to suspend a worker)

Figure 2

When workers are exposed to falls during bridge construction, safety nets may be used. Safety nets are generally viewed as backup safety devices rather than primary life saving devices. Safety nets are required when workplaces are more than 25 feet above ground or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines, or safety belts is impractical.

A lanyard is a flexible line of rope, wire rope, or strap used to secure the body belt or body harness to a deceleration device, lifeline, or anchorage. Self-retracting lifelines and lanyards can limit a free fall to less than two feet. These devices allow the worker to move about while working. If a fall does occur, the device locks and suspends the worker until rescue is accomplished.

Ladder safety climb systems combine the safety belt and lanyard with a rope or rail type grab device. Ladder safety climb devices can be used on high structures to provide the user safety as well as a system that reduces the effort required to climb very high ladders.

NCDOT requires the use of fall protection equipment during bridge construction, bridge inspection, and other work activities where an employee can fall from elevated surfaces.

6.2.11 Use and Maintenance

All PPE must be kept clean and in reliable condition. PPE that is damaged or deemed to be not safe, must be replaced. All employees are to be trained properly in the use, proper maintenance, and disposal of PPE.

Items which are fitted to the individuals shall not be reissued to other employees nor are they to be shared. Items that are owned by the employee and used on the job must be certified safe and reliable by NCDOT.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of PPE in their areas. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with PPE through their auditing process.

6.3.2 Supervisors

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will ensure that employees are properly trained before using PPE and that they are being worn properly. Supervisors will ensure that no employee is allowed in a work environment without the proper protective equipment consistent with the hazard.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

Employees are to report any unsafe act associated with this safety policy and procedure to their supervisors. Additionally, employees shall identify and report any hazards which may require PPE.

Employees who are assigned PPE are to keep them available and in good working order at all times and to have them replaced when they become worn or unsafe.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training. Safety and Loss Control will also provide assistance in performing hazard assessments.

Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased PPE comply with current safety regulations.

Safety Engineers will conduct hazard assessments and train other designated employees to perform hazard assessments. Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Equipment Unit

Central Equipment Unit will support the Divisions/Units with the selection and purchasing of PPE.

APPENDIX A: Hazard Assessment Form

Name_____ Job Title_____

Facility_____Date _____

General

It is necessary to assess head, eye and face, hand, and foot hazards that exist in a worksite operation so the protective devices can be matched to the appropriate hazard. Therefore, a walk-through survey should be performed of the areas in question. During the walk-through survey, the user of this form should identify the sources of these hazards and observe the following hazard sources during the walk-through:

- Sources of motion (machinery or processes)
- Sources of high temperatures
- Types of chemical exposures (fumes, splashes, contact)
- Sources of harmful dust
- Sources of light radiation (welding, brazing, cutting, high intensity lights, etc.)
- Sources of falling objects or potential for dropping objects
- Sources of sharp objects
- Sources of rolling or pinching objects
- Sources of electrical hazards

Exercise **common sense** and **appropriate expertise** when performing the hazard assessments and analyses. Also note if any of the hazard(s) can be eliminated.

Head Hazards

Examine areas where impact and penetration hazards may be present due to falling objects and/or low head room clearance. Examples may include working below other workers who are using tools and materials that may fall; and working below machinery which may cause material or objects to fall. Additionally, look at areas where work on energized conductors is taking place.

Check the appropriate box for each hazard.

	Yes	No	Description of Hazards_____
Impact	o	o	_____
Penetration	o	o	_____
Electrical shock	o	o	_____
Other_____	o	o	_____

APPENDIX A: Hazard Assessment Form (Continued) 2

Eye and Face Hazards

Examine woodworking, machinery, welding, and chemical handling operations as a start.

Check the appropriate box for each hazard.

	Yes	No	Description of Hazards_____
Impact	o	o	_____
Potential of flying objects	o	o	_____
Chemical splash	o	o	_____
Chipping, hammering,	o	o	_____
Torch cutting and brazing	o	o	_____
Welding	o	o	_____
Other_____	o	o	_____

Hand and Arm Hazards

Examine work activities where chemicals, surface heat, radiant heat, extreme cold, splinters, abrasion, cuts and electrical shock exists or where the potential exists.

Check the appropriate box for each hazard.

	Yes	No	Description of Hazards_____
Penetration	o	o	_____
Chemical	o	o	_____
Temperature	o	o	_____
Electrical shock	o	o	_____
Other_____	o	o	_____

Foot and Leg Hazards

Examine work activities where falling or rolling objects, sharp objects, molten metal, hot surfaces, chainsaw operations, and wet slippery surfaces exist.

Check the appropriate box for each hazard.

	Yes	No	Description of Hazards_____
Impact	o	o	_____
Penetration (Puncture)	o	o	_____
Compression (Rollover)	o	o	_____
Chemical	o	o	_____
Temperature	o	o	_____
Electrical shock	o	o	_____
Slippery conditions	o	o	_____
Other_____	o	o	_____

Once the hazard assessment is complete, then perform the hazard analysis as listed in Appendix B.

APPENDIX B: Hazard Analysis

A hazard analysis cannot be performed until a hazard assessment has been completed. The steps in performing a hazard analysis are:

- Summarize the description of hazards from the hazard assessment form and place this summary in the upper right hand corner of the hazard analysis form.
- Estimate the level of risk for each hazard category based on:
  - Your observations
  - The results from the hazard assessment
  - The following **Level of Risk** scale

  Enter that value into column A.
- Estimate the seriousness of potential injury (if injury would occur, how serious would it be) for each hazard category based on:
  - Your observations
  - The results from the hazard assessment
  - The following **Seriousness of Personal Injury** scale

  Enter that value into column B.
- Calculate the risk/injury factor for each hazard category (Column A x Column B) . Enter the calculated risk/injury factor into the **Risk/Injury Factor** column.
- Total all the values in the **Risk/Injury Factor** column to arrive at the Total Risk/Injury Factor for that hazard group.
- Recommend and select the appropriate PPE to protect against the hazards based on:
  - Knowledge of available PPE and what it can do
  - The calculated risk/injury factor
- Summarize the required PPE for the hazard group.

Templates for the hazard groups are provided. The hazard groups with the higher risk/injury factors require closer attention. (A sample hazard analysis is presented on the following page.)

Level of Risk

1	2	3	4	5
None	***Little***	***Moderate***	***Moderate to High***	***High***

Seriousness of Personal Injury

1	2	3	4	5
Minor: First Aid; No lost time	***Minor:*** Minimal lost time; Quick return to job job ning	***Medium :*** Some lost time; Slower return to regular	***Medium to Serious*** : More lost time; Light duty work before returning to regular job	***Serious:*** Significant lost time; Rehabilitation and light duty work regular required before retur to regular job

APPENDIX B: Hazard Analysis (Continued) 2

(Sample Hazard Analysis)

Hand and Arm Hazards

Description of Hazards Material handling of sharp objects and wood-working duties.

Hazard Category	Level of Risk (A)	Seriousness of Potential Injury (B)	Risk/Injury Factor (A x B)	Recommended Personal Protective Equipment
Penetration	4	5	20	Cut-resistant gloves, general use and splinter-resistant gloves
Chemical	2	2	4	Have chemical resistant gloves available
Temperature	2	1	2	None
Electrical shock	1	1	1	None
Other				None

Total Risk/Injury Factor 27

Summary of required PPE Cut resistant general use gloves and chemical resistant gloves available as needed.

Head Hazards

Description of Hazards

Hazard Category	Level of Risk (A)	Seriousness of Potential Injury (B)	Risk/Injury Factor (A x B)	Recommended Personal Protective Equipment
Impact				
Penetration				
Electrical shock				
Other				

Total Risk/Injury Factor

Summary of required PPE

APPENDIX B: Hazard Analysis (Template) (Continued) 3

Eye and Face Hazards

Description of Hazards _____

Hazard Category	Level of Risk (A)	Seriousness of Potential Injury (B)	Risk/Injury Factor (A x B)	Recommended Personal Protective Equipment
Impact				
Potential of flying objects				
Chemical splash				
Chipping, hammering, etc. Torch cutting and brazing				
Welding				

_____

Total Risk/Injury Factor

Summary of required PPE _____

Hand and Arm Hazards

Description of Hazards _____

Hazard Category	Level of Risk (A)	Seriousness of Potential Injury (B)	Risk/Injury Factor (A x B)	Recommended Personal Protective Equipment
Penetration				
Chemical				
Temperature				
Electrical shock				
Other				

_____

Total Risk/Injury Factor

Summary of required PPE _____

APPENDIX B: Hazard Analysis (Continued) 4

Foot and Leg Hazards

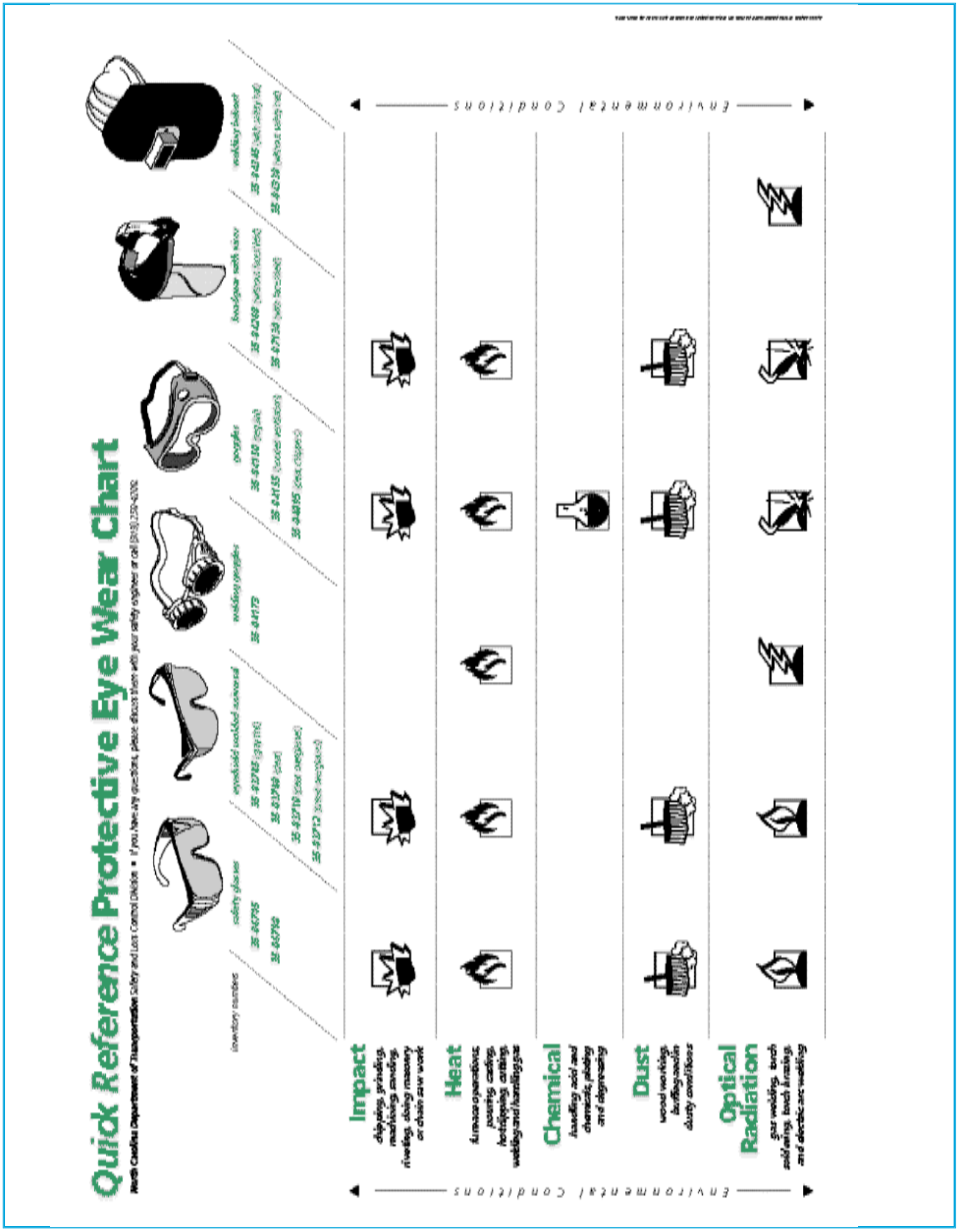
Description of Hazards _____

Hazard Category	Level of Risk (A)	Seriousness of Potential Injury (B)	Risk/Injury Factor (A x B)	Recommended Personal Protective Equipment
Impact				
Penetration (Puncture)				
Compression (Roll over)				
Chemical				
Temperature				
Electrical shock				
Slippery conditions				
Other				

Total Risk/Injury Factor _____

Summary of required PPE _____

APPENDIX C: Eye and Face Protection Selective Chart



APPENDIX D: Hand and Arm Protective Wear

Cut-Resistant

This type of glove is used where protection against cuts is required. Plastic dots can be adhered to the metal mesh to facilitate gripping. Another type of cut-resistant glove combines stainless steel with cut-resistant fiber wrapped with nylon fibers for enhanced flexibility and surface softness. These materials resist knives, glass, sheet metal, sharp edges, and other cutting surfaces. They are cut-resistant but not cut-proof or puncture proof. These materials must not be subjected to high speed knives or serrated blades.

High and Low Temperatures

Gloves, mittens, and arm and sleeve protectors are available in a wide variety of materials. Leather is a common welder's glove material. Heavy duty terrycloth gloves can provide heat protection of up to 350 degrees F. For extreme high and low temperature protection, specially processed silica fiber cloth (non-asbestos) can withstand temperatures of from -100^{0}F to 1100^{0}F. Do not use asbestos gloves.

Splinters, Cuts, Abrasion, and General Use

Light weight pigskin, goatskin, or calfskin leather gloves enable dexterity and grip while offering some resistance to cuts and abrasions. Other materials which offer similar protection include laminated nitrile coating on stretch fabric, vinyl, rubber coated, or impregnated fabrics.

Electrical Protection

Rubber devices that protect against electrical shock must meet the ANSI J6 series standards. Rubber insulating gloves must meet ANSI J6.6. These gloves are available to meet different voltage exposures. Light weight low voltage gloves are for use on voltages of under 1000V. Gloves for use on high voltage are of thicker material for the dielectric strength. As the voltage rating increases, so does the glove weight. Leather glove protectors are available to protect rubber gloves against punctures and abrasion. Employees who use this type of equipment must be qualified (see 29 CFR 1910.331 [a]). Rubber gloves must be visually inspected and an "air" test must be performed before they are used.

Repetitive Motion and Vibration

Protective gear is available to minimize repetitive hand and wrist motions. One glove has openings for the fingers but offers palm protection. These anti-vibration gloves may be worn under regular work gloves.

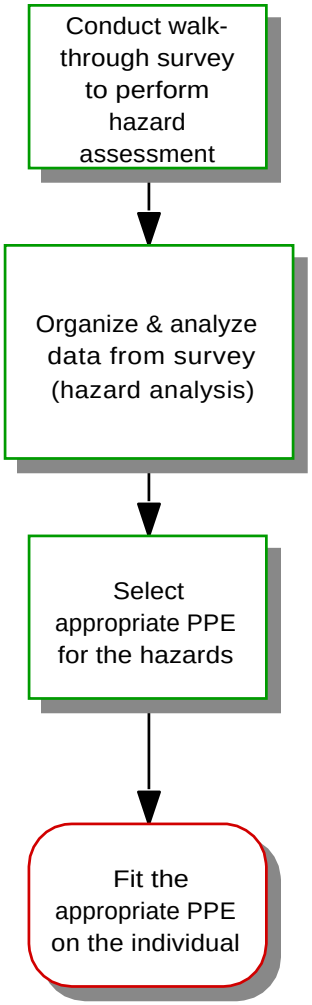
APPENDIX D: Hand and Arm Protective Wear (Continued) 2

Chemicals

Glove materials used to protect against chemicals include natural rubber, neoprene, polyvinyl chloride, polyvinyl alcohol, and nitrile. Chemical degradation guides are available to determine the general suitability of various glove materials to exposures of specific chemicals.

Many operational variables may affect the performance of chemical protection gloves, including chemical combinations and concentrations, temperature, and exposure time. Safety and Loss Control will assist Managers/Unit Heads and Supervisors in determining the suitability of the glove material for the job.

PPE Flowchart



Respiratory Protection SPP# 1910.134

Quick Reference

Select this Link to view latest Revision changes

Select this Link to view
latest Revision changes

1.0 Purpose

The purpose of this safety policy and procedure (SPP) is to establish guidelines for using respiratory protection to protect the health of North Carolina Department of Transportation (NCDOT) employees from inhalation hazards.

2.0 Scope and Applicability

The human respiratory system is typically the quickest avenue of material entry into the human body. Toxic materials that enter the body through the lungs may present serious health risks.

This safety policy and procedure presents guidelines for the use of respiratory protection by NCDOT employees. Details are presented on the administration requirements of a respiratory protection program, the need for exposure assessments, provisions for training, and respirator selection guidelines. Additionally, details are presented on recordkeeping, purchasing, and medical requirements associated with respiratory protection. This document also describes the areas of responsibility for unit heads, supervisors, employees, Safety and Risk Management (SRM), Division Safety Engineers (SE), and central equipment units within NCDOT.

This SPP affects any employee who, as a result of his or her job duties, is exposed to air contaminants or hazardous environments where contaminants exceed the Occupational Safety and Health Act (OSHA) Permissible Exposure Limit (PEL) or are immediately dangerous to life and health (IDLH). It also applies to employees performing an occupational activity that, per management, requires respiratory protection – even if the actual airborne hazard concentration is below the PEL or is otherwise unknown.

3.0 Reference

This SPP is established in accordance with OSHA standards for general industry which also includes shipyards (29 CFR 1910.134) and construction (29 CFR 1926.103)

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Engineering and administrative controls will always be explored prior to reliance on respiratory protection. NCDOT employees will use respirators when engineering and administrative controls are in the process of being explored/implemented or are unable to reduce air contaminants below their respective PEL. Safe work practices and employee training shall supplement the use of respiratory protection.

5.0 General Responsibilities

It is the responsibility of each unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on respiratory protection.

It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Respiratory Protection.

6.1 Acronyms/Definitions

ACRONYMS

AIHA	**American Industrial Hygiene Association**
APF	**Assigned Protection Factor**
APR	**Air-Purifying Respirator**
CFR	**Code of Federal Regulations**
ESLI	**End of Service Life Indicator**
HEPA	**High Efficiency Particulate Air**
IDLH	**Immediately Dangerous to Life and Health**
IH	**Industrial Hygiene/Hygienist**
MSHA	**Mine Safety and Health Administration**
NCDOT	**North Carolina Department of Transportation**
NIOSH	**National Institute for Occupational Safety and Health**
OSHA	**Occupational Safety and Health Administration**
OV	**Organic Vapor**
PEL	**Permissible Exposure Limit**
PLHCP	**Professionally Licensed Healthcare Provider**
QLFT	**Qualitative Fit Test**
SE	**Safety Engineer**
SPP	**Safety Policy and Procedure**
SRM	**Safety and Risk Management**
STEL	**Short Term Exposure Limit**
TWA	**Time Weighted Average**

DEFINITIONS

Aerosol
Particles, solid or liquid, suspended in air.

Airline Respirator
An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

Air-Purifying Respirator (APR)
Respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

American Industrial Hygiene Association (AIHA)
Professional organization of industrial hygiene.

Approved
Evaluated and listed as permissible by NIOSH/MSHA, for the respirator's intended use.

Assigned Protection Factor (APF)
The workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program.

Contaminant
A harmful, irritating, or nuisance airborne material.

Disposable Respirator
A respirator for which maintenance is not intended and that is designed to be discarded after excessive resistance, sorbent exhaustion, physical damage, or end-of- use-service-life renders it unsuitable for its intended use. (See: Dust mask)

Dust
An aerosol consisting of mechanically produced solid particles derived from the breaking up of larger particles.

Dust Mask
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. NOTE: the elastic, fabric face covers typically used in medical settings are separate from dust masks. They are not respirators and are not considered by NCDOT to provide any respiratory protection.

End-of-Service-Life Indicator (ESLI)
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.

Exposure Limit
The maximum allowable concentration of a contaminant in the air to which an individual may be exposed. These may be time-weighted averages, excursion limits, ceiling limits and short-term limits.

Filter
A component used in respirators to remove solid or liquid aerosols from the inspired air.

Fit Check
A test conducted by the wearer to determine if the respirator is properly sealed to the face.

Fit Test
The use of challenge agent to evaluate the fit of a respirator on an individual.

Fume
Solid aerosols formed by the condensation of metal.

Hazardous Atmosphere
An atmosphere that contains a contaminant(s) in excess of the exposure limit or is oxygen deficient.

High-Efficiency Particulate Air (HEPA) Filter
A filter that removes from the air 99.97 percent or more of the aerosols having a diameter of 0.3 micrometers.

Immediately Dangerous to Life or Health (IDLH)
Any atmosphere that poses an immediate hazard to life or poses immediate irreversible debilitating effects on health.

Negative Pressure Respirator (tight fitting)
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.

Permissible Exposure Limit (PEL)
Regulatory limits for contaminants that include:

- Eight-hour time weighted average (TWA)
- Short Term Exposure Limit (STEL)
- Ceiling (c)
- Excursion Limits

Powered Air-Purifying Respirator (PAPR)
An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering. Loose-fitting (hooded) PAPRs do not require fit testing. PAPRs with a tight face seal will still require fit testing.

Qualitative Fit Test (QLFT)
A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

Workplace Exposure Assessment
Evaluation of respiratory hazards by activity observation, material data sheets, historical data review, and/or air monitoring by a Safety Engineer or Industrial Hygienist.

6.2 General Provisions

This section details the provisions of this SPP with each provision discussed in a separate subsection. These provisions are:

- Training
- Written Respiratory Program
- Administration
- Exposure Assessment
- Respirator Selection
- Respirator Fit Test
- Recordkeeping
- Purchasing
- Medical Surveillance

6.2.1 Training

Employees who use or who are assigned respirators shall be trained in:

- Respirator limitations under various conditions
- Protection factors of the various types of respirators
- Proper use, maintenance, cleaning, disinfection, and storage of respirators
- Testing of the respirator face seal

This training shall be provided upon initial job assignments requiring the use of respirators and shall occur annually and when job conditions change. The training (and retraining) will include a fit test if employees are assigned tight-fitting respirators. Upon initial training employees shall be provided the information in Appendix D: Voluntary Respirator Use Information. A signed copy of Appendix D shall be retained by the employer.

6.2.2 Written Respiratory Program

This safety policy and procedure provides an overview of the key components of respiratory protection. Each unit shall have a written respiratory program if respirators are provided to employees. The key elements of this written respiratory program are:

- Using standard operating procedures for respirator training, selection, use, maintenance, storage, procurement, and medical examinations
- Selecting respirators based upon employee exposure hazards
- Training respirator users on the proper use and limitations of respirators
- Respirator fit testing
- Assigning respirators to individual workers for their exclusive use
- Cleaning and disinfecting respirators on a regular basis
- Storing respirators in convenient, clean and sanitary locations
- Inspecting respirators during routine cleaning for worn or damaged parts
- Conducting surveillance of work area conditions and degrees of employee exposure or stress
- Conducting regular inspections and evaluations to determine the continued effectiveness of the program

- Not assigning respirators until it has been determined that the employee is physically able to perform the work and use the equipment

A comprehensive Written Respiratory Program can be found in Appendix B. Units may adopt the Written Respiratory Program provided in Appendix B or produce their own with more specific guidelines to their operations.

6.2.3 Administration

Each Division Safety Engineer shall administer the written respiratory protection program. SRM will assist in the implementation of the program, selection of approved respirators, training, and recordkeeping.

6.2.4 Exposure Assessment

A safety professional or industrial hygienist shall assess employee exposures to airborne contaminants prior to the employee using a respirator. Based on the assessment, the proper respirator shall be selected. Exposure assessments shall be based on such data as air monitoring results, process information, work environment, historical data, and/or work practices relative to the type of contaminant.

The OSHA Permissible Exposure Limit (PEL) of an air contaminant does not have to be exceeded for an employee to be required to use a respirator. The supervisor or safety professional may also require respirator use because of nuisance exposure or due to doubts in the exposure assessment findings.

6.2.5 Respirator Selection

6.2.5.1 Air Purifying Respirators (APR)

The majority of respirators used at NCDOT are air purifying respirators (APR). They rely on cartridge or material filtration of atmospheric air to lower contaminant exposure. The four most common types are:

- **Disposable filtering facepiece APR**
- **Half face negative pressure APR**
- **Full face negative pressure APR**
- **Powered air purifying respirator (PAPR)**

APRs are appropriate for low-level exposures to such contaminants as

- Silica
- Lead
- Asbestos
- Welding fumes
- Asphalt fumes
- Respirable dust
- Pesticides
- Hexavalent Chromium

Which could be expected from such activities as

- Sawing
- Hot work (welding, torching, metal grinding)
- Grinding
- Paving
- Painting

NOTE: these lists are not exhaustive, and an exposure assessment must be performed on any activity to dictate proper respirator assignment.

6.2.5.2 Assigned Protection Factor (APF)

- **APF [10]: Disposable filtering facepiece, half face negative pressure APR**
- **APF [50]: Full face negative pressure APR**
- **APF [25]: Powered air purifying respirator (PAPR)**

The number that appears in brackets ([ ]) after each APR above is the assigned protection factor (APF). A respirator's APF corresponds to its level of contaminant reduction. For example, a respirator with an APF of 25 will reduce actual user exposure of atmospheric contaminants by a factor of 25. To further illustrate, if an employee is exposed to 200 µg/m^3 of lead, if he/she is using a respirator with an APF of 25 (e.g. PAPR), the actual exposure would be 8 µg/m^3 (200 / 25 = 8). Higher APF respirators, therefore, may be required in atmospheres of higher contaminant concentration. The proper APF respirator should always be used to lower employee exposure below the PEL.

6.2.5.3 APR Cartridge Selection

The types of filtering cartridges/materials used on APRs vary between particulate filters and chemical filters.

Particulate filters are rated both on an oil resistance scale:

- N – not resistant to oil
- R – partially resistant to oil
- P – resistant to oil

And on an efficiency scale:

- 95 – when properly used this filter removes 95% of 0.3 µm-sized particles
- 99 – when properly used this filter removes 99% of 0.3 µm-sized particles
- 100 – when properly used this filter removes 99.97% of 0.3 µm-sized particles

Chemical cartridge filters are more substance specific. They include:

- OV – organic vapor filter
- Acid gas – hydrogen sulfide, chlorine, sulfur dioxide
- Hg – mercury filter

The proper respirators and filters shall be selected to provide the protection factor to achieve compliance with a PEL for the particular airborne contaminant(s). Filter cartridges are color coded for clarification. Some cartridges protect against multiple contaminants (e.g. OV/P100). Other filters are built-in to the respirator (i.e. N95 filtering facepieces).

6.2.5.4 Supplied Air Respirators (SAR)

Unlike APRs, supplied air respirators (SARs), do not rely on filtration of atmospheric air. Instead, they provide breathing air either from a self-contained tank or from an airline source. SARs can be used for either high-exposure situations (e.g. abrasive blasting operations) or for emergency escape. SARs use grade-D breathing air which must be regularly tested. The APF for supplied air depends on the specific type of facepiece and pressure mode, the manufacturer's manual should be referenced to find the specific model's APF. Escape SARs are only to be used in emergency situations.

6.2.6 Recordkeeping

Medical evaluation records are to be kept by the employer and made available to the employee. Although they do not contain HIPA information, they will be treated as confidential medical records and kept securely and separately from the employee's personnel file. If the PLHCP maintains the records instead of NCDOT that is acceptable and preferred.

Records shall be kept on each employee who receives training and fit testing. This record will include the name, location, type of contaminant(s), respirator type, fit tester, medical evaluation and results of fit testing. Fit test records are to be kept until the next fit test is administered, or for 5 years, whichever occurs first. See Appendix A for the form.

6.2.7 Fit Testing

Fit testing shall be conducted annually for all employees required to wear a tight-fitting respirator (e.g. half-face APR or filtering facepiece). Tested employees shall be clean shaven. Mustaches and goatees are not allowed to interfere with the sealing area of the respirator. At least two different brand/models of respirator shall be made available for employees to choose from. The fit test should be performed by a safety professional.

Annual fit tests may be quantitative (e.g. TSI Porta Count) or qualitative. Qualitative fit tests (QLFT) shall utilize one of the following irritants: isoamyl acetate (banana oil – recommended for organic vapor respirators), saccharin, bitrex, or irritant smoke. proceed as follows:

- If using banana oil, saccharin, or bitrex, perform a sensitivity test using the dilute irritant while the employee is not wearing the respirator.
- After determining the sensitivity threshold of the irritant, allow the employee 5 minutes for their senses to return to normal.

- Don the respirator and adjust the straps to provide a comfortable but snug fit.
- Perform a positive pressure seal check by covering the exhalation valve and exhaling. The APR should have some resistance during the check, as air should not pass freely around the respirator seal edges.
- Perform a negative pressure seal check by covering the cartridges and inhaling. The APR should collapse inward somewhat (depending on what type it is). Air should not pass easily around the respirator seal edges.

While wearing the respirator, the user shall perform the following exercises for at least 30 seconds each while being properly tested with the respective irritant or odorizer:

- Normal breathing
- Deep breathing
- Turning head side to side
- Moving head up and down (nodding)
- Talking (reciting a poem or song or counting backwards from 100)
- Grimacing
- Bending over (touching toes)
- Normal breathing

If the user does not taste/smell the irritant at any point during the exercises, the fit test should be considered passed.

Loose-fitting PAPRs do not require annual fit testing, nor do they require users to be clean-shaven. *The use of PAPRs does not exempt employees from the medical clearance and annual training requirements of this policy.*

6.2.8 Purchasing

Only NIOSH-approved respirators shall be purchased and kept in stock along with an adequate supply of cartridges and replacement parts. Respirators shall be provided by the employer at no cost to the employee.

6.2.9 Medical Surveillance

All employees who are required to use a respirator for any work activity shall complete the medical evaluation questionnaire or receive an initial medical examination that obtains the same information as the medical questionnaire.

- The questionnaire evaluation or initial medical examination must be performed by a professionally licensed healthcare professional (PLHCP).
- The PLHCP will provide a written recommendation to the employer regarding the employee's ability to use the specified respirator(s).
- If the recommendation demonstrates the need for one, or if an employee gives a positive response to any question among questions 1 through 8 in Section 2, Part A of the questionnaire, the employee will be sent to a PLHCP for a follow-up, in person medical examination.

***VOLUNTARY** use of filtering facepiece respirators (e.g. N95s) by employees does not require medical clearance.*

No employees will wear a respirator until medical clearance has been completed. Any medical event or substantial physical change which would affect an employee's breathing or their ability to wear a respirator shall warrant a follow-up medical examination. If employee annually documents that no significant changes to his/her job activity nor physical appearance has occurred that would change the effectiveness of the existing medical clearance, then the initial clearance remains valid. A copy of the required (Part A) medical questionnaire is attached in Appendix C. An additional (Part B) may optionally be included in the questionnaire submitted. For a copy of part B please reference the OSHA publication or reach out to SRM.

6.3 Specific Responsibilities

6.3.1 Industrial Hygienist

The NCDOT industrial hygienist (IH), or manager of the NCDOT IH program, will act as the program administrator for the department's respiratory protection program. As the program administrator, the IH shall have specific training and be knowledgeable about respirator use to supervise the program properly. All other responsible parties should administer the program in liaison with the IH.

6.3.2 Unit Heads

Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of respiratory protection equipment and related supplies. They will also be responsible for identifying the employees affected by this safety policy and procedure and assure those employees are provided a medical examination before being issued a respirator.

Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.3 Supervisors

Supervisors will not allow any employee who has not received the required training or medical evaluation to perform any of the tasks or activities requiring respiratory protection. They will also ensure that respirators are properly worn and maintained.

Supervisors will request and coordinate the required training for the affected employees. Supervisors will be responsible for ensuring that an adequate supply of respirators, cartridges, and replacement parts are available.

6.3.4 Employees

Employees shall comply with all applicable guidelines contained in this SPP. They will maintain and clean the respirator assigned to them and properly store the respirator when not in use. Employees will be clean shaven if required to wear a tight-fitting respirator.

6.3.5 Safety Engineer

Safety Engineer will act as manager of the written respiratory program specific for the unit and provide assistance to unit heads and supervisors on respirator use and training.

Safety Engineer shall conduct respiratory training and fit testing on an annual basis.

Safety Engineer shall consult with an Industrial Hygienist as needed to perform exposure assessments and for proper respirator selection.

6.3.6 Safety and Risk Management

Safety and Risk Management (SRM) will provide prompt assistance to unit heads, supervisors, or others as applicable on any matter concerning this SPP.

SRM will provide consultative audit and exposure assessment assistance to ensure effective implementation of this safety policy and procedure.

6.3.7 Central Equipment Unit

Central Equipment Unit will maintain an inventory of approved respirators for NCDOT.

APPENDIX A: Respirator Fit Test Form

NCDOT

RESPIRATOR FIT TEST FORM

QUALITATIVE FIT TEST

Date: _____

Employee Name: _____ Unit: _____

Division: _____

Job Description:

_____

Respirator: ____ half-face ____ full face _____ Positive Pressure Check: **Yes No**

Negative Pressure Check: **Yes No** Facial Hair: **Yes No**

Prescription Glasses: **Yes No** Familiarity With Respirator: **Yes No**

Test Agent: Saccharin Irritant Smoke Isoamyl acetate Bitrex

Pre-test: Taste: Pass Fail Odor: Pass Fail Irritant: Pass Fail

FIT TEST RESULTS

Respirator Brand & Model	Normal	Deep Breathing	Head side to side	Head up and down	Speaking Passage	Jogging	Normal

P = Pass **F** = Fail Must have all **P**'s to have a satisfactory fit test.

Reason for failure to fit test: _____

By passing all the above fit tests, the employee is qualified to use the above respirator for the following contaminants: _____

I certify that I have trained the above individual on the use, care, limitations and maintenance of the respirator and performed the fit test in accordance with the respirator manufacturer's procedures and OSHA requirements.

Fit Tester Signature _____

I have been fit tested and trained on the above listed respirator. I will follow the NCDOT policies and procedures for the use, maintenance and care of the respirator. No changes to my health, appearance, or work activities has occurred that would negate my existing medical clearance.

Employee Signature _____

APPENDIX B: Comprehensive NCDOT Respiratory Program

NCDOT
DIVISION RESPIRATORY PROTECTION

I. Introduction

In the control of those occupational diseases caused by breathing air contaminants, the primary objective is to prevent harmful exposures. This is accomplished as far as feasible by accepted administrative, engineering control measures and work practice controls. When effective controls are not feasible, or while they are being put in place, appropriate respirators may be required.

II. Purpose and Scope

The purpose of this program is to comply with 29 CFR 1910.134, the OSHA respiratory protection standards, ANSI Respiratory Protection Z88.2-1992, and to assure respirator users are protected against air contaminants in the workplace. The program applies when respirators are:

- Used to comply with OSHA requirements
- Required by the employer without explicit OSHA requirement
- Worn voluntarily

III. Responsibility

A. The Division Safety Engineer is responsible for:

1. Respirator selection
2. Training and instruction
3. Fit testing users for tight-fitting respirators
4. Medical evaluation
5. Respirator availability and use
6. Respirator maintenance and inspection
7. Quality and quantity of breathing air
8. Routine audit of the program
9. Records retention

B. The employee is responsible for:

1. Using the respirator provided according to instructions and training
2. Completing the medical evaluation
3. Performing seal checks each time he puts on his respirators.
4. Undergoing fit tests
5. Cleaning, disinfecting, inspecting, and storing his/her respirator
6. Making the most of the annual training provided

C. The supervisor is responsible for:

1. Supplying respirators
2. Assurance that respirators are worn safely

IV. Respirator Selection

The manager of the divisional respiratory program selects respirators based on the concentration of hazardous contaminants likely to be encountered and the nature of the work being done. Breathing zone air samples are the best measurement of employee exposure, however a reasonable estimate of expose can be used.

A. Lead
   PAPR with P100 filters
   Half face tight fitting respirator with P100 filters (Contract Inspectors only)

B. Respirable Crystalline Silica
   Half or full-face APR with P100 cartridges
   Disposable filtering facepiece respirator N95 under some circumstances

C. Herbicides and Pesticides
   Half-face APR with organic vapor cartridge with P100 filter

D. Nuisance Dust
   Disposable filtering facepiece respirator N95

E. Abrasive Blasting Dust
   Bullard or Clemco Abrasive Blast Helmet Type CE

V. Use of Respirators

Each employee shall use the respirator correctly. Failure to use or wear the respirator correctly will reduce the provided protection and may cause breathing difficulty for the user. Employees shall adhere to the following:

A. Put the respirator on as instructed during training.
B. For tight fitting respirators, the wearer must be clean shaven so no hair interferes with the face to respirator sealing area.
C. For tight fitting respirators, the wearer must perform the fit seal check prior to entering the work area.
D. Loose fitting respirators shall only be worn after the wearer assures that the respirator is being supplied with the required airflow. Wears do not have to be clean shaven. (see manufacturer's instructions)
E. Filters and cartridges shall be replaced as follows:
    1. P100 filters (purple/pink) when breathing resistance increases, when it becomes wet, or after a scheduled period of time. Replacement times are dependent on work activity, SE should provide consulting on when to replace cartridges.
    2. Organic vapor cartridges after each use and/or at the end of the shift.
    3. Disposable dust mask N-95 after each use and/or at the end of the shift.
    4. PAPR cartridges are to be flow tested periodically. See the manufacturer's instructions for how to perform test and for replacement procedure based on test results.
F. Employee shall be allowed to take periodic breaks to maintain respirator and to relief discomfort.

VI. Medical Evaluation

Each employee shall be medically evaluated prior to using any respirator. The program manager shall have the medical provider conduct the evaluation to include the required OSHA questionnaire and additional necessary tests, and written clearance for use. The medical evaluation shall be repeated anytime the employee has a medical event which would affect the ability to wear a respirator. During annual respiratory training employees shall document that no significant job activity nor health changes have occurred that would negate the received medical clearance.

VII. Maintenance and Care of Respirators

Employees shall maintain their respirator to retain their original effectiveness by periodic inspection, repair, cleaning, and proper storage. Manufactures instructions shall be followed to inspect, repair, and cleaning.

A. Inspection
   Employees shall inspect their respirators before each use and while cleaning to check the condition of the face piece, head straps, connecting tube, and canisters and elastomeric parts for signs of deterioration.

B. Repair
   Employee's respirators, which do not pass inspection, shall be replaced or repaired immediately. Employees can change canisters and head with OEM parts designed for the respirator. All other replacement or repairs are handled by person trained to repair respirators. (NOTE: Only the manufacturer or technician trained by the manufacturer can attempt to adjust or repair reducing and admission valves regulators, and alarms.)

C. Cleaning
   Employees shall clean and disinfect their respirators as frequently as necessary to make sure they are sanitary. All reusable respirators shall be cleaned following use by the following methods:
   1. Disassemble respirator
   2. Wash with warm dilute dish soap solution or wipe with respirator cleaning wipes
   3. Inspect all parts
   4. Air dry or pat dry
   5. Re-assemble respirator

D. Storage
   Employees shall store respirators after inspection, cleaning, and necessary repairs, so the respirators are protected against damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. The preferred method is in a plastic bag inside a crush proof box.

VIII. Training

A. Training is required when respirators are used. The program manager provides training for workers required by OSHA to wear a respirator and for their supervisors. The training includes:
   1. Why respirators are needed
   2. How improper fit, usage, or maintenance can compromise the protection provided.
   3. Capabilities and limitations

4. How to use during emergencies and what to do if the respirator malfunctions
5. How to inspect, put on and remove, use and check the seals
6. Maintenance and storage
7. How to recognize medical signs and symptoms that affect use
8. General requirements of 29 CFR 1910.134 Training must be provided initially, annually, and anytime a significant job activity or health condition of an employee changes that may change aspects of their respiratory protection.

B. Training is required when respirators are worn even though they are not required by OSHA. Employees who wear respirators even though they are not required to by OSHA need to be provided with the information in Appendix D of 1910.134, either orally or in writing.

C. Fit Test will be conducted as prescribed in 1910.134 Appendix A. Any employee required to wear a tight-fitting respirator must be fit tested annually. Employees using only loose-fitting PAPRs or abrasive blast helmets are not required to be fit tested. Voluntary use of filtering facepieces do not require fit testing.

IX. Records

The respiratory program manager maintains the following records:

A. An up-to-date copy of the written respiratory program.
B. List of employees enrolled in the written respiratory program.
C. Fit test reports. These are to be kept until the time of the next annual fit test, or for 5 years from the latest occurrence.
D. Training records. These are to be kept until the time of the next annual training, or for 5 years from the latest occurrence.
E. Medical evaluation records for the duration of employment plus 30 years. These are to be treated appropriately as medical records and thus be kept confidential and separate from the employee's personnel file.
F. Employee exposure records for duration of employment plus 30 years.

X. References

- **American National Standard for Respiratory Protection. ANSI Z88.2.**
- **American National Standard for Respirator Fit Test Methods. ANSI Z88.10**
- **NIOSH Respirator Decision Logic. October 2004. DHHS (NIOSH) Publication No. 2005-100.**
- **OSHA Respiratory Standard. 29 CFR 1910.134. Revised 2011.**
- **NCDOT SPP #1910.134 (latest revision)**

Division Safety Engineer:

_____

Date:

_____

APPENDIX C: Respirator Medical Evaluation Questionnaire

Part A Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

1. Today's date:

2. Your name:

3. Your age (to nearest year):

4. Sex (circle one): Male/Female

5. Your height: ft. in.

6. Your weight: lbs.

7. Your job title:

8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code):

9. The best time to phone you at this number:

10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): Yes/No

11. Check the type of respirator you will use (you can check more than one category):

    a. ☐ N, R, or P disposable respirator (filter-mask, non-cartridge type only).

    b. ☐ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

12. Have you worn a respirator (circle one): Yes/No If "yes," what type(s):

Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").

	YES	NO
1. Do you currently smoke tobacco, or have you smoked tobacco in the last month?	☐	☐
2. Have you ever had any of the following conditions?		
a. Seizures	☐	☐
b. Diabetes (sugar disease)	☐	☐
c. Allergic reactions that interfere with your breathing	☐	☐
d. Claustrophobia (fear of closed-in places)	☐	☐
e. Trouble smelling odors	☐	☐
3. Have you ever had any of the following pulmonary or lung problems?	YES	NO
a. Asbestosis	☐	☐
b. Asthma	☐	☐
c. Chronic bronchitis	☐	☐
d. Emphysema	☐	☐
e. Pneumonia	☐	☐
f. Tuberculosis	☐	☐
g. Silicosis	☐	☐
h. Pneumothorax (collapsed lung)	☐	☐
i. Lung cancer	☐	☐
j. Broken ribs	☐	☐
k. Any chest injuries or surgeries	☐	☐
l. Any other lung problem that you've been told about	☐	☐
4. Do you *currently* have any of the following symptoms of pulmonary or lung illness?	YES	NO
a. Shortness of breath	☐	☐
b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline	☐	☐
c. Shortness of breath when walking with other people at an ordinary pace on level ground	☐	☐
d. Have to stop for breath when walking at your own pace on level ground	☐	☐
e. Shortness of breath when washing or dressing yourself	☐	☐
f. Shortness of breath that interferes with your job	☐	☐
g. Coughing that produces phlegm (thick sputum)	☐	☐
h. Coughing that wakes you early in the morning	☐	☐
i. Coughing that occurs mostly when you are lying down	☐	☐

j.	Coughing up blood in the last month	☐	☐
k.	Wheezing	☐	☐
l.	Wheezing that interferes with your job	☐	☐
m.	Chest pain when you breathe deeply	☐	☐
n.	Any other symptoms that you think may be related to lung problems	☐	☐
5.	Have you ever had any of the following cardiovascular or heart problems?	YES	NO
a.	Heart attack	☐	☐
b.	Stroke	☐	☐
c.	Angina	☐	☐
d.	Heart failure	☐	☐
e.	Swelling in your legs or feet (not caused by walking)	☐	☐
f.	Heart arrhythmia (heart beating irregularly)	☐	☐
g.	High blood pressure	☐	☐
h.	Any other heart problem that you've been told about?	☐	☐
6.	Have you ever had any of the following cardiovascular or heart symptoms?	YES	NO
a.	Frequent pain or tightness in your chest	☐	☐
b.	Pain or tightness in your chest during physical activity	☐	☐
c.	Pain or tightness in your chest that interferes with your job	☐	☐
d.	In the past two years, have you noticed your heart skipping or missing a beat	☐	☐
e.	Heartburn or indigestion that is not related to eating	☐	☐
f.	Any other symptoms that you think may be related to heart or circulation problems	☐	☐
7.	Do you currently take medication for any of the following problems?	YES	NO
a.	Breathing or lung problems	☐	☐
b.	Heart trouble	☐	☐
c.	Blood pressure	☐	☐
d.	Seizures	☐	☐
8.	If you've used a respirator, have you ever had any of the following problems?	☐	☐
	(If you've never used a respirator, check NO and go to question 9.)		
a.	Eye irritation	☐	☐
b.	Skin allergies or rashes	☐	☐
c.	Anxiety	☐	☐
d.	General weakness or fatigue	☐	☐
e.	Any other problem that interferes with your use of a respirator	☐	☐

	YES	NO
9. Would you like to talk to the PLHCP about your answers to this questionnaire?	☐	☐

Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

	YES	NO
10. Have you ever lost vision in either eye (temporarily or permanently)?	☐	☐
11. Do you currently have any of the following vision problems?	☐	☐
a. Wear contact lenses	☐	☐
b. Wear glasses	☐	☐
c. Color blind	☐	☐
d. Any other eye or vision problem	☐	☐
12. Have you ever had an injury to your ears, including a broken eardrum?	☐	☐
13. Do you currently have any of the following hearing problems?	☐	☐
a. Difficulty hearing	☐	☐
b. Wear a hearing aid	☐	☐
c. Any other hearing or ear problem	☐	☐
14. Have you ever had a back injury?	☐	☐
15. Do you currently have any of the following musculoskeletal problems?	☐	☐
a. Weakness in any of your arms, hands, legs, or feet	☐	☐
b. Back pain	☐	☐
c. Difficulty fully moving your arms and legs	☐	☐
d. Pain and stiffness when you lean forward or backward at the waist	☐	☐
e. Difficulty fully moving your head up or down	☐	☐
f. Difficulty fully moving your head side to side	☐	☐
g. Difficulty bending at your knees	☐	☐
h. Difficulty squatting to the ground	☐	☐
i. Climbing a flight of stairs or a ladder carrying more than 25 lbs.	☐	☐
j. Any other muscle or skeletal problem that interferes with using a respirator	☐	☐

APPENDIX D: Voluntary Respiratory Use Information

Respirators are an effective method 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.

I have read and understand the requirements laid out in this appendix and will follow them if I choose to voluntarily wear an air purifying respirator under working conditions where it is not required.

Name: _____ Date: _____

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Hand and Portable Power Tools SPP# 1910.241

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and accountability for hand and portable power tools used by North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Hand and power tools improve employee efficiency in job performance. The safety objective with these tools is to protect users from inflicting harm on themselves and others. Although it is generally assumed that anyone knows how to use common hand tools, hand tool accidents contribute significantly to NCDOT's compensable disabling injuries. Proper selection, use, care, and supervision of hand and portable power tools can prevent abuse of these tools and eliminate or reduce employee injuries.

This safety policy and procedure provides guidelines for the use of hand and portable power tools. It includes provisions for training and lists the general requirements for all tools. Additionally, it presents specifics on hand tool use, types of portable power tools, and the hazard controls for portable power tools. This document also provides the general requirements for Personal Protective Equipment and tool storage.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Risk Management, and Central Equipment Unit within NCDOT and applies to all NCDOT employees who work with hand and portable power tools.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.241-244) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.300-305).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, hand and portable power tools will not be used until employees receive training in the proper use of these tools. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Hand and Portable Power Tools will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Hand and Portable Power Tools. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities.

6.1 Definitions

Hand Tools
Tools that are manually operated and powered by human force such as screw drivers, pliers, wrenches, and cutting shears, etc.

Pneumatic Tools
Tools that are powered by air such as air wrenches, air grinders, spray guns, and air fasteners.

Power Tools
Tools that are manually operated and powered by electricity, air, gasoline, diesel, or explosives**.**

UL Approved
Tools approved by Underwriters' Laboratory.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- General Requirements for All Tools
- Use of Hand Tools
- Portable Power Tools
- Personal Protective Equipment
- Storage

6.2.1 Training

An effective tool use program should include training in safe work practices to reduce tool injuries and control accidents. For hand tools, employees should be trained in:

- Selecting the right tool for the job
- Knowing the hazards of the tool
- Using tools correctly
- Having a regular tool inspection procedure
- Maintaining tools
- Storing tools properly

Employees who use portable power tools shall be trained in:

- Selecting the right tool for the job
- Knowing the hazards of the tool
- Disconnecting the power before changing accessories

- Following manufacturer's operating and inspection rules
- Having guards in place
- Maintaining tools
- Storing tools properly

This training shall be performed upon initial employment and/or job reassignment. Periodic refresher training shall also be conducted at the discretion of the supervisor.

6.2.2 General Requirement for All Tools

All hand and portable power tools supplied by NCDOT or employees of NCDOT will be maintained in safe working order.

Hand tools shall be inspected regularly and before using. Tools or handles that are cracked, broken, or deformed shall be removed from service. Impact tools such as wedges, pins, and chisels shall be kept free of mushroomed heads.

Portable power tools shall be inspected regularly and before using. Tools with missing or broken guards, nicked or frayed electrical cords, broken plugs, broken switches, damaged equipment housing, or missing or broken tool retainer shall not be used and shall be tagged and removed from service.

6.2.3 Use of Hand Tools

Figure 1 illustrates some of the many hand tools that are used in NCDOT. Misuse of common hand tools such as screwdrivers, hammers, punches, cutting tools, tap and die tools, saws, files, hands snips and cutters, wood chisels, axes, hatchets, knives, shovels, and rakes is a source of many injuries. Supervisors may mistakenly assume that everyone knows the proper use of common hand tools.

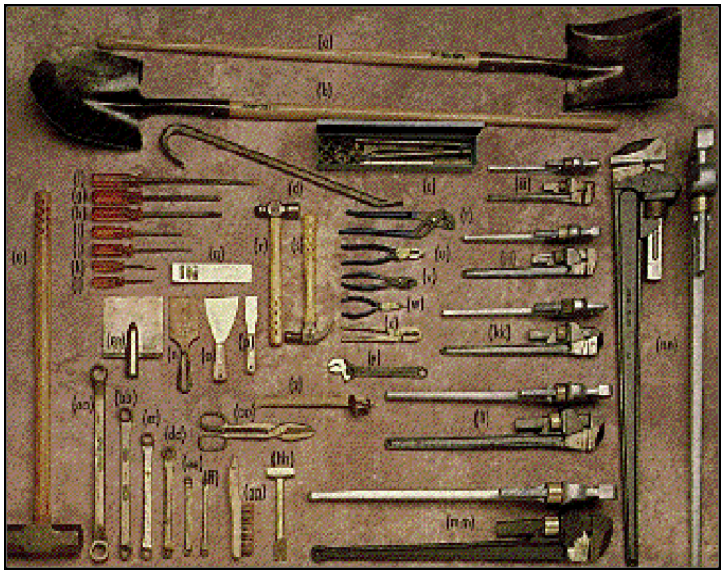


Figure 1

Figure 2 illustrates floor jack stands and hydraulic floor jack which must be inspected prior to use with periodic inspection documented every 6 months.

Figure 2

Appendix A presents specific **safe work practices** for hand tools in the following major hand tool categories:

- Metal-Cutting Hand Tools
- Wood-Cutting Tools
- Miscellaneous Cutting Tools
- Torsion Tools
- Shock Tools
- Spark-Resistant Tools

Tool safeguards are generally accomplished through a number of safety features found on tools. Safety features such as tool guards and handle design can help prevent injuries. Figure 2 presents a handle design tool safeguard feature.

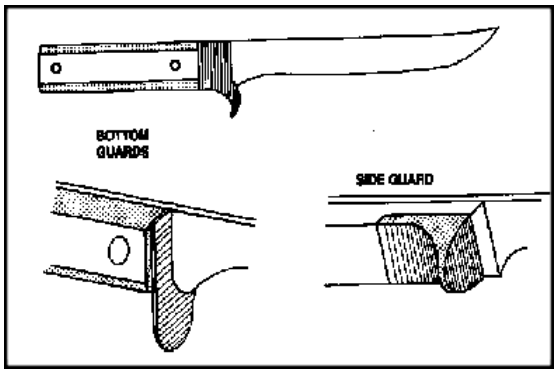


Figure 2

6.2.4 Types of Portable Power Tools

Portable power tools are divided into 3 primary groups according to the power source:

- Electrical
- Air-Powered
- Special Powered

Electrical tools in NCDOT include drills, circular saws, reciprocating saws, miter-box and shop saws, stationary band saws, jig/saber saws, rotary die grinders, soldering irons, percussion tools, grinding wheels, buffers, wire brushes, sanders, and routers. Employees must recognize and protect themselves from shock, noise, cuts, burns, and other potential hazards by using proper guards and safety equipment and devices.

Air-powered tools include air hoses, grinders, and pneumatic-impact tools.

Compressed air used for cleaning shall utilize an air blow-off gun restricting air pressure to less than 30 PSI. Figure 1 shows a compressed air nozzle gun for cleaning which restricts air pressure below 30 PSI.

Figure 1

Workers should ensure hoses do not present a tripping hazard and prevent accidental disconnection of hoses from the tools. Air-powered grinders require the same type of guarding as electrical grinders.

Pneumatic-impact tools (nailers, drills, impact wrenches, staplers, jackhammers, etc.) require two safety devices: an automatically closing valve and a retaining device to hold the tool in place to prevent it from being fired accidentally. Additionally, employees must check noise levels to determine if hearing protection is needed and guard their eyes against flying debris.

Special powered tools include hydraulic, gasoline-powered, and powder- actuated equipment. Hydraulic tools cause injuries because high pressure leaks or ruptures in hoses may force oil under the skin of employees' hands or arms.

Gasoline-powered tools are commonly used in logging and construction activities. The chain saw is a common gasoline-powered tool in NCDOT. Mowers, trimmers, and other various gasoline-powered tools are also used in NCDOT.

Powder-actuated tools are commonly used for fastening fixtures and materials to metal, precast or prestressed concrete, masonry block, brick, stone, and wood surfaces. Blank cartridges provide the energy and are ignited by a percussion primer.

Gasoline-powered and powder-actuated tools present serious hazards and must be operated only by trained personnel and adequately guarded to prevent fires and injuries. Similar precautions are used for impact wrenches as for any electrical or hydraulic equipment.

6.2.5 Hazard Control for Portable Power Tools

Portable power tools are designed for particular tasks and if used for other purposes other hazards may be created. Additionally, the extreme mobility of these tools and their power sources creates significant hazards.

Therefore, controls should be in place to minimize or eliminate the hazards associated with portable power tools. The commonly used controls on portable power tools include:

- Start switch lockouts
- Interlocks
- Dead man switches
- Vibration minimization (as applicable)
- Tool guards
- Safeguarding energy sources

Start switch lockouts prevent inadvertent operation. A tool cannot operate until a keyed switch selects the operating mode.

Interlocks on tools protect operators and others. For example, a riding mower has a switch under the operator's seat that shuts off the blades or engine when the operator stands up.

Dead man switches shut off power to the tool when the switch is released. Drills, saws, mowers, hedge trimmers, and other portable power tools have these controls.

Vibration minimization is usually a tool design function. If extreme vibration of the tool is a problem to the employee, using isolation pads within the machine or between the handles and operator may be an option.

Tool guards should be provided where possible. Tools such as circular saws, belt sanders, and abrasive wheel grinders should be equipped with guards that effectively prevent the hands and fingers of the operator from coming into contact with blades and nip points.

Guarding may not be possible on some equipment such as chain saws. In those cases, other safety features should be in place (e.g., blade brake, anti- kickback design, etc.).

Safeguarding energy sources must be practiced with all the power tools. Electrical safeguards, controls for handling gasoline and other flammable liquids, and controls for air and fluids under pressure must all be in place.

Appendix B details selected portable power tools safe practices. These practices include hazard control techniques and should be followed by employees who use these types of tools.

6.2.6 Personal Protective Equipment

Employees using hand and power tools are to be provided with Personal Protective Equipment (PPE) when exposed to falling, flying, abrasive and splashing objects, or harmful dusts, fumes, vapors, or gases.

The PPE should be matched against the particular hazard to provide the required level of protection. See SPP # 1910.132, Personal Protective Equipment, for details on matching PPE against the particular hazard.

6.2.7 Storage

Hand and portable power tools shall be stored on racks, tool cribs, or bins. Tools shall be stored in such a manner that sharp edges do not protrude out of tool cribs or bins or damage other tools. Each day, tool storage areas should be locked with a complete audit of all tools.

Special tools may require unusual storage. See manufacturer's instructions for those requirements. For example, powder-actuated hand tools should be stored under lock and key.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will identify the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

Managers/Unit Heads will ensure that hand and portable power tools are being inspected by supervisors.

6.3.2 Supervisors

Supervisors will ensure that only trained employees operate and use hand and portable power tools.

Supervisors will inspect hand and portable power tools during Facility and Jobsite Audits as well as observe the storage and use of such tools by employees.

Supervisors will enforce the use of PPE while employees operate hand and portable power tools.

Supervisors will ensure that guards and switches on portable power tools are in place and functioning.

Supervisors will ensure that portable power tools are used and maintained in accordance with this safety policy and procedure.
Supervisors will communicate to managers/unit heads hand and portable power tool needs such as storage facilities and bins, upgrading, replacement parts, and new tools.

6.3.3 Employees

Employees shall inspect all tools prior to their use and shall report any broken or damaged tools to their supervisors.

Employees shall not operate any hand and portable power tool unless they have been trained on that specific tool.

Employees shall wear all required PPE when using tools.

6.3.4 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training. Safety and Risk Management will work with Purchasing and Central Equipment Unit to ensure that all newly purchased hand and portable power tools comply with this safety policy and procedure and current safety regulations.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Inventory Unit

Central Inventory Unit or State Contract Supplier shall ensure that the required guards, switches, and warning labels are specified during equipment purchases.

Appendix A: Selected Hand Tools Safe Work Practices

Metal-Cutting Hand Tools

Chisels

- Factors determining the selection of a cold chisel are the materials to be cut, the size and shape of the tool, and the depth of the cut to be made.
- The chisel should be made heavy enough so that it will not buckle or spring when struck.
- A chisel large enough only for the job should be selected so that the blade is used rather than the point or corner. Also, a hammer heavy enough to do the job should be used.
- Employees shall wear safety goggles when using a chisel and should set up a shield or screen to prevent injury to other workers from flying chips. If a shield does not afford positive protection to all exposed employees, then glasses with side protection should be worn.

Tap and Die Work

Tap and die work requires certain precautions. The work should be firmly mounted in the vise. Only a T-handle wrench or adjustable tap wrench should be used. When threads are being cut with a hand die, hands and arms should be kept clear of the sharp threads coming through the die and metal cuttings should be cleared away with a brush.

Hack Saws

- Hack saws should be adjusted in the frame to prevent buckling and breaking, but should not be tight enough to break off the pins that support the blade. Install blade with teeth pointing forward.
- Pressure should be applied on the forward stroke not on the back stroke. If the blade is twisted or too much pressure is applied, the blade may break and cause injury to the hands or arms of the user.

Files

- Selection of the right kind of file for the job will prevent injuries and lengthen the life of the file. Inasmuch as the extremely hard and brittle steel of the file chips easily, the file should never be cleaned by being struck against a vise or other metal object. A file-cleaning card or brush should be used.
- For the same reason, a file is not to be hammered or used as a pry. Such abuse frequently results in the file's chipping or breaking causing injury to the user. A file should not be made into a center punch, chisel, or any other type of tool because the hardened steel may fracture in use.
- A file is never to be used without a smooth, crack-free handle; if the file should bind, the tang may puncture the palm of the hand, the wrist, or other part of the body. Under some conditions, a clamp- on raised offset handle may be useful to give extra clearance for the hands. Files are not to be used on lathe stock turning at high speed (faster than 3 turns per file stroke) because the end of the file may strike the chuck, dog, or face plate and throw the file (or metal chip) back at the operator hard enough to inflict serious injury.

Appendix A: Selected Hand Tools Safe Work Practices (Continued 2)

Tin Snips

- Tin snips should be heavy enough to cut the material so easily that the worker needs only one hand on the snips and can use the other to hold the material. The material is to be well supported before the last cut is made so that cut edges do not press against the hands.
- Jaws of snips are to be kept tight and well lubricated.
- Employees shall wear safety goggles when trimming corners or slivers of metal because small particles often fly with considerable force. They shall always wear gloves.

Cutters

- Cutters used on wire, reinforcing rods, or bolts should have ample capacity for the stock; otherwise, the jaws may be sprung or spread. Also, a chip may fly from the cutting edge and injure the user.
- Cutters require frequent lubrication. To keep cutting edges from becoming nicked or chipped, cutters are not to be used as nail pullers or pry bars.
- Cutter jaws should have the hardness specified by the manufacturer for the particular kind of material to be cut. By adjustment of the bumper stop behind the jaws, cutting edges are to be set to have a clearance of 0.003 inch when closed.

Wood-Cutting Tools

Edge tools are to be used so that if a slip should occur the direction of force will be away from the body. For efficient and safe work, edge tools are to be kept sharp and ground to the proper angle. A dull tool does a poor job and may stick or bind.

Wood Chisels

- Inexperienced employees shall be instructed in the proper method of holding and using chisels. Handles are to be free of splinters.
- The wood handle of a chisel struck by a mallet is to be protected by a metal or leather cap to prevent it from splitting.
- The work to be cut must be free of nails to avoid damage to the blade or cause a chip to fly into the user's face or eye.

Saws

Saws should be carefully selected for the work they are to do. For crosscut work on green wood, a coarse saw (4 to 5 points per inch) is to be used. A fine saw is better for smooth, accurate cutting in dry wood. Saws are to be kept sharp and well set to prevent binding.

Axes

- An ax person is to make sure that there is a clear circle in which to swing the ax before starting to chop. Also, all vines, brush, and shrubbery within the range should be removed, especially overhead vines that may catch or deflect the ax.

Appendix A: Selected Hand Tools Safe Work Practices (Continued 3)

- Ax blades shall be protected with a sheath or metal guard wherever possible. When the blade cannot be guarded, it is safer to carry the ax at one's side. The blade on a single-edged ax shall be pointed down.

Hatchets

Hatchets shall not be used for striking hard metal surfaces, since the tempered head may injure the user or others by flying chips. When using a hatchet in a crowded area, employees shall take special care to prevent injury to themselves and other workers. Using a hatchet to drive nails is prohibited.

Miscellaneous Cutting Tools

Planes, Scrapers, Bits, and Drawknives

- Planes, scrapers, bits, and drawknives are to be used only by experienced employees. These tools are to be kept sharp and in good condition.
- The principal hazard in the use of knives is that the hands may slip from the handle onto the blade or that the knife may strike the body or the free hand. A handle guard or a finger ring (and swivel) on the handle eliminates these hazards. Adequate guarding is important.
- Employees who must carry knives with them on the job shall keep them in sheaths or holders. Never carry a sheath knife on the front part of a belt - always carry it over the right or left hip, toward the back. This will prevent severing a leg artery or vein in case of a fall.
- Knives must never be left lying on benches or in other places where they may cause hand injuries. Safe placement and storage of knives is important to knife safety.
- Supervisors must ensure that employees who handle knives have ample room in which to work so they are not in danger of being bumped by other workers.
- Supervisors should be particularly careful about the hazard of employees leaving knives hidden under a product, under scrap paper or wiping rags, or among other tools in work boxes or drawers. Knives are to be kept separate from other tools to protect the cutting edge of the knife as well as to protect the employee.
- Horseplay shall be prohibited around knife operations. Throwing, "fencing," trying to cut objects into smaller and smaller pieces, and similar practices are not only dangerous but reflect inadequate supervision.
- Supervisors shall ensure that nothing is cut that requires excessive pressure on the knife. Knives shall not be used as a substitute for can openers, screwdrivers, or ice picks.

Torsion Tools

Socket wrenches are safer to use than adjustable or open-end wrenches.

Open-End or Box Wrenches

Open-end or box wrenches shall be inspected to make sure that they fit properly and are never to be used if jaws are sprung or cracked. When defective they shall be taken out of service until repaired.

Appendix A: Selected Hand Tools Safe Work Practices (Continued 4)

Socket Wrenches

Socket wrenches give great flexibility in hard-to-reach places. The use of special types shall be encouraged where there is danger of injury.

Adjustable Wrenches

Adjustable wrenches are used for many purposes. They are not intended, however, to take the place of standard open-end, box or socket wrenches. They are used mainly for nuts and bolts that do not fit a standard wrench. Pressure is always applied to the fixed jaw.

Pipe Wrenches

- Pipe wrenches, both straight and chain tong, shall have sharp jaws and be kept clean to prevent slipping.
- The adjusting nut of the wrench is to be inspected frequently. If it is cracked, the wrench shall be taken out of service. A cracked nut may break under strain, causing complete failure of the wrench and possible injury to the user.
- A piece of pipe "cheater" slipped over the handle shall not be used to give added leverage because this can strain a pipe wrench to the breaking point. The handle of every wrench is designed to be long enough for the maximum allowable safe pressure.
- A pipe wrench should never be used on nuts or bolts, the corners of which will break the teeth of the wrench, making it unsafe to use on pipe and fittings. Also, a pipe wrench, when used on nuts and bolts, damages their heads. A pipe wrench shall not be used on valves, struck with a hammer, nor used as a hammer.

Pliers

- Side-cutting pliers sometimes cause injuries when short ends of wires are cut. A guard over the cutting edge and the use of safety glasses will help prevent eye injuries.
- The handles of electricians' pliers are to be insulated. In addition, the electricians shall wear the proper electrical rated gloves if they are to work on energized lines.
- Pliers shall not be used as a substitute for a wrench.

Special Cutters

Special cutters include those for cutting banding wire and strap. Claw hammers and pry bars shall not be used to snap metal banding material.

Pipe Tongs

Employees must neither stand nor jump on the tongs nor place extensions on the handles to obtain more leverage. They should use larger tongs.

Screwdrivers

- The practice of using screwdrivers for punches, wedges, pinch bars, or pries shall not be allowed.
- Cross-slot (Phillips-head) screwdrivers are safer than the square bit type, because they have less tendency to slip. The tip must be kept clean and sharp, however, to permit a good grip on the head of the screw.
- The part to be worked upon must never be held in the hands; it should be laid on a bench or flat surface or held in a vise.

Appendix A: Selected Hand Tools Safe Work Practices (Continued 4)

- No screwdriver used for electrical work shall have the blade or rivet extending through the handle. Both blade and handle shall be insulated except at the tip.

Shock Tools

Hammers

- A hammer is to have a securely wedged handle suited to the type of head used. The handle shall be smooth, without cracks or splinters, free of oil, shaped to fit the hand, and of the specified size and length.
- Employees shall be warned against using a steel hammer on hardened steel surfaces. Instead, a soft- head hammer or one with a plastic, wood, or rawhide head should be used. Safety goggles or safety glasses shall be worn to protect against flying chips, nails, or scale.

Riveting Hammers

Riveting hammers, often used by sheet metal workers, must have the same kind of use and care as ball pen hammers and should be watched closely for cracked or chipped faces.

Carpenter's or Claw Hammers

- The faces shall be kept well-dressed at all times to reduce the hazard of flying nails while they are being started into a piece of wood. A checker-faced head is sometimes used to reduce this hazard.
- Eye protection is required for all nailers and all employees working in the same area.

Spark-Resistant Tools

- Spark-resistant tools of nonferrous materials are sometimes advised for use where flammable gases, highly volatile liquids, and explosive materials are stored or used. The intensified sparks from steel tools are capable of igniting substances such as gunpowder, lint, TNT, carbon disulfide, and ethyl ether.
- In certain circumstances, steel coated with aluminum paint can emit sparks when struck with a metal striker (steel, brass, or spark-resistant alloys) and such sparks may ignite mixtures of flammable gases or vapors in air.
- Nonferrous tools reduce the hazard from sparking but do not eliminate it. They must be inspected before each use to be certain that they have not picked up foreign particles which could produce friction sparks.

Appendix B: Portable Power Equipment Safe Work Practices

Electric Tools

- Insulating platforms, rubber mats, and rubber gloves provide an additional factor of safety when tools are used in wet locations, such as in tanks, in boilers, and on floors.
- Only tools in good repair and listed by Underwriters' Laboratories shall be used.
- Protection from electric shock while using portable power tools has been described as depending upon third wire protective grounding. "Double insulated" tools provide more reliable shock protection without third wire grounding. Tools in this category are permanently marked by the words "double insulation" or "double insulated."
- Double insulated or all-insulated tools do not require separate ground connections; the third wire or ground wire is to be used wherever it is supplied as indicated to be part of the tool's electrical connection.
- Failure of insulation is harder to detect than worn or broken external wiring. This illustrates the need for frequent inspection and thorough maintenance. Care in handling the tool and frequent cleaning will help prevent the wear and tear that cause defects.
- Double insulated tools shall not be operated on wet surfaces.
- All electric power tools shall be effectively grounded except the double insulated and cordless types.
- Electric cords shall be inspected periodically and kept in good condition. Heavy-duty plugs that clamp to the cord should be used to prevent strain on the current-carrying parts if the cord is accidentally pulled.
- Although no guards are available for drill bits, some protection is afforded if drill bits are carefully chosen for the work to be done, such as being no longer than necessary to do the work.
- Electric saws are usually well guarded by the manufacturer, but employees must be trained to use the guard as intended. The guard should be checked frequently to be sure that it operates freely and encloses the teeth completely when it is not cutting and encloses the unused portion of the blade when it is cutting.
- Circular saws shall not be jammed or crowded into the work. The saw is to be started and stopped outside the work.

Appendix B: Portable Power Equipment Safe Work Practices (Continued 2)

Abrasive Wheels and Tools

- All grinding machines shall be supplied with sufficient power to maintain the spindle speed at safe levels under all conditions of normal operation.
- Grinding machines must be equipped with safety guards in conformance with the requirements of American National Standards Institute, B7.1, Safety Code, for the use, care, and protection of abrasive wheels.
- Floor-stand and bench-mounted abrasive wheels, used for external grinding shall be provided with safety guards (protection hoods). The maximum regular exposure of the grinding wheel periphery and sides shall be not more than 90 degrees except that when work requires contact with the wheel below the horizontal plane of the spindle, the angular exposure shall not exceed 125 degrees.
    - Floor and bench-mounted grinders shall be provided with work rests which are rigidly supported and readily adjustable. Such work rests shall be kept at a distance not to exceed 1/8 inch from the surface of the wheel.
    - Tongue guards at the top of the wheel shall be kept at a distance not to exceed ¼" to contain piece of the wheel in event it breaks apart.
- Cup-type wheels used for external grinding shall be protected by either a revolving-cup guard or a band-type guard. All other portable abrasive wheels used for external grinding shall be provided with safety guards (protection hoods), except as follows:
    - When the work location makes it impossible, a wheel equipped with safety flanges shall be used
    - When wheels 2 inches or less in diameter which are securely mounted on the end of a steel mandrel are used
- Portable abrasive wheels used for internal grinding shall be provided with safety flanges (protection flanges) except as follows:
    - When wheels 2 inches or less in diameter which are securely mounted on the end of a steel mandrel are used
    - If the wheel is entirely within the work being ground while in use
- When safety guards are required, they shall be so mounted as to maintain proper alignment with the wheel, and the guard and its fastenings shall be of sufficient strength to retain fragments of the wheel in case of accidental breakage. The maximum angular exposure of the grinding wheel periphery and sides shall not exceed 180 degrees.
- When safety flanges are required, they shall be used only with wheels designed to fit the flanges. Only safety flanges, of a type and design and properly assembled so as to ensure that the pieces of the wheel will be retained in case of accidental breakage, shall be used.
- All abrasive wheels shall be closely inspected and ring-tested before mounting to ensure that they are free from cracks and defects.
- Grinding wheels shall fit freely on the spindle and shall not be forced into place. The spindle nut shall be tightened only enough to hold the wheel in place.
- All employees using abrasive wheels shall be protected by eye protection equipment.

Pneumatic Power Tools

- The operating trigger on portable hand-operated utilization equipment shall be so located as to minimize the possibility of its accidental operation and shall be arranged to close the air inlet valve automatically when the pressure of the operator's hand is removed.
- Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tools from becoming accidentally disconnected.
- Safety clips or retainers shall be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.
- All pneumatically driven nailers, staplers, and other similar equipment provided with automatic fastener feed, which operate at more than 100 psi pressure at the tool shall have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.
- Compressed air shall not be used for cleaning purposes except with an air blow gun limited to less than 30 psi. static pressure at the outlet nozzle and the use of proper eye protection.
- The manufacturer's safe operating pressure for hoses, pipes, valves, filters, and other fittings shall not be exceeded.
- The use of hoses for hoisting or lowering tools shall not be permitted.
- All hoses exceeding 1/2 inch inside diameter shall have a safety device at the source of supply or line to reduce pressure in case of hose failure.
- Airless spray guns of the type which atomize paints and fluids at high pressures (1,000 pounds or more per square inch) shall be equipped with automatic or visible manual safety devices which will prevent pulling of the trigger to prevent release of the paint or fluid until the safety device is manually released.
- In lieu of the above, a diffuser net which will prevent high pressure, high velocity release, while the nozzle tip is removed, plus a nozzle tip guard which will prevent the tip from coming into contact with the operator, or other equivalent protection shall be provided.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Air Contaminants SPP# 1910.1000

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines to protect the health of North Carolina Department of Transportation (NCDOT) employees from hazards due to the inhalation of airborne contaminants (e.g., gases, fumes, mists, vapors, particulates).

2.0 Scope and Applicability

An air contaminant is any substance which is accidentally or unwillingly introduced into the air, having the effect of rendering the air toxic or harmful to some degree. Through inhalation, airborne dust, fumes, vapors, mists, and gases may all be taken into the body. These contaminants can irritate the skin, eyes, nose, throat, and lungs, or they may also be absorbed into the bloodstream therefore affecting internal organs.

This document establishes guidelines to protect the health of NCDOT employees from these air contamination hazards. It includes training provisions for affected employees and discussion on the warning signs of air contaminant overexposure. Discussion is also presented concerning when work area evaluations may be required. Additionally, this document presents a brief exposure assessment methodology and a control recommendation hierarchy.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure applies to all shop areas, offices, warehouses, production areas, equipment operations, construction sites, repair and maintenance facilities, and water, rail, and air transportation. It also applies primarily to chemical contaminants. (Biological contaminants are addressed in SPP# 1910.1030, Bloodborne Pathogens.)

This safety policy and procedure also affects any employee who, as result of his or her job duties, is exposed to air contaminants.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.1000) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.1100-1140).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, air contaminants will be identified and measured where there is suspicion of air contamination in the workplace. When air contaminant hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Air Contaminants will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Air Contaminants. It is also the responsibility of each NCDOT employee to report immediately unsafe conditions to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities.

6.1 Definitions

ACGIH
American Conference of Governmental Industrial Hygienists.

Administrative Controls
These are non-engineering controls which are used to reduce or eliminate exposure to harmful contaminants. Examples are work rotation, product substitution, pre-employment evaluations, timed exposures, etc.

AIHA
American Industrial Hygiene Association.

Ceiling Values
Concentrations designated by a "c" designation preceding a value which shall not be exceeded at any time during the work shift. If instantaneous readings are not feasible, then the ceiling value shall be assessed based on a 15 minute time interval.

Eight (8) Hour Time Weighted Average (TWA)
The amount of exposure determined based on an eight (8) hour exposure. Sampling should be for at least six (6) hours of the eight (8) hour work shift. All substances not designated by a "c" are considered to be an eight (8) hour TWA, Excursion, or Short Term Exposure Level (STEL). For multiple samples collected during the shift, the TWA is calculated by summing each exposure multiplied by the time interval sampled, and dividing by the total time sampled.

$$TWA = \frac{(C1 \times T1)+(C2 \times T2)....(Cn \times Tn)}{T1+T2....Tn}$$

Where:

C = measured concentration for time interval T
T = time interval in minutes

Engineering Controls
An engineered process where contaminants are removed physically from the work area, diluted with air or treated to render innocuous, or are prevented from becoming airborne. Examples are local exhaust ventilation, general ventilation, enclosures, cyclones, scrubbers, and chemical reactors.

MSDS
Material Safety Data Sheet.

Permissible Exposure Limit (PEL)
Regulatory limits for contaminants that include the following: Eight hour TWA, Short Term Exposure Limit (STEL), Ceiling (c), or Excursion Limits.

Qualified Person
Person who has training and experience in air monitoring, exposure assessment, and workplace evaluations.

Threshold Limit Values
Voluntary limits for contaminants as published by the American Conference of Governmental Industrial Hygienists.

Workplace Exposure Evaluation
Air monitoring for contaminants by a qualified person (Safety Engineer, Industrial Hygienist) who has training and experience in air monitoring exposure assessment and workplace evaluations.

Work Practices
Specific work procedures that are designed to minimize the release of contaminants to the work area. Examples include wet methods, vacuuming instead of sweeping, slower pace, lower equipment speeds, etc.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Warning Signs of Exposure
- Work Area Evaluation
- Exposure Assessment
- Control

6.2.1 Training

Employees who may be exposed to air contaminants in their job duties shall receive training on air contaminants. Their supervisors will also receive this training which will consist of:

- Contaminant name and characteristics (physical and chemical properties)
- Exposure route
- Symptoms of over exposure
- Toxic health effects (acute and chronic)
- Work practices used to reduce exposures
- Engineering controls to reduce exposures
- Administrative controls to reduce exposures

This training shall be provided upon initial employment and/or job reassignment. Retraining shall be provided when job conditions change. Periodic refresher training shall be provided at the discretion of the supervisor.

Qualified persons who perform air monitoring shall receive additional training. This training shall include:

- Air sampler air flow calibration
- Sample train set ups
- Analytical procedures
- Air monitoring protocols
- OSHA reference methods
- Exposure calculations
- Exposure data statistical analyses

6.2.2 Warning Signs of Overexposure

Overexposure to contaminants may not always show warning signs. Most gases and vapors provide warnings such as headaches, nausea, mucous membrane irritation, nervous system dysfunction, and rashes in a short period of time (minutes to hours). Some gases and most particulates do not have immediate warning signs and are insidious in their health effects (the signs of a disease process may take years to manifest).

Anytime an employee claims to have experienced a warning condition or has become sick while using chemicals or while engaged in a particular process, he or she is to report this condition immediately to his or her supervisor.

6.2.3 Work Area Evaluation

Air contaminants can present a significant threat to an employee's health and safety. Reliable measurements of airborne contaminants are useful for:

- Analyzing the need for engineering controls
- Selecting PPE
- Delineating areas where protection is needed
- Assessing the potential health effects of exposure
- Determining the need for specific medical monitoring

A supervisor should request a review of a work area whenever there is reasonable suspicion of air contamination. Reasonable suspicion can include whenever:

- An employee has complaints
- An employee is seen by a physician for symptoms relating to exposure
- There is a product change
- There is a change in MSDS
- There is a change in the process
- There are other conditions that would be suspected of increasing a risk of exposure

The suspected work areas shall be evaluated to determine exposure potential based on a review of MSDS, process characteristics, and work practices (Appendix A).

Air sampling shall be performed by a qualified person. The air sampling shall be performed according to standard procedures (OSHA Reference Methods; NIOSH Analytical Methods; ASTM Methods for Air Toxics).

6.2.4 Exposure Assessment

After air sampling and laboratory analyses are completed, exposures will be assessed by the qualified person for determining compliance with regulations, most recent ACGIH TLV's, published toxicological data, and AIHA Exposure Guidelines. Exposure assessment will be evaluated as either exceeds the PEL or is below the PEL based on the recommended NIOSH Exposure Determination and Measurement Strategy (Appendix B).

The determination may require the use of statistical methods to determine compliance. NCDOT will always use the Upper Confidence Limit at the 95 percent confidence level to ensure exposures are in compliance.

Exposure risk assessments shall be conducted periodically at all work areas to ensure compliance with established exposure limits. High risk assessment categories will receive greater frequency of evaluation than those with low risk assessments.

6.2.5 Controls

If employee exposures are above the established PEL, TLV, or manufacturer recommendations, then control of the exposure will be determined by the qualified person. Engineering controls, product substitution, and work practice modification will be given priority over administrative and respiratory protection as control strategies.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads should be generally familiar with exposures in their organization and the location of those exposures. They will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors are responsible for ensuring that the PPE is used when required, proper work practices are used, engineering controls are in good operating condition, and administrative controls are used when feasible. Additionally, they are responsible for recognizing possible exposures by odor, mucous membrane irritation, headaches, nausea, visible dust emissions, and vapors.

6.3.3 Employees

Employees shall be responsible for recognizing possible exposures by odor, mucous membrane irritation, headaches, nausea, visible dust emissions, and vapors. Employees are to follow work practices for the process, use PPE as required, activate engineering controls when necessary, and report suspicious circumstances to their supervisors.

6.3.4 Qualified Person

Qualified persons shall be responsible for conducting air monitoring where there is suspicion of air contamination. They shall perform exposure assessments, workplace evaluation, and recommend exposure controls. They shall also provide air contaminants training to affected employees and their supervisors.

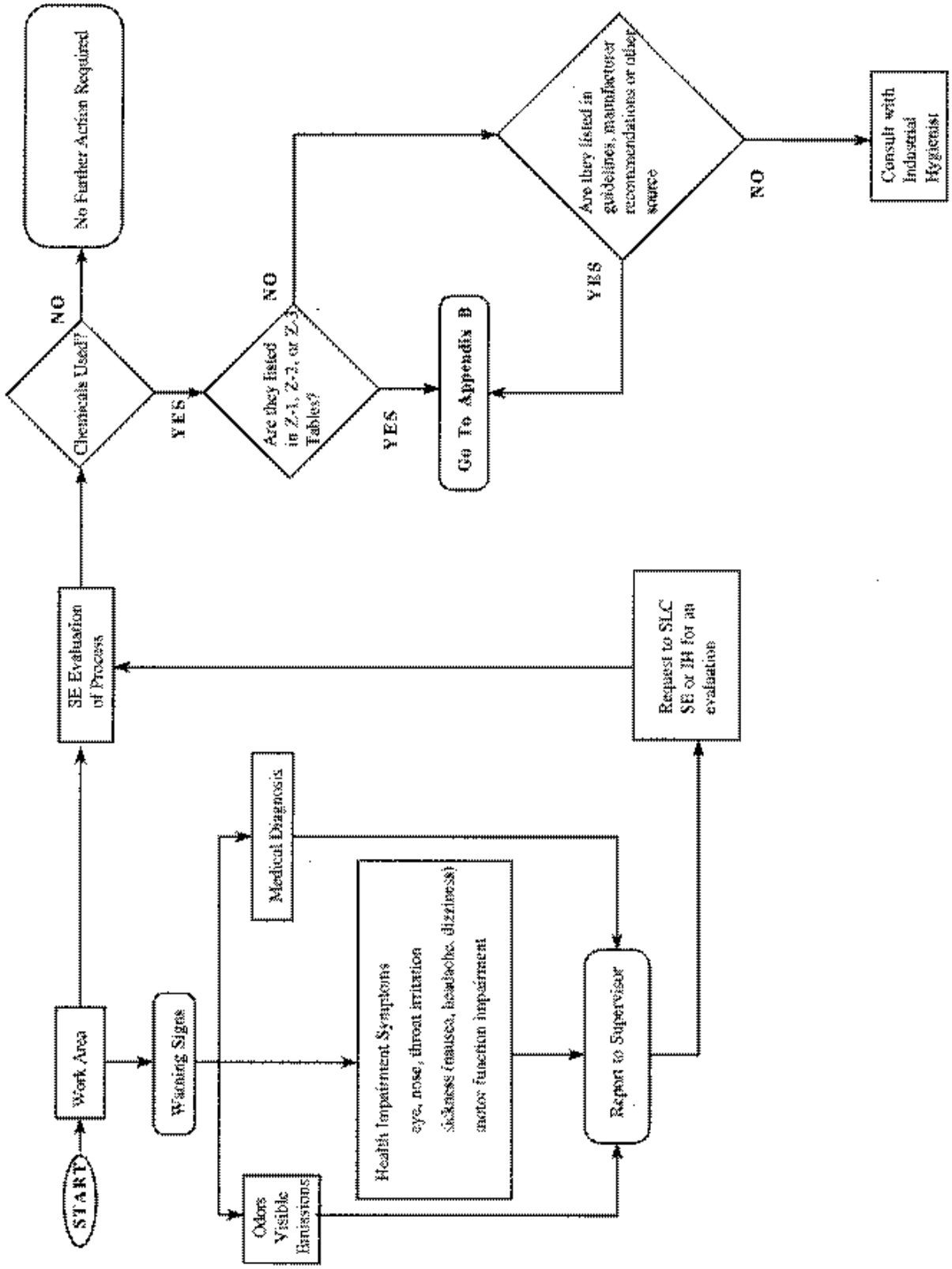
6.3.5 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training. Additionally, Safety and Loss Control will be responsible for providing qualified persons to assess, evaluate, and control workplace air contamination. Safety and Loss Control will provide and maintain air monitoring equipment and provide laboratory analyses.

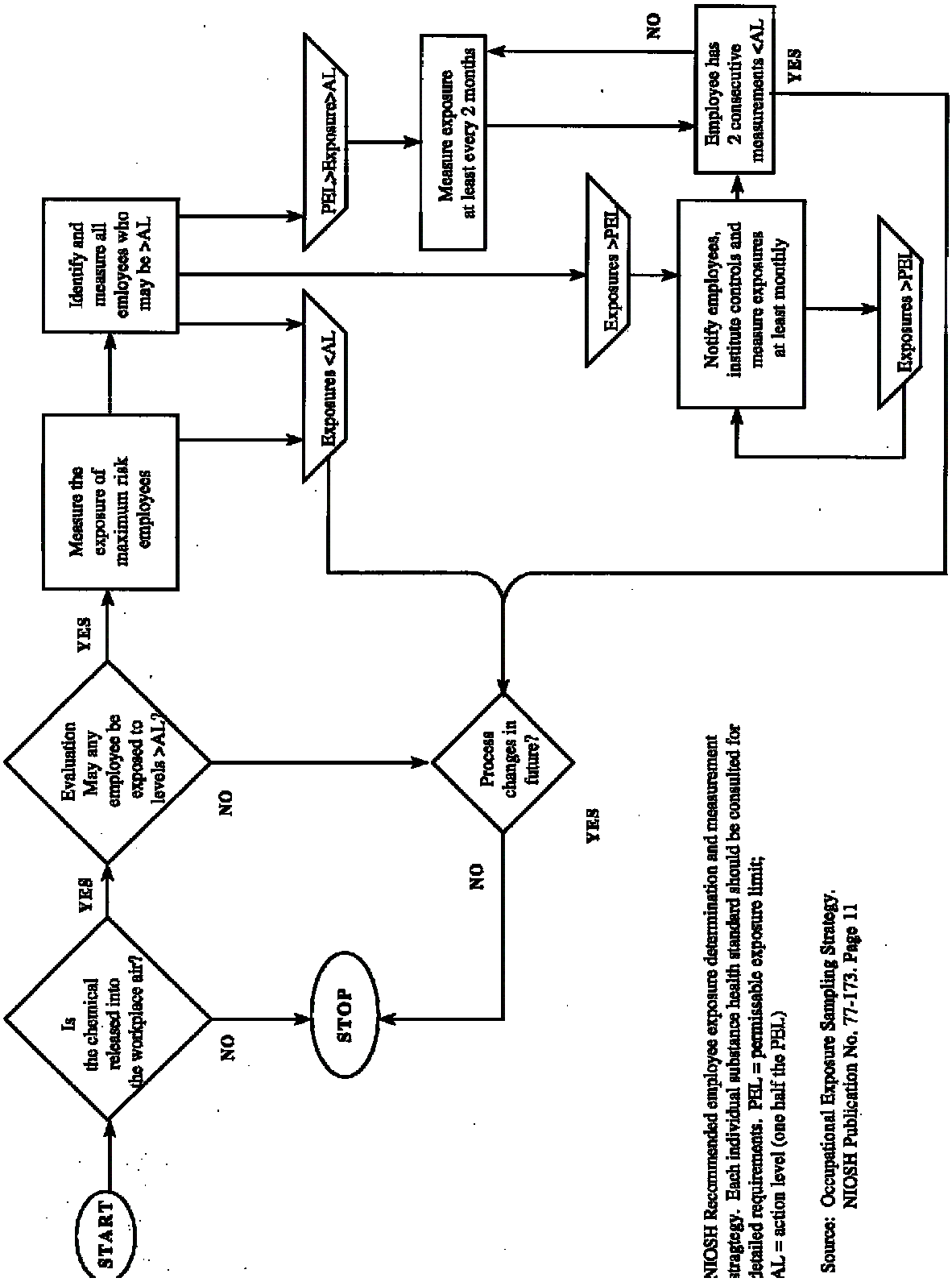
The NCDOT Industrial Hygienist will provide training, expertise, and guidance to the qualified person on air monitoring strategies. The air monitoring data will be evaluated by the Industrial Hygienist for completeness, accuracy, and precision. The Industrial Hygienist is also responsible for procuring and maintaining all air monitoring instrumentation.

Additionally, the Industrial Hygienist will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Work Area Evaluation Flow Chart



APPENDIX B: NIOSH Exposure Determination & Measurement Strategy



NIOSH Recommended employee exposure determination and measurement strategy. Each individual substance health standard should be consulted for detailed requirements. PEL = permissable exposure limit; AL = action level (one half the PEL)

Source: Occupational Exposure Sampling Strategy. NIOSH Publication No. 77-173. Page 11

Asbestos SPP# 1910.1001

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines to ensure the prevention of North Carolina Department of Transportation (NCDOT) employee exposure to airborne asbestos fibers.

2.0 Scope and Applicability

Asbestos is the common name for a group of minerals that may appear as masses of compact or relatively long, silky fibers. Asbestos is resistant to heat and corrosive chemicals.

Asbestos fibers are carried into the body as airborne particles. These fibers can become embedded in the tissues of the lung and digestive system. Once the fibers become trapped in the lung's air sacs, they are removed very slowly. Years of exposure to asbestos can cause a number of disabling and fatal diseases.

This safety policy and procedure establishes prevention and assessment practices for asbestos related job activities. It does not address management practices associated with asbestos removal projects. See SPP #1910.1001A, Asbestos Management, for those details.

This safety policy and procedure includes training provisions and discussion on the forms of asbestos. It also presents asbestos related NCDOT job activities and asbestos sign requirements. This safety policy and procedure presents discussion on the significance of Permissible Exposure Levels and how asbestos exposures will be assessed. Additionally, it presents provisions for medical surveillance and recordkeeping requirements.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects any employee who as a result of his or her job duties is exposed to asbestos.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.139 and 1910.1001), Occupational Safety and Health for Construction Standard (29 CFR 1926.1101), and for Maritime Standard (29 CFR 1915.1001).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious harm to employees. Therefore, asbestos materials will be handled such that employees' exposures do not exceed the Permissible Exposure Levels (PEL). When asbestos hazards exist that cannot be eliminated, then engineering controls, administrative controls, proper work practices, Personal Protective Equipment (PPE), and employee training will be implemented to reduce exposures below the PEL. These measures will be implemented to minimize asbestos hazards in order to ensure the safety of employees.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Asbestos. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Asbestos.

6.1 Definitions

Asbestos
Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated and/or altered.

Asbestos-Containing Material (ACM)
Any material containing more than 1 percent asbestos.

Authorized Person
Any person authorized by the employee and required by work duties to be present in regulated areas.

Building/Facility Owner
The legal entity, including a lessee, which exercises control over management and recordkeeping functions relating to a building and/or facility in which activities governed by this standard take place.

Class I Asbestos Work
Activities involving the removal of thermal system insulation and surfacing asbestos-containing material or presumed asbestos-containing material in amounts greater than 25 linear feet or 10 square feet, respectively.

Class II Asbestos Work
Activities involving the removal of asbestos-containing material which is not thermal system insulation or surfacing material insulation. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.

Class III Asbestos Work
Repair and maintenance operations, where " asbestos-containing material," including thermal system insulation and surfacing material, is likely to be disturbed.

Class IV Asbestos Work
Maintenance and custodial activities during which employees contact asbestos-containing material and presumed asbestos-containing material and activities to clean up waste and debris containing asbestos-containing material or presumed asbestos-containing material.

Employee Exposure
Exposure to airborne asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals that could occur if the employee were not using respiratory protective equipment.

Fiber
A particulate form of asbestos, tremolite, anthophyllite, or actinolite, 5 micrometers or longer, with a length-to-diameter of at least 3 to 1.

High-Efficiency Particulate Air Filter (HEPA)
A filter capable of trapping and retaining at least 99.97 percent of 0.3 micrometer diameter mono-disperse particles.

National Institute of Standards and Technology (NIST)
The agency responsible for establishing a national laboratory accreditation program for the analysis of asbestos in materials and associated quality control.

National Voluntary Laboratory Accreditation Program (NVLAP)
An asbestos analytical laboratory which participates in the NIST quality control program and has a unique number. All suspect material samples shall be sent to a NVLAP laboratory.

Presumed Asbestos-Containing Material (PACM)
Thermal insulation, surfacing material, and flooring material found in buildings constructed no later than 1980. This may be rebutted with material sampling and laboratory analysis reporting negative results.

Regulated Area
An area established by the employer to demarcate areas where airborne concentrations of asbestos exceed, or can reasonably be expected to exceed, the permissible exposure limit.

Surfacing ACM
Material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes) which contains more than 1 percent asbestos.

Thermal System Insulation (TSI)
Asbestos-containing material applied to pipes, fittings, boilers, breeching, tanks, ducts, or other structural components to prevent heat loss or gain and that contains more than 1 percent asbestos.

Tremolite, Anthophyllite, or Actinolite
The non-asbestos form of these minerals and any of these minerals that have been chemically treated and/or altered.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Employee Training
- Forms of Asbestos
- NCDOT Asbestos Related Work Activities
- Signs
- Permissible Exposure Limits
- Exposure Assessment
- PPE
- Medical Surveillance
- Recordkeeping

6.2.1 Employee Training

Employees who may be exposed to asbestos in their job duties will be trained in all procedures and safety methods. The training program will contain at a minimum the following information:

- The health effects associated with asbestos exposure
- The relationship between smoking and exposure to asbestos
- The quantity, location, manner of use, release, and storage of asbestos and the specific nature of operations which could result in exposure to these minerals
- The engineering controls and work practices associated with the employee's job assignment
- The specific procedures implemented to protect employees from exposure to asbestos
- The purpose, proper use, and limitations of respirators and protective clothing
- The purpose and a description of the medical surveillance program
- The content of the standard including appendices
- The names, addresses, and phone numbers of public health organizations which provide information, materials, and/or conduct programs concerning smoking cessation
- The requirements for posting signs and affixing labels and the meaning of the required legends for such signs and labels
- Access to information and training materials
- Copies of the standard and training information

Employee training records will be maintained for at least one year after the last day of employment.

This training shall be provided upon initial job assignment. Refresher training shall be provided annually.

6.2.2 Forms of Asbestos

Asbestos-containing products come in 2 forms:

- Friable
- Nonfriable

Friable asbestos is a material that contains more than 1 percent asbestos by weight that can be crumbled, pulverized, or, when dry, reduced to powder by hand pressure. Examples of friable, asbestos materials include sprayed-on fireproofing, ceiling treatments, and pipe insulation.

Nonfriable asbestos is a material that contains more than 1 percent asbestos by weight that cannot be crumbled, pulverized or, when dry, reduced to powder by hand pressure. Examples of nonfriable asbestos materials include floor tile, mastics, and transite cement sheeting.

The form that asbestos products take in the workplace determines the potential airborne exposure risk. Friable asbestos materials can present a higher exposure risk than nonfriable materials.

Asbestos has many different applications but is used most frequently in building products, insulating materials, friction materials, and textiles. Asbestos materials may be sprayed on structural beams as fireproofing. Asbestos materials may also be found in boiler and pipe insulation, stage curtains, and ceiling treatments on plaster or sheetrock.

Manufactured asbestos products have included floor and ceiling tiles, brake and clutch linings, paints and sealants, patching and taping compounds, and transite cement panels.

Refer to Appendix A for a more complete listing of asbestos-containing materials. Thermal system insulation and surfacing material installed prior to 1980 shall be considered to contain asbestos greater than 1 percent until a negative determination is made. It is noted that other types of construction material may contain asbestos-containing material if installed after 1980.

6.2.3 NCDOT Asbestos Related Work Activities

Within NCDOT, certain job activities bring employees into contact with asbestos-containing materials. These job activities include:

- Vehicle brake maintenance
- Facilities maintenance
- Ferry boat maintenance
- Building renovation and demolition

Employees involved in these job activities are required to adhere to certain precautionary practices. PPE may also be required depending upon the

specific job activity and the amount of airborne friable asbestos. Appendix B presents work practices and engineering controls for automotive brake work. NCDOT will ensure that no employee who works with asbestos-containing materials is exposed to an airborne concentration of asbestos in excess of 0.1 fiber per cubic centimeter of air measured as an 8 hour time weighted average (8 hour TWA).

It shall be determined if materials contain asbestos before any building renovation and/or demolition activities begin. TSI, surfacing material, flooring material, and other materials known to contain asbestos, installed prior to 1980, shall be presumed to contain asbestos. To determine if suspect materials do not contain asbestos, they must be sampled and analyzed for asbestos by a NVLAP laboratory.

Sampling of suspect material shall be performed only by North Carolina accredited asbestos inspectors.

NCDOT personnel will not be used for any asbestos removal work (Class I and Class II type work as defined in 1926.1101). This type of work shall be performed by contractors experienced in asbestos removal or, under some circumstances, a general contractor that has personnel trained in asbestos removal. See SPP #1910.1001A, Asbestos Management, for additional details.

6.2.4 Signs

Warning signs will be provided and displayed at each regulated area. In addition, warning signs will be posted at all approaches to regulated areas so that an employee may read the signs and take necessary protective steps before entering the area.

Warning signs will be designed large enough to be clearly understood and will indicate the particular danger involved such as cancer and lung disease, authorized personnel only, etc.

Warning labels will be placed on all materials, containers, tools, clothing, or other articles that have been exposed to asbestos, tremolite, anthophyllite, and actinolite to warn employees of the potential for exposure.

Signs shall be posted at entrances to mechanical rooms/areas which contain TSI or surfacing asbestos-containing material/presumed asbestos-containing material and in which employees reasonably can be expected to enter. The signs must identify the material present.

Previously installed and identified asbestos-containing material/ presumed asbestos-containing material must be labeled in areas where the label will be clearly noticed. Wording of signs/labels shall be as follows:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

6.2.5 Permissible Exposure Limits (PEL)

Additionally, NCDOT will ensure that no employee is exposed to an airborne concentration of asbestos in excess of 1.0 fiber per cubic centimeter of air as averaged over a sampling period of 30 minutes (Excursion Limit).

Since asbestos is a carcinogen, NCDOT will ensure that its employees are exposed to the lowest level feasible and will provide respirators to protect employees whenever they are using or handling asbestos materials.

6.2.6 Exposure Assessment

Air monitoring will be conducted in accordance with the OSHA Reference Method (Appendix of A of 1926.1101; 1910.1001; 1915.1001). The air monitoring results shall be reviewed by a Certified Industrial Hygienist (CIH).

6.2.7 Personal Protective Equipment (PPE)

Respirators will be provided and used by employees under the following circumstances:

- Where exposures exceed the 8 hour TWA PEL or the 30 minute Excursion Limit or whenever using or handling asbestos-containing material(s)
- For all Class I, Class II and Class III work
- In work situations where feasible engineering and work practice controls are not yet sufficient to reduce exposure to or below the TWA
- In any emergencies where work is necessary
- Whenever an employee desires to use a respirator or the Safety Engineer or Industrial Hygienist determines that an employee requires the use of a respirator

Respirators are mandatory for Class I, II, and III work regardless of the exposure level. Other types of exposure to asbestos will be evaluated and the respirator selected will be based on the level of exposure and in conformance with the applicable table.

Respirators will be selected in conformance with the NCDOT Written Respirator Program and the safety policy and procedure for Respirator Protection. Under no circumstances will a single use (disposable type) respirator be used for protection against airborne asbestos fibers.

6.2.8 Medical Surveillance

NCDOT personnel who handle, use, or are exposed to asbestos-containing material in excess of the PELs shall be included in a medical surveillance program. The program shall include the completion of the work/personal history form, examination by a licensed physician, pulmonary function testing, and x-ray of the lungs. For related information, see SPP # 1910.20, Access to Medical Records.

6.2.9 Recordkeeping

NCDOT shall maintain the following records:

- Exposure records for 30 years
- Training records for at least one year after employee termination
- Medical surveillance records for 30 years after termination
- Records of asbestos-containing material / presumed asbestos-containing material for as long as the facility exists

NCDOT will maintain an accurate record of all measurements taken to monitor employee exposure to asbestos, tremolite, anthophyllite, or actinolite. These records will include the following information:

- The date of the measurement
- The operation involving exposure to asbestos, tremolite, anthophyllite, or actinolite which is being monitored
- Sampling and analytical methods used and evidence of their accuracy
- Number, duration, and results of samples taken
- Type of respiratory protective devices worn
- Names, social security numbers, and exposures of the employees whose exposures are represented

This record will be maintained for at least 30 years and be made available to employees or regulatory agencies upon demand.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure that adequate funds are available and budgeted for the purchase of asbestos protection related equipment in their areas. They will also identify the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities related to asbestos handling or removal.

Supervisors will communicate appropriate needs to managers/unit heads and/or supervisors.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

6.3.4 Building Owner/Lessee

It is the responsibility of the building owner/lessee to notify:

- Prospective employers applying for or bidding on work whose employees reasonably can be expected to work in or adjacent to areas containing asbestos-containing material
- Employees of the owner/lessee who will work in or adjacent to areas with asbestos-containing material
- On multi-employer worksites, all employees who will be performing work in or adjacent to areas containing asbestos-containing material
- Tenants who will occupy areas containing asbestos-containing material

6.3.5 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing the required training. Safety and Loss Control will provide and maintain air monitoring equipment and provide laboratory

analyses. Safety and Loss Control shall have responsibility for conducting asbestos air monitoring or provide contract services for such air monitoring.

The Industrial Hygienist will provide training, expertise, and guidance on air monitoring strategies. The air monitoring data will be evaluated by the Industrial Hygienist for completeness, accuracy, and precision.

Additionally, the Industrial Hygienist will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Sample List of Suspected Asbestos-Containing Materials

There are over 3600 commercial products that contain asbestos. Materials with an asbestos content greater than 1 percent may be found in the following materials:

- Cement Pipes
- Cement Wallboard
- Cement Siding
- Asphalt Floor Tile
- Vinyl Floor Tile
- Vinyl Sheet Flooring
- Flooring Backing
- Construction Mastics (floor tile, carpet, ceiling tile, etc.)
- Acoustical Plaster
- Decorative Plaster
- Textured Paints/Coating
- Ceiling Tiles and Lay-in Panels
- Spray-Applied Insulation
- Blown-in Insulation
- Fireproofing Materials
- Taping Compounds (thermal)
- Packing Materials (for wall/floor penetrations)
- High Temperature Gaskets
- Laboratory Hoods/Table Tops
- Fire Blankets
- Fire Curtains
- Elevator Equipment Panels
- Elevator Brake Shoes
- HVAC Duct Insulation
- Boiler Insulation
- Breeching Insulation
- Ductwork Flexible Fabric Connections
- Cooling Towers
- Pipe Insulation (corrugated air-cell, block, etc.)
- Heating and Electrical Ducts
- Electrical Panel Partitions
- Electric Wiring Insulation
- Chalkboards
- Roofing Shingles
- Roofing Felt
- Base Flashing
- Thermal Paper Products
- Fire Doors
- Caulking/Putties
- Adhesives
- Wallboard
- Joint Compounds
- Vinyl Wall Coverings
- Spackling Compounds

NOTE: This list does not include every product/material that may contain asbestos. It is intended as a general guide to show which types of materials may contain asbestos.

APPENDIX B: Work Practices and Engineering Controls for Automotive Brake Work

This appendix specifies engineering controls and work practices that must be implemented by NCDOT during automotive brake and clutch inspection, disassembly, repair, and assembly operations. Proper use of these engineering controls and work practices will reduce employees' asbestos exposure below the permissible exposure level during clutch and brake inspection, disassembly, repair, and assembly operations.

NCDOT shall institute engineering controls and work practices using either the *Negative Pressure Enclosure/HEPA Vacuum System Method* or the *Low Pressure/Wet Cleaning Method* of this appendix. Any other method which NCDOT can demonstrate to be equivalent in terms of reducing employee exposure to asbestos as defined and which meets the requirements described in *Equivalent Methods* of this appendix may be used. For those facilities in which no more than 5 pairs of brakes or 5 clutches are inspected, disassembled, reassembled and/or repaired per week, the *Wet Method* of this appendix may be used. The work practices and controls associated with each of these methods are described in the following sections.

Negative Pressure Enclosure/HEPA Vacuum System Method

- The brake and clutch inspection, disassembly, repair, and assembly operations shall be enclosed to cover and contain the clutch or brake assembly and to prevent the release of asbestos fibers into the worker's breathing zone.

- The enclosure shall be sealed tightly and thoroughly inspected before work begins on brake and clutch inspection, disassembly, repair, and assembly.

- The enclosure shall be such that the worker can clearly see the operation and shall provide impermeable sleeves through which the worker can handle the brake and clutch inspection, disassembly, repair and assembly. The integrity of the sleeves and ports shall be examined before work begins.

- A HEPA-filtered vacuum shall be employed to maintain the enclosure under negative pressure throughout the operation. Compressed-air may be used to remove asbestos fibers or particles from the enclosure.

- The HEPA vacuum shall be used first to loosen the asbestos containing residue from the brake and clutch parts and then to evacuate the loosened asbestos containing material from the enclosure and capture the material in the vacuum filter.

- The vacuum's filter, when full, shall be first wetted with a fine mist of water, then removed and placed immediately in an impermeable container, properly labeled with asbestos warning labels and disposed of in sealed impermeable bags or other closed impermeable containers.

- Any spills or releases of asbestos containing waste material from inside of the enclosure or vacuum hose or vacuum filter shall be immediately cleaned up and disposed of in sealed impermeable bags or other closed impermeable containers.

APPENDIX B: Work Practices and Engineering Controls for Automotive Brake Work (Continued) 2

Low Pressure/Wet Cleaning Method

- A catch basin shall be placed under the brake assembly, positioned to avoid splashes and spills.
- The reservoir shall contain water containing an organic solvent or wetting agent. The flow of liquid shall be controlled such that the brake assembly is gently flooded to prevent the asbestos-containing brake dust from becoming airborne.
- The aqueous solution shall be allowed to flow between the brake drum and brake support before the drum is removed.
- After removing the brake drum, the wheel hub and back of the brake assembly shall be thoroughly wetted to suppress dust.
- The brake support plate, brake shoes and brake components used to attach the brake shoes shall be thoroughly washed before removing the old shoes.
- In systems using filters, the filters, when full, shall be first wetted with a fine mist of water, then removed and placed immediately in an impermeable container, labeled with asbestos warning labels and disposed of in sealed impermeable bags or other closed impermeable containers.
- Any spills of asbestos-containing aqueous solution or any asbestos-containing waste material shall be cleaned up immediately and disposed of in sealed impermeable bags or other closed impermeable containers.
- The use of dry brushing during low pressure/wet cleaning operations is prohibited.

Equivalent Methods

An equivalent method is one which has sufficient written detail so that it can be reproduced and has been demonstrated that the exposures resulting from the equivalent method are equal to or less than the exposures which would result from the use of the *Negative Pressure Enclosure/HEPA Vacuum System Method* of this appendix. For purposes of making this comparison, NCDOT shall assume that exposures resulting from the use of the *Negative Pressure Enclosure/HEPA Vacuum System Method* shall not exceed 0.004 f/cc, as measured by the OSHA reference method and as averaged over at least 18 personal samples.

APPENDIX B: Work Practices and Engineering Controls for Automotive Brake Work (Continued) 3

Wet Method

- A spray bottle, hose nozzle, or other implement capable of delivering a fine mist of water or amended water or other delivery system capable of delivering water at low pressure, shall be used to first thoroughly wet the brake and clutch parts. Brake and clutch components shall then be wiped clean with a cloth.

- The cloth shall be placed in an impermeable container, labeled with asbestos warning labels and then disposed of in sealed impermeable bags or other closed impermeable containers, or the cloth shall be laundered in a way to prevent the release of asbestos fibers in excess of 0.l fiber per cubic centimeter of air.

- Any spills of solvent or any asbestos containing waste material shall be cleaned up immediately and then disposed of in sealed impermeable bags or other closed impermeable containers

- The use of dry brushing during the wet method operations is prohibited.

Asbestos Management SPP# 1910.1001A

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines to ensure the prevention of North Carolina Department of Transportation (NCDOT) employee exposure to airborne asbestos fibers.

2.0 Scope and Applicability

Asbestos is the common name for a group of material minerals that may appear as masses of compact or relatively long, silky fibers. Asbestos is resistant to heat and corrosive chemicals.

Asbestos fibers are carried into the body as airborne particles. These fibers can become embedded in the tissues of the lung and digestive system. Once the fibers become trapped in the lung's air sacs, they are removed slowly. Years of exposure to asbestos can cause a number of disabling and fatal diseases.

This document establishes management practices associated with asbestos removal projects.

This safety policy and procedure includes training provisions, a listing of materials that contain asbestos, and guidelines for areas suspected of containing asbestos materials. It also presents discussions on building materials and inspections, renovation/demolition guidelines, and administrative controls requirements. Details are also presented for emergency situations, notification requirements, recordkeeping, work practices, decision trees, and forms.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects building owners, facility managers, leasee's, maintenance personnel, custodial personnel and building occupants.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.1001), Occupational Safety and Health for Construction Standard (29 CFR 1926.1101), Maritime Standard (29 CFR 1915.1001) North Carolina Hazardous Materials Management Branch Rules (HMMB) [15A NCAC 19C Sections .0601 through .0609], and National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious harm to employees. Therefore, NCDOT has implemented an operations and management (O and M) program to control the release of asbestos fibers from asbestos containing materials. The O and M Program details responsibilities of management, notification, recordkeeping, worker protection, training, hazard awareness, administrative controls, work practices and surveillance within NCDOT.

5.0 General Responsibilities

It is the responsibility of each manager/unit head and facility manager to ensure implementation of NCDOT's safety policy and procedure on Asbestos Management.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities.

6.1 Definitions

Accredited Air Monitor
An individual who has a high school diploma and least three months of asbestos air monitoring experience as, or under the direct supervision of, an accredited supervising air monitor and has successfully completed a NIOSH 582 Course or HMMB approved course and the 5 day Asbestos Supervisor Course or the Project Monitoring Course. HMMB will issue an identification number and card which must be carried on the person.

Accredited Designer
An individual who has a high school diploma and least three months of asbestos related experience as, or under the direct supervision of, an accredited designer and has successfully passed an AHERA approved designer course. HMMB will issue an identification number and card which must be carried on the person.

Accredited Inspector
An individual who has a high school diploma and least three months of asbestos related experience as, or under the direct supervision of an accredited inspector and has successfully completed the three day AHERA approved asbestos inspector training. HMMB will issue an identification number and card which must be carried on the person.

Accredited Management Planner
An individual who has a high school diploma and is an accredited inspector and has successfully completed the two day AHERA approved asbestos management training course. HMMB will issue an identification number and card which must be carried on the person.

Accredited Supervising Air Monitor
An individual who is a Certified Industrial Hygienist and has least three months of asbestos related experience and has successfully completed an AHERA approved Supervision course and the three day HMMB approved respirator training course. HMMB will issue an identification number and card which must be carried on the person.

Accredited Supervisor
An individual who has a high school diploma and least three months of asbestos related experience as, or under the direct supervision of an accredited supervisor and has successfully passed a 4 or 5 day AHERA approved supervisor course. HMMB will issue an identification number and card which must be carried on the person.

Accredited Worker
An individual who has successfully completed an AHERA approved asbestos worker course. AHMB will issue an identification number and card which must be carried on the person.

Asbestos
Includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that have been chemically treated and/or altered.

Asbestos-Containing Material (ACM)
Any material containing more than 1 percent asbestos.

Building/Facility Owner
The legal entity, including a lessee, which exercises control over management and record keeping functions relating to a building and/or facility in which activities governed by this standard take place.

Category I Non-Friable Asbestos-Containing Material
Asbestos containing packing, gaskets, resilient flooring covering, and asphalt roofing products containing more than one percent asbestos measured by polarized light microscopy .

Category II Non-Friable Asbestos
Any material that is not Category I non-friable ACM containing more than one percent asbestos measured by polarized light microscopy.

Cutting
To penetrate with a sharp-edged instrument and includes sawing, but does not include shearing, slicing, or punching.

Demolition
The wrecking or taking out of any load-supporting structural member of a facility together with any related handling operations or the intentional burning of any facility.

Facility
Any institutional, commercial, public, industrial, or residential structure, installation, or building, excluding residential with four or less units, any ship and any active or inactive waste disposal site.

Friable Asbestos
Material containing one percent or more of asbestos as determined by polarized light microscopy, that when dry can be crumbled, pulverized, or reduced to powder by hand pressure.

Grinding
To reduce to powder or small fragments. Includes mechanical chipping or drilling.

Hazardous Materials Management Branch (HMMB)
The legal entity in North Carolina responsible for NESHAP - Asbestos enforcement. It is a section of Division of Epidemiology, Department of Environment, Health and Natural Resources.

High-Efficiency Particulate Air Filter (HEPA)
A filter capable of trapping and retaining at least 99.97 percent of 0.3 micrometer diameter mono-disperse particles.

Leak-Tight
Solids or liquids are contained in a manner that will prevent their leakage or spilling.

National Institute of Standards and Technology (NIST)
The agency responsible for establishing a national laboratory accreditation program for the analysis of asbestos in materials and associated quality control.

National Voluntary Laboratory Accreditation Program (NVLAP)
An asbestos analytical laboratory which participates in the NIST quality control program and has a unique number. All suspect material samples shall be sent to a NVLAP laboratory.

Non-Friable Asbestos
Material containing one percent or more of asbestos as determined by polarized light microscopy, that when dry cannot be crumbled, pulverized, or reduced to powder by hand pressure.

Operations and Maintenance (O&M)
A program that controls the release of fibers to the environment and protects health by integrating inspections, hazard assessment, controlled access and administrative controls into a functional plan.

Owner/Operator of a Demolition or Renovation Activity
Any person who owns, leases, operates, controls, or supervises the facility being demolished or renovated or any person who owns, leases, operates, controls, or supervises the demolition or renovation operation, or both.

Particulate Asbestos
Finely divided particles of asbestos or material containing asbestos.

Planned Renovation Activity
A renovation operation, or a number of such operation, in which some RACM will be removed or stripped within a given period of time and that can be predicted.

Poor Condition
The binding of the material that is losing its integrity as indicated by peeling, cracking, or crumbling of the material.

Polarized Light Microscopy (PLM)
An EPA method for determining the presence of asbestos and the content of materials suspected of containing asbestos. The method is detailed in appendix A, subpart F, 40 CFR part 763 section 1. The laboratory performing the analyses shall be NVLAP accredited.

Presumed Asbestos-Containing Material (PACM)
Thermal insulation, surfacing material and flooring material found in buildings constructed no later than 1980. This may be rebutted with material sampling and laboratory analysis reporting negative results.

Regulated Area
An area established by the employer to demarcate areas where airborne concentrations of asbestos exceed, or can reasonably be expected to exceed the permissible exposure limit.

Regulated Asbestos-Containing Material (RACM)
Material that is (a) friable, (b) Category I nonfriable ACM that has become friable, (c) Category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting or abrading, or (d) Category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material in the course of the demolition or renovation operations.

Remove
To take out RACM or facility components that contain or are covered with RACM from any facility.

Renovation
Altering a facility or one or more facility components in any way, including the stripping or removal of RACM from a facility component.

Resilient Floor Covering
Asbestos containing floor tile, and sheet vinyl floor covering containing more than one percent asbestos determined by PLM.

Strip
To take off RACM from any part of a facility or facility components.

Surfacing ACM
Material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes) which that contains more than 1 percent asbestos.

Thermal System Insulation (TSI)
ACM applied to pipes, fittings, boilers, breeching, tanks, ducts or other structural components to prevent heat loss or gain and that contains more than 1 percent asbestos.

Transmission Electron Microscopy (TEM)
The process of analyzing particulate collected on filters by transmission electron microscopy using energy dispersive radiation to identify specific asbestos fibers. The required method is defined in 40 CFR Part 763, Subpart E.

Visible Emissions
Any emissions, which are visually detectable without the aid of instruments, coming from RACM or asbestos-containing material.

Waste Generator
Any owner or operator of a source covered by NESHAP whose act or process produces asbestos-containing waste material.

Waste Shipment Record
The shipping document, required to be originated and signed by the waste generator, used to track and substantiate the disposition of asbestos-containing waste material.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. The provisions are:

- Training
- Materials Containing Asbestos
- Areas with Suspected or Known Asbestos Materials
- Building Materials and Inspections
- Renovation/Demolition
- Administrative Controls
- Emergency Situations
- Notifications
- Recordkeeping
- Work Practices
- Decision Trees
- Forms

6.2.1 Training

NCDOT will provide training to ensure employees and building occupants who may be exposed to asbestos are properly and adequately trained in all procedures and safety methods related to asbestos. The training program will contain as a minimum the following information:

- The health effect associated with asbestos exposure.
- The relationship between smoking and exposure to asbestos in producing lung cancer.
- The quantity, location, manner of use, condition, and storage of and the specific nature of operations which could result in exposure to these minerals.
- The engineering controls and work practices associated with the employee's job assignment.
- The specific procedures implemented to protect employees from exposure to asbestos such as work practices, emergency and clean-up procedures, and personal protective equipment (PPE) to be used.
- The purpose and a description of the medical surveillance program.
- The names, addresses and phone numbers of public health organizations which provide information, materials and/or conduct programs concerning smoking cessation.
- The requirements for posting signs and affixing labels and the meaning of the required legends for such signs and labels.
- Access to information and training materials.
- Copies of the standard, guidelines and training information.

Training records will be maintained at least one year after the last day of employment for the employee.

Outside contractors who may come into contact with ACM/PACM shall also be trained. Copies of their training should be submitted for review prior to their activity involving asbestos.

6.2.2 Materials Containing Asbestos

There are over 3600 commercial products that contain asbestos. Materials with an asbestos content greater than 1 percent may be found in the following materials: pipe insulation, boiler insulation, breeching, HVAC duct tape, HVAC flex fittings, flooring materials, mastics, adhesives, brakes, clutches, gaskets, ceiling panels/tiles, ceiling surfacing material, fire doors, fireproofing, window glazing, caulking, tapes, wall board compound, wall board, plastic, paper and paint.

Refer to Appendix A for a more complete listing. Thermal system insulation and surfacing material installed prior to 1980 shall be considered as containing asbestos greater than 1 percent until a negative determination is made. It is noted that other types of construction material may contain ACM although it may be installed after 1980.

6.2.3 Areas with Suspected or Known Asbestos Materials

The following areas in NCDOT are likely to contain varying amounts of asbestos. However, these areas pose no immediate health risk to employees as long as asbestos containing areas are not disturbed. These areas include:

- Office areas
- Shop areas
- Storage areas
- HVAC rooms
- Mechanical rooms
- Pipe chases
- Air plenums
- Boiler rooms
- Roofs
- Crawl spaces
- Disposal sites

6.2.4 Building Materials and Inspections

Most building materials are suspected of containing asbestos material. To assure that the materials do not contain asbestos, an inspection by an accredited inspector shall be performed on all facilities owned, leased or used by NCDOT. Sampling of suspect material shall be performed only by North Carolina accredited asbestos inspectors.

Asbestos material in buildings is grouped or categorized as follows:

- Friable
- Non-friable
  - Category I non-friable
  - Category II non-friable
- Regulated ACM

A database shall be established by Facilities Management to allow facility managers to determine the location, quantity and condition of building ACM and building materials that do not contain asbestos. Known or suspected ACM shall be examined at least every 6 months to determine their condition or sooner if their condition has been reported to have changed.

6.2.5 Renovation/Demolition

Before any renovation or demolition project that will or reasonably likely will disturb building materials, the facility manager shall check the database for presence of asbestos in the materials. If the material is not listed on the data base, the material shall be sampled for asbestos prior to renovation/demolition activity. If the disturbance of ACM shall make it friable (i. e. release fibers to the environment), it is considered regulated material (RACM). Friability determinations shall be made by an accredited inspector or management planner.

RACM greater than 160 square feet or 250 linear feet or 35 cubic feet that will be disturbed during the renovation/demolition are reportable quantities to HMMB. All projects involving the disturbance of these quantities of ACM shall be conducted by licensed asbestos abatement contractors and the projects shall follow the State Construction Office (SCO) Asbestos Abatement Guidelines (latest version). These projects will have to be designed by an accredited designer.

The HMMB Asbestos Permit Application and Notification for Demolition/Renovation (DENHR 3768) shall be filled out prior to the commencement of any demolition or renovation project. It is the policy to have the contractor performing the asbestos abatement to complete and submit the form to HMMB. The contractor cannot start any project until they have a signed HMMB permit form.

Projects where the amounts of ACM disturbed are greater than 3000 square feet of surfacing material or 1500 linear feet of TSI shall require an air monitoring plan by a Supervising Air Monitor and clearance sampling.

For quality assurance purposes, all abatement project documents shall be submitted to Safety and Loss Control for review.

6.2.6 Administration Controls

Small projects (less than 10 square feet of surfacing material or 25 linear feet of TSI) involving the disturbance of ACM shall be controlled by the use of work permits and assuring that the contractor's employees are properly trained or use accredited asbestos abatement workers. A permit system shall be used and no work can be performed until the work permit is signed.

NCDOT employees used for small projects shall be trained in the AHERA 16 to 20 hour Operations and Maintenance (O and M) course. These employees are also regulated by the OSHA Asbestos standards.

6.2.7 Emergency Situations

Under some circumstances buildings may be damaged (high winds, tornado's, hurricanes, fires, explosions) which may require immediate actions for clean-up. Under these circumstances if it is known that no ACM has been disturbed, then proceed with clean-up. If ACM is known or highly suspected, contact the Safety Engineer to assist in determining the proper course of action.

6.2.8 Notifications

It is the responsibility of the building owner/leasee to notify:

- Prospective employers applying for or bidding work whose employees reasonably can be expected to work in or adjacent to areas containing ACM
- Employees of the owner/leasee who will work or adjacent to areas with ACM
- Tenants who will occupy areas containing ACM

The building owner/lessee shall post signs at the entrance to mechanical rooms/areas in which employees reasonably can be expected to enter and which contain TSI or surfacing ACM/PACM. The signs must identify the material present, the location and the appropriate work practices that will ensure ACM/PCAM will not be disturbed.

Previously installed ACM/PACM identified by the building owner/leasee must be labeled in areas where the label will be clearly noticed. Wording of signs/labels shall be as follows:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

6.2.9 Recordkeeping

NCDOT shall maintain the following records:

- Exposure records for thirty years
- Training records for at least one year after employee termination
- Medical surveillance records for thirty years after termination
- Records of ACM/PACM for as long as the facility exists
- Fiber release episodes
- Work permits
- Material surveillance
- Abatement log

These records will be maintained and be made available to employees or regulatory agencies upon demand.

6.2.10 Work Practices

Class III type work and Class IV type work are the types of work that will be predominately followed within NCDOT.

Class III type work operations includes repair, maintenance, minor renovation, and other tasks where there is intentional disturbance of ACM/PACM but the disturbance is incidental to the task at hand. A disturbance results in a fiber release from ACM/PACM. Work practices for class III type work include:

- Use local exhaust ventilation to the extent feasible and keep the material wet. No dry sweeping of waste material is allowed. All waste material is to be bagged immediately for disposal.
- Where drilling, cutting, abrading, sanding, chipping, breaking, or sawing occurs, use of impermeable dropcloths; isolation of such operations using mini-enclosures or glove bag systems.
- Where there is no negative exposure assessment or where the PEL is exceeded, containment of the area using drop cloths and plastic barriers, or a specific control system listed for Class I work; employees performing work under such circumstances must also use appropriate respiratory protection.
- If feasible the air handling system should be off during the disturbance.

Class IV type work includes minor contact with ACM/PACM and includes such activities as:

- Housekeeping - dusting surfaces, vacuuming carpets, mopping floors and cleaning up ACM debris.
- Maintenance - changing light bulbs, working on a light fixture attached to ceiling with ACM/PACM, floor stripping/polishing and working around mechanical rooms or pipe chases with ACM (TSI).

Employees cleaning up debris and waste in a regulated area where respirators are required, must wear the appropriate respiratory protection.
Waste and debris in areas where friable TSI or surfacing material is accessible, shall be assumed to contain asbestos.

6.2.11 Decision Trees

Use the NESHAP decision tree to determine if the project requires HMMB notification and the use of an asbestos contractor. (See Appendix B.)

6.2.12 Forms

The following forms will be used for asbestos management:

- ACM Inspection (Appendix C)
- Asbestos Hazard Assessment (Appendix D)
- Surveillance (Appendix E)
- Fiber Release Episodes (Appendix F)
- Work Permit (Appendix G)

Refer to these appendices for additional details.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will be responsible for identifying the employees affected by this safety policy and procedure. They will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with Asbestos Management through their auditing process.

Managers/Unit Heads will know where ACM/PACM is located and its condition.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training perform any of the tasks or activities related to Asbestos Management.

Supervisors will know where ACM/PACM is located and its condition. Supervisors will notify managers/unit heads of fiber release episodes and changes in condition of ACM.

They will ensure that employees have been trained where they may be exposed to asbestos or may come into contact with asbestos.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure and follow proper work practices for the type of work performed. Employees will also notify supervisors of any changes in ACM condition.

6.3.4 Safety and Loss Control

It is the responsibility of Safety and Loss Control to train, perform work area evaluations, determine exposure assessments and recommend controls to reduce exposure. Risk assessments shall be made based on the exposure assessment and employee duties.

Safety and Loss Control will also be responsible for quality assurance of the asbestos management program to include inspections, hazard assessments, bulk sample analytical, abatement designs, air monitoring and asbestos management. Safety Engineers may be used to collect samples on an as needed basis if they are accredited inspectors.

Additionally, the Industrial Hygienist will:

- Provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure
- Develop an asbestos operations and maintenance program
- Provide expertise on matters relating to asbestos
- Oversee the quality assurance for inspections, designs and projects
- Select a laboratory for the analyses of asbestos
- Review the laboratory's Quality Assurance/Quality Control (QA/QC) program

6.3.5 Facilities Management

Facilities Management will conduct inspections and perform hazard assessment at NCDOT facilities and develop a database on the location, quantity and type of asbestos materials.

6.3.6 Materials and Tests Unit

Materials and Tests Unit shall be responsible for selecting a NVLAP laboratory or laboratories for processing and analyzing bulk samples.

6.3.7 Facility Managers

Each facility manager shall be responsible for implementing the O and M Plan where asbestos-containing materials are present.

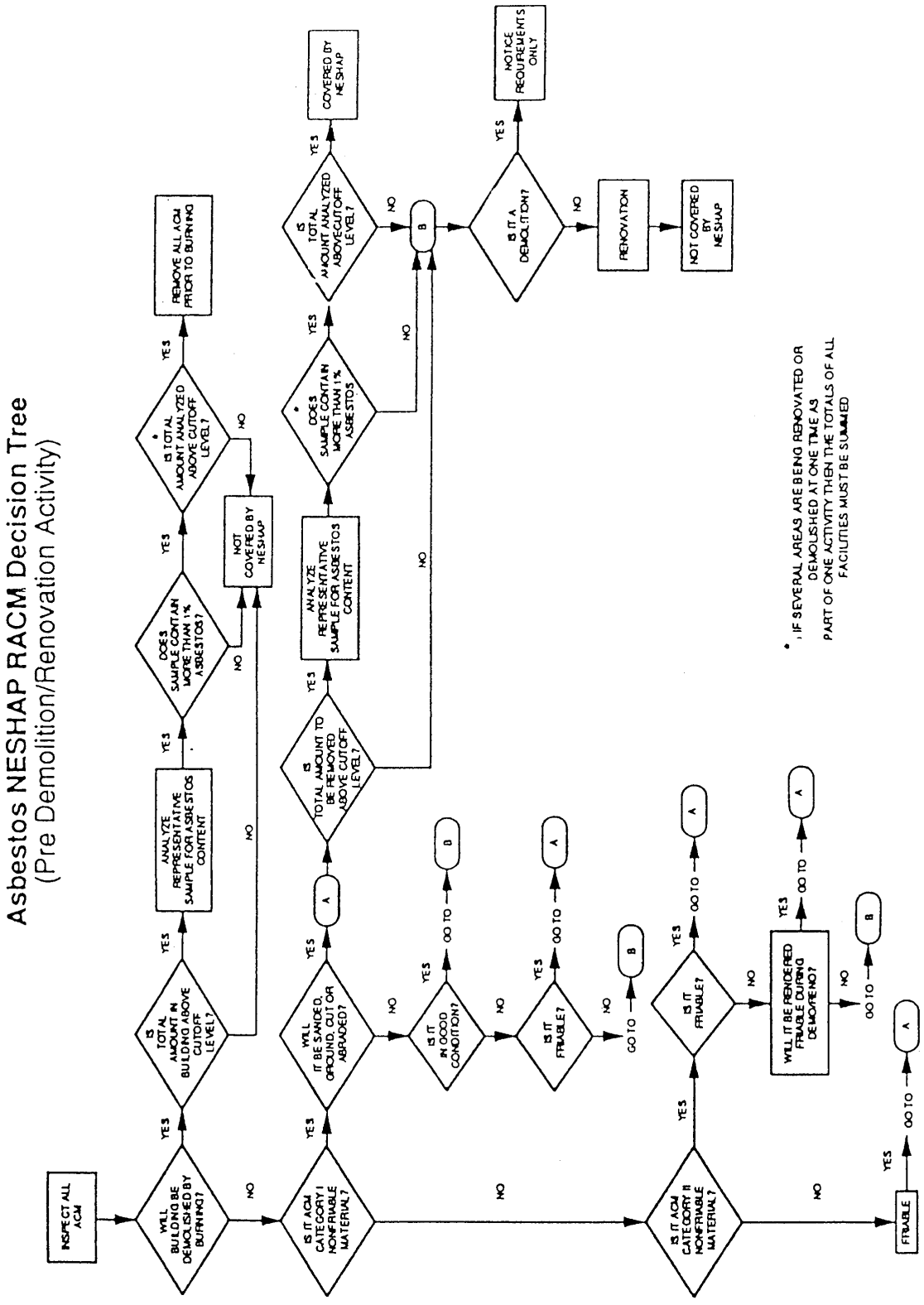
APPENDIX A: Sample List of Suspected Asbestos-Containing Materials

There are over 3600 commercial products that contain asbestos. Materials with an asbestos content greater than 1 percent may be found in the following materials:

- Cement Pipes
- Cement Wallboard
- Cement Siding
- Asphalt Floor Tile
- Vinyl Floor Tile
- Vinyl Sheet Flooring
- Flooring Backing
- Construction Mastics (floor tile, carpet, ceiling tile, etc.)
- Acoustical Plaster
- Decorative Plaster
- Textured Paints/Coating
- Ceiling Tiles and Lay-in Panels
- Spray-Applied Insulation
- Blown-in Insulation
- Fireproofing Materials
- Taping Compounds (thermal)
- Packing Materials (for wall/floor penetrations)
- High Temperature Gaskets
- Laboratory Hoods/Table Tops
- Fire Blankets
- Fire Curtains
- Elevator Equipment Panels
- Elevator Brake Shoes
- HVAC Duct Insulation
- Boiler Insulation
- Breeching Insulation
- Ductwork Flexible Fabric Connections
- Cooling Towers
- Pipe Insulation (corrugated air-cell, block, etc.)
- Heating and Electrical Ducts
- Electrical Panel Partitions
- Electric Wiring Insulation
- Chalkboards
- Roofing Shingles
- Roofing Felt
- Base Flashing
- Thermal Paper Products
- Fire Doors
- Caulking/Putties
- Adhesives
- Wallboard
- Joint Compounds
- Vinyl Wall Coverings
- Spackling Compounds

NOTE: This list does not include every product/material that may contain asbestos. It is intended as a general guide to show which types of materials may contain asbestos.

APPENDIX B: NESHAP Decision Tree



APPENDIX C: NCDOT ACM Inspection Form

Facility: _____

Location: _____

_____

Building: _____

Date: _____

Project ID No. _____

Division _____

District _____

Sample or Visual ID No.	Description of material Location: sample and material	COMMENTS: Damage Assessment, Friability, Air Plenum, Air Currents, Accessibility, Contact, Vibration	Est. Amount
HGA No.			
HGA No.			
HGA No.			
HGA No.			
HGA No.			
HGA No.			
HGA No.			
HGA No.			
HGA No.			

_____

Inspector and NC Accred. No.

PAGE _____ OF _____

APPENDIX D: NCDOT Asbestos Hazard Assessment Form

Division: _____ Date: _____ Project ID No.: _____

Facility: _____

Location: _____

Building: _____

Homogeneous Area ID No. _____ Description: _____

Location: _____

Material Type: _____

Asbestos Content: Chrysotile _____% Amosite _____% Crocidolite _____%

Quantity: _____

Potential For Fiber Release

Friability: _____

Accessibility: _____

Contact: _____

Damage: Good Condition: _____ Significantly Damaged(>25%): _____ Damaged(<25%): _____

Damage Type: _____

Air Currents: _____

Inside: _____ Outside: _____

Area Usage: _____ No. of persons exposed: _____

Sample ID Nos. _____

NIST Laboratory: _____

Classification

NESHAP: _____ OSHA : _____

Hazard Rating: _____

Response Action:

_____

_____

_____

_____

SKETCH / SPECIAL NOTES

APPENDIX E: Asbestos Surveillance Form

Building .....

Location: .....

HGA No.	Type of material	Date	Condition	Change since last inspection	Action required

.....

(Signature)

.....

(Accred No.)

APPENDIX F: Asbestos Fiber Release Episode Form

Fiber Release Episode Form

Division: ____ Unit: _____

Episode Data

Date: _____ Time: _____

Location: _____

_____

_____

Type of material: ___Surfacing ___TSI ___Misc: (describe)_____

Material Classification: ___ Friable ___ Non-friable

Type of release: _____

Estimated quantity disturbed: _____

Areas affected from the release: _____

_____

HVAC turned off: (date/time) _____

Exposures: _____

Asbestos Work Permit Issued: YES NO N/A

Actions taken to control exposures: _____

_____

_____

_____

_____

Notifications:

___ Asbestos Program Manager

___ Safety and Loss Control (919) 250-4200

___ Facilities Management

___ O&M personnel

___ Asbestos abatement contractor

_____

(Signature)

APPENDIX F: Asbestos Fiber Release Episode Form (Continued) 2

Sample

Fiber Release Episode Form

Division: 19 Unit: LABORATORY

Episode Data

Date: 4-15-96 Time: 0900

Location: SUNSET BLDG
101 SOUTH ST
MAPLE, NC

Type of material: ___ Surfacing ___ TSI ✓ Misc: (describe) CEILING TILES

Material Classification: ✓ Friable ___ Non-friable

Type of release: TILES DAMAGED DURING LIGHT FIXTURE REMOVAL

Estimated quantity disturbed: 6 SF

Areas affected from the release: NE CORNER OF LAB.

HVAC turned off: (date/time) 4-15-96 0910

Exposures: LAB. WORKERS ; POSSIBLY ADJ. PERS. ; MAINT WORKERS

Asbestos Work Permit Issued: YES (NO) N/A

Actions taken to control exposures: CLOSED LAB. ; & CLOSED DOOR ; WET MATERIAL BARRICADED ENTRY TO ROOM UNTIL O&M PERSONNEL ARRIVED

Notifications:

✓ Asbestos Program Manager
✓ Safety and Loss Control (919) 250-4200
✓ Facilities Management
✓ O&M personnel
___ Asbestos abatement contractor

(Signature)

APPENDIX G: NCDOT's Asbestos Work Permit Form

TO: Asbestos Program Manager

Job Request No. _____ **Start Date:** _____

____ ACM is present in the vicinity of the renovation and most likely will not be disturbed during the renovation
____ ACM is present and the disturbance of asbestos may be anticipated
____ ACM will be disturbed during the renovation

Date: _____ Division: _____ Organization/Unit: _____

Requester: Name: _____ Tele. No. _____

Description of Work: _____

_____

Building: _____

Location: _____

Type of material: ____ Surfacing ____TSI ____Miscellaneous (describe): _____

Location of material to be disturbed: _____

Estimated amount to be disturbed: _____ Project duration: _____

Project type: ____ O&M ____ Designed ____ Emergency ____ Special (describe): _____

To be completed by Asbestos Program Manager

Company or personnel conducting work: _____

Supervisor: _____ Accred. No. _____

Telephone No. _____

HMMB Permit No. _____

Personnel Trained for OSHA Class II type work? **YES NO**

Work requires OSHA Class I or II type training? **YES NO**

Work Practices and Procedures to be used if not a designed project:

____HVAC off ____negative pressure enclosure ____wet methods ____HEPA vacuuming ____Protective clothing

____glove bag ____ mini-enclosure ____occupants notified ____warning signs posted ____waste disposal

____ wetting agents ____encapsulant ____labelled disposal bags ____respirators ____polysheets

Special Work Practices and/or equipment required: _____

_____

_____

Special Conditions: _____

_____

Notification

____ Safety and Loss Control ____ Facilities Management

NOTE: An application must be submitted for all maintenance work whether or not asbestos-containing or presumed asbestos containing materials might be affected. An authorization must be received before any work is completed.

Approved to proceed:

_____
(Signature) (Date)

Not Approved to proceed:

_____
(Signature) (Date)

APPENDIX G: NCDOT's Asbestos Work Permit Form (Continued) 2

Sample

TO: Asbestos Program Manager

Job Request No. 96-009 Start Date. 4-15-96

___ ACM is present in the vicinity of the renovation and most likely will not be disturbed during the renovation
___ ACM is present and the disturbance of asbestos may be anticipated
✓ ACM will be disturbed during the renovation

Date: 4-1-96 Division: 19 Organization/Unit: ROAD MAINTENANCE

Requester: Name: JOE CAMEL Tele. No. 919-123-4567

Description of Work: REMOVE STEAM VALVE

Building: SUNSET

Location: 555 MAPLE, OAK CITY

Type of material: ___ Surfacing ✓ TSI ___ Miscellaneous (describe):

Location of material to be disturbed: BOILER ROOM

Estimated amount to be disturbed: 4 LF Project duration: 1 DAY

Project type: ✓ O&M ___ Designed ___ Emergency ___ Special (describe):

To be completed by Asbestos Program Manager

Company or personnel conducting work: RAPID ABATE, RALEIGH, NC

Supervisor: MARK FIBER Accred. No.

Telephone No. 919-123-7454

HMMB Permit No. N/A

Personnel Trained for OSHA Class II type work? (YES) NO

Work requires OSHA Class I or II type training? YES (NO)

Work Practices and Procedures to be used if not a designed project:

✓ HVAC off ___ negative pressure enclosure ✓ wet methods ✓ HEPA vacuuming ✓ Protective clothing
✓ glove bag ___ mini-enclosure ✓ occupants notified ✓ warning signs posted ✓ waste disposal
✓ wetting agents ___ encapsulant ✓ labelled disposal bags ✓ respirators ✓ polysheets

Special Work Practices and/or equipment required: VALVE 8 ft. OFF FLOOR - WILL NEED A LADDER & PORTABLE LIGHTS

Special Conditions: LEAKING STEAM; ROOM HOT - POTENTIAL ASBESTOS STRESS PROBLEM

Notification

✓ Safety and Loss Control ✓ Facilities Management

NOTE: An application must be submitted for all maintenance work whether or not asbestos-containing or presumed asbestos containing materials might be affected. An authorization must be received before any work is completed.

Approved to proceed:

J. Doe
(Signature) (Date)

Not Approved to proceed:

(Signature) (Date)

Bloodborne Pathogens SPP# 1910.1030

Quick Reference

Select this Link to view latest Revision changes

Select this Link to view
latest Revision changes

1.0 Purpose

The purpose of this document is to eliminate or minimize employee occupational exposure to blood or certain other body fluids and to fully comply with the referenced OSHA Bloodborne Pathogens Standard.

2.0 Scope and Applicability

This safety policy and procedure affects all North Carolina Department of Transportation (NCDOT) employees that, as a result of performing their job duties, are "reasonably anticipated" to come into contact with bodily fluids or other contaminated sources/materials.

3.0 Reference

This safety policy and procedure is established in accordance with 29 CFR 1910.1030 of the Occupational Safety & Health Act.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. When hazards exist that cannot be eliminated, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Bloodborne Pathogens will be implemented according to the referenced OSHA standard. This safety policy and procedure will include Exposure Control Plan and is not limited to the Hepatitis B Virus (HBV) and Human Immune Deficiency Virus (HIV) which causes AIDS. NCDOT will ensure that those employees who are exposed to bloodborne diseases are provided with confidential, fair, and equal treatment.

5.0 General and Specific Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on Bloodborne Pathogens. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor.

5.1 Supervision

It is the responsibility of NCDOT to provide accurate and timely information to employees concerning exposure, identification of labels and signs, proper use of PPE, and safeguards to prevent infection. Those who supervise others within NCDOT will ensure that all affected employees receive the applicable Bloodborne Pathogen training listed in LMS for their Unit.

5.2 Employees

NCDOT employees whose primary job may expose them to Bloodborne Pathogens must receive initial and annual training concerning exposure, identification of labels and signs, proper use of PPE, and safeguards to prevent infection. Those who supervise these employees will ensure that all affected employees receive Bloodborne Pathogen training. The appropriate LMS online course "OSHA – Bloodborne Pathogens (Vivid)" should be assigned to affected employees. Classroom Bloodborne Pathogen listed in LMS may also be used.

5.3 Safety & Risk Management

Safety and Risk Management will provide prompt assistance to Managers/Unit Heads, Supervisors and others as necessary on any matter concerning this safety policy and procedure.

Division Safety Engineers, Consultants, and Officers will provide consultative assistance within their respective division to ensure the effective administration of this safety policy.

6.0 General Provisions

- Definitions
- Exposure Determination and Exposure Control Plan
- Engineering and Work Practice Controls
- Disposal of Contaminated Materials
- Training Requirements
- Pre-Exposure Vaccinations
- Post-Exposure Vaccinations
- Recordkeeping
- Confidentiality

6.1 Definitions

Blood
Blood means human blood, human blood components, and products made from human blood.

Bloodborne Pathogens
Pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, Hepatitis B Virus (HBV) and Human Immune Deficiency Virus (HIV).

Bodily Fluids
Bodily fluids include but are not limited to blood, semen, vaginal fluids, saliva, vomit, amniotic fluid, or other body fluids that contain blood.

Contaminated
The presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.

Contaminated Sharps
Any contaminated object that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires.

Decontamination
The use of chemical or physical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.

Disinfectant
An EPA approved agent that disinfects by destroying, neutralizing, or inhibiting the growth of harmful microorganisms. The most common disinfectant is a solution of at least 10 percent chlorine bleach mixed with water.

Occupational Exposure Incident
Skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious material that may result from the performance of an employee's duties.

Other Potentially Infectious Materials
Human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

Parenteral
Piercing mucous membranes on the skin barrier through such events as needle sticks, human bites, cuts, and abrasions.

Personal Protective Equipment (PPE)
Equipment used to prevent the spread of infectious diseases. Examples include disposable gloves, face shields, protective garments, mouth-to-mouth resuscitation devices, etc. Normal work attire is not considered to be protective clothing.

Regulated Biohazardous Waste
Liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated needles; any other wastes containing blood or potentially infectious materials.

Universal Precautions
The concept of universal precaution is to treat all blood and body fluids as if they contain infectious Bloodborne Pathogens regardless of the source.

6.2 Exposure Determination and Exposure Control Plan

In developing an exposure control plan, NCDOT has evaluated the work tasks associated with the functions of NCDOT to determine which tasks could be reasonably anticipated to result in exposure to Bloodborne Pathogens. NCDOT uses the following categorical distinctions to determine the level of potential exposure:

Category I:

Tasks that involve exposure to blood, body fluids, or tissues. All procedures or other job-related tasks that involve an inherent potential for mucous membrane or skin contact with blood, body fluids, or tissues, or a potential for spills or splashes of them are Category I tasks. Category I tasks are those normally associated with frequent and repetitive handling and working directly with blood products such as those performed by physicians, nurses, Emergency Medical Technicians (EMTs), etc. These jobs by design require an almost constant exposure to the potential for infection.

NCDOT has identified no employees or job task that require Category I level tasks of potential exposure to Bloodborne Pathogens.

Category II:

Tasks that involve no exposure to blood, body fluids, or tissues, but employment may require performing unplanned Category I tasks. The normal work routine involves no exposure to blood, body fluids or tissues, but exposure may be required as a condition of employment.

Category II tasks are those normally associated with employees whose primary job function does not require them normally to be exposed to blood or body fluids but who are trained to respond to emergency medical situations and are distinctly identified as emergency responders by the organization. This does not include all employees who have received employer provided first aid and Cardiopulmonary Resuscitation (CPR) training, but only those specifically designated as emergency responders. Others who are trained and respond to emergencies do so as a "good Samaritan" and should also follow all universal precautions. Category II tasks also include employees that may be exposed to biological hazards while performing tasks such a Bridge Inspection Divers and Rest Area Custodians. Those employees identified in Category II tasks are offered vaccinations free of charge prior to exposure for Hepatitis B Virus should they desire. If the employee declines the vaccination, he or she is required to signify this in writing using Appendix A.

NCDOT has identified the following tasks as Category II tasks.

First Responders - Ferry Division
Enforcement Officers - Division of Motor Vehicles
Rest Area Custodians – Division of Highways
Bridge Inspector Divers – Division of Highways

Ferry Division First Responders have been identified in the Category II tasks. In an incident that could prove life threatening to a ferry passenger, immediate contact of Emergency Medical Technicians is not always practical. Therefore, First Responders in this situation may be called upon to perform Category I tasks.

Division of Motor Vehicle Enforcement Officers have been identified in the Category II tasks. In incidents on our highways such as automobile accidents, DMV Enforcement Officers may be in a response situation where Category I tasks are required. In addition, due to possible confrontational situations during an arrest, exposure potential to blood or body fluids is an elevated risk.

Division of Highways Bridge Divers have also been identified in the Category II tasks. These divers are required to work in water bodies where the level of contamination varies. While they are not categorized as a classification that would be required to perform Category I tasks, they do have an elevated risk of acquiring the Hepatitis B Virus from possible exposure to contaminated water bodies.

Rest Area Custodians have been identified in the Category II tasks. Most Rest Areas are staffed by Contract personnel, but some Divisions may utilize NCDOT personnel to perform Custodial duties at certain Rest Areas.

While their normal work routines are not expected to expose them to blood, body fluids, or tissues, the potential exists for them to be exposed. Therefore, precautionary measures should be followed by these personnel in the performance of their duties.

Category III:

Tasks that involve no exposure to blood, body fluids, or tissues, and Category I tasks are not a condition of employment. The normal work routine involves no exposure to blood, body fluids, or tissues (although situations can be imagined or hypothesized under which anyone, anywhere, might encounter potential exposure to body fluids).

Persons who perform these duties are not called upon as part of their employment to perform or assist in emergency medical care or first aid or to be potentially exposed in some other way.

Category III tasks are those tasks associated with normal work routines where there are no direct work tasks or pre-planned emergency response actions reasonably anticipated for the employee. All Category III employees should follow universal precautions in the performance of their duties, avoiding contact with blood, body fluids, or physical items contaminated with blood or body fluids.

The following sections detail NCDOT's Exposure Control Plan which shall be reviewed and updated as needed.

6.3 Engineering and Work Practice Control

Engineering and work practice controls are to be used to eliminate or minimize the risk of employee exposure. Engineering controls and/or work practice controls are reviewed by supervisors on a regular basis not to exceed one year and any time a work task changes where the potential for occupational exposure is present. Where potential occupational exposures remain after placing engineering and work practice controls in place, PPE shall also be used.

Hand-washing facilities with hot and cold running water that are readily accessible to employees are to be provided in NCDOT facilities. Where it is not feasible to provide hand washing facilities such as on a work site, first aid kits will include an appropriate antiseptic hand cleanser or antiseptic towelettes. If an occupational exposure occurs where antiseptic hand cleansers or antiseptic towelettes are used, the employee should be transported to the nearest facility with hand washing facilities with hot and cold running water and the affected area thoroughly washed with soap and running water.

When gloves or other PPE are used and removed, employees are to wash their hands immediately after removal of the protective gear. All gloves, PPE, or clothing contaminated with blood or body fluid will be disposed of in sealed containers according to disposal procedures.

Equipment that may become contaminated with blood or potentially infectious materials are to be visibly examined before use and decontaminated as necessary.

Areas including floors where an incident occurred resulting in the presence of bloodborne pathogens shall be thoroughly cleaned with appropriate disinfectant and contaminated items will be collected in Biohazard bags for proper disposal.

6.4 Disposal of Contaminated Materials

All items that have been contaminated with blood or other potentially infectious materials are to be disposed of as a regulated waste. While it is not practical or economically feasible to place specially designed waste receptacles at all NCDOT facilities and work sites, this does not diminish the requirement for proper labeling, handling, and disposal of biohazardous materials. If there is waste material generated which contains or is contaminated with blood or body fluids, take the following steps:
Do not handle in any manner contaminated items without proper PPE.
Place all contaminated items in a sealable container being careful not to contaminate the outside of the container. If the contaminated item is sharp or likely to puncture the container, use a container that is sufficiently sturdy to prevent the puncture of the container walls.
Label the container prominently to identify that the contents are blood and/or body fluids

Red bags or containers may be substituted for labels.
Place the container in a secure area with the label completely visible.
Dispose of gloves and other protective equipment in the same container. Ensure that glove outer surfaces do not touch the skin as they are removed.
Notify your Safety Officer immediately. Your Safety Officer will make the necessary arrangement to have the waste material properly contained, labeled, and disposed of.
Safety Officers will maintain appropriate regulated biohazardous waste containers with appropriate labeling and use these containers for the disposal of contaminated articles.
Safety and Risk Management will ensure that contracts are maintained with Hazardous Waste Contractors designated by DOT Roadside Environmental Unit to also include biohazardous waste and arrangements for the pickup and disposal of materials contained in biohazardous waste containers. Check with local hospitals and law enforcement as a free source of disposal.

6.5 Training Requirements

All employees performing at risk tasks shall receive education about precautionary measures, epidemiology, modes of transmission, and prevention of HIV/HBV and other associated infectious agents. This training is provided at no cost to the employee and during normal work hours. Training will be provided at the time of initial assignment to tasks where occupational exposures are “reasonably anticipated” to occur and at least annually thereafter. Training shall include:

- A copy of the regulatory text of this standard is available for review by any employee.
- NCDOT Exposure Control Plan for Bloodborne Pathogens shall be reviewed.
- Location and proper use of PPE, proper work practices, and the concept of Universal Precautions as it applies to their work practices.

- The meaning of color coding or other methods used to designate and dispose of contaminated articles or infectious waste.
- The actions to take if there is personal exposure to fluids or tissues, appropriate reporting procedures, and the medical monitoring recommended in cases of needle-stick injuries or other exposure to blood or body fluids.
- Information on the Hepatitis B vaccine, including information on its safety, method of administration, the benefits of being vaccinated, and that a pre-exposure vaccine is offered free of charge for Category I and II employees, and post- exposure vaccines free of charge for all employees who encounter an occupational exposure.
- Information on the post-exposure evaluation and follow-up that NCDOT provides for the employee following an exposure incident.

6.6 Pre-Exposure Vaccinations

Employees identified as having Category I or II work tasks will be provided at no cost the Hepatitis B vaccination. If the employee refuses the HBV vaccination, he or she must sign a Hepatitis B vaccination declination form (See Appendix A). When completed, this form must be retained indefinitely in the employee's file.
If an employee has received an HBV vaccination from a previous employer, evidence of that vaccination must be obtained by the employee and placed in the employee's file.

6.7 Post-Exposure Vaccinations

Employees who report work-related exposure will be provided at no cost a Hepatitis B vaccination. If the employee refuses the HBV vaccination, they must sign a Hepatitis B vaccination declination form (See Appendix A). When completed, this form must be retained indefinitely in the employee's file. If an employee has received an HBV vaccination from a previous employer, evidence of that vaccination must be obtained by the employee and placed in the employee's file.

Post-exposure medical evaluation will be provided at no cost through Safety & Risk Management Worker's Compensation third party administrator. A Workers Compensation claim must be filed for exposure to Bloodborne Pathogens.

Medical counseling for any employee found, as a result of the monitoring described above, to be seropositive for HBV or HIV, will be provided at no cost. Counseling guidelines have been published by the Public Health Service. For detailed information, reference the Occupational Safety & Health Bloodborne Pathogen Standard 29 CFR part 1910.1030.

Following a report of an exposure incident, a confidential medical evaluation and follow-up shall be made available to the exposed employee. The medical evaluation and follow-up provided by the physician shall include the following as a minimum:

- Documentation of routes of exposure and circumstances under which the exposure occurred.

- Identification and documentation of source individual unless prohibited by law. Results of source individual testing shall be made available to the exposed employee. (If the source denies permission for testing, the local or state health director may order testing of the source if that director determines that the exposure poses a significant risk of transmission of HIV and that the source is at high risk for HIV infection.)
- Testing of the exposed employee's blood by consent.
- Post-exposure vaccination and treatment, when medically indicated, as recommended by the United States Public Health Service.
- Counseling and evaluation of reported illnesses.

NCDOT Safety and Risk Management Workers Compensation unit shall ensure that the physician or healthcare professional responsible for medical evaluation is provided with a copy of 29 CFR 1910.1030 (Bloodborne Pathogen Standard).

6.8 Recordkeeping

NCDOT shall maintain records at the Division/Unit level for each employee involved in a Category I task or for Category II and III employees who have been exposed to bloodborne pathogens for a minimum period of their employment duration plus 30 years. These records will consist of:

- Training Records that indicate the dates of the training sessions, the content of the training sessions, trainer's name and qualifications.
- Inspection reports for the areas and/or tasks where biohazardous tasks are performed, identifying conditions noted and corrective actions taken.
- Incident Investigation Reports for each incident of mucous membrane or
- parenteral exposure to body fluids or tissue, an evaluation of these conditions, and a description of corrective measures taken to prevent a recurrence or similar exposure.

A medical record consisting of the following:

- Employee name and social security number.
- A copy of the employee's hepatitis B vaccination records and medical records relative to the employee's ability to receive vaccination.
- A copy of all results of physical examinations, medical testing and follow-up procedures as they relate to the employee's ability to receive vaccination or to post exposure evaluation following an exposure incident.
- NCDOT's copy of the physician's written opinion. A copy of all information provided to the physician.

6.9 Confidentiality

All employee medical records shall remain confidential. No information regarding employee medical information is to be disclosed or reported to any person outside the workplace except as may be required by law.

Employee medical and training records shall be provided upon request for examination and copying to the subject employee and to anyone having the express and written consent of the employee.

Copies of medical records shall be transferred to successor employer if employees leave NCDOT employment.

APPENDIX A: Hepatitis B Vaccination Declination

HEPATITIS B VACCINE DECLINATION

Completion of this form is mandatory for all Category I and II employees with work tasks that may have potential for exposure who decline to receive the Hepatitis B vaccination in the event of an exposure incident .

I fully understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring the Hepatitis B virus (HBV) infection.

I have been provided with the opportunity to be vaccinated with the Hepatitis B vaccine at no charge to myself. However, I decline the Hepatitis B vaccination at this time.

I fully understand that, by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccination series at no charge to me.

Enter Brief Description of Event or Situation causing exposure with Date and Time.

_____

_____

_____

_____

Employee Name

_____

Employee Signature

_____

Beacon Number

_____

Date

APPENDIX B: Universal Precautions

INFECTION THROUGH BLOOD AND BODILY FLUIDS

Universal Precautions will be utilized to ensure NCDOT employees are safeguarded against the spread of infectious diseases through contact with human blood or other bodily fluids. Regardless of the "perceived" risk involved, all employees should protect themselves from potential infection.

- Any accident/incident involving the transfer of blood or bodily fluids should be reported by the supervisor before shift end.
- Personal Protective Equipment (PPE) will be provided for and used by all employees considered to be at risk of infection.
- Gloves should be worn for touching blood and bodily fluids, mucous membranes or non- intact skin of all persons, for handling items or surfaces soiled with blood or bodily fluids, and for rendering assistance to injured persons. Always wash hands and arms after helping a victim.
- For those employees trained to perform CPR, separate yourself from direct contact with the victim by using a face shield or mask or one-way resuscitating device.
- Needlestick injuries should be reported to the supervisor immediately.
- Any items located that are believed to be human waste products (i.e., blood, soiled clothing, needles, or items identified with the universal biohazard symbol) should be handled only by a properly trained employee.
- All known items soiled with blood or other bodily fluids (i.e., clothing) should be disposed by a properly trained employee.
- All equipment and working surfaces shall be decontaminated with an appropriate disinfectant to eliminate the potential for infection.
- NCDOT will provide at no cost Hepatitis B vaccination series to supervisors and those employees considered to be at the greatest risk of infection.
- A post-exposure evaluation will be provided at no cost to the employee.

APPENDIX C: Biohazard Symbol

The following is a universal symbol identifying material or objects contaminated with human blood or bodily fluids. When this symbol is identified, follow all Universal Precautions in this safety policy and procedure to ensure infectious diseases are not transmitted.

Author:	Mark Scott, Jim Sawyer (RSO-M&T)	Revision #:	New
Approved By:	Bobby Lewis	Date Revised:	July 2020

SAFETY POLICY & PROCEDURE

Ionizing Radiation SPP# 1910.1096

Quick Reference

Contents

Special Notice:

SPP# 1910.96 Ionizing Radiation and revisions are cancelled as of this date. Appropriately destroy all hard copies which shall be replaced with SPP# 1910.1096 Ionizing Radiation in accordance with OSHA General Industry Standards.

Information Security. N.C.G.S.104E-9(a)(4) outlines authority to withhold information from public disclosure as defined by this and other N.C.G. Ss, except to individuals with a need to know. The Materials and Test (M&T) Unit, Radiation Safety Officer (RSO), Director, Safety and Risk Management (SRM) and Communication, NCDOT will coordinate and forward request by public for agency radioactive material information to the Radiation Protection Section, North Carolina Department of Health and Humans Services, (RPS-NCDHHS)for approval to release information and/or directed response from RPS-NCDHHS.

1.0 Purpose

The purpose of this Safety Policy and Procedure (SPP) is to establish guidelines for radiation protection and safety of North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Radiation is a form of energy. Ionizing radiation has very damaging effects on skin tissue and can serve as a precursor to several forms of cancer. Materials and Test Unit's Nuclear Density gauges are the primary radiation source in NCDOT.

This SPP provides guidelines for the safe handling of Ionizing Radiation. It includes provisions for training, description of ionizing equipment used in NCDOT, and the necessity of warning signs for restricted areas. Additionally, it includes discussion on the monitoring of personnel for ionizing radiation exposure and the reporting of ionizing radiation overexposure.

This document also details the areas of responsibility for M&T Unit, managers/unit heads, supervisors, employees, SRM, and Division Safety Staff within NCDOT.

The M&T Unit, NCDOT is the designated custodian of nuclear density gauges for this Agency responsible for Program Management, Security, Recordkeeping, Training, Leak Testing, Personnel Monitoring, Exposure Reporting Procedure, Emergency Procedures, Loss/Theft/Damage/Misplacement Reporting, Inspections, Compliance, Etc.… .

This SPP affects any employee who because of their job duties will handle and operate equipment producing or containing ionizing radiation sources. Specifically, this safety policy and procedure affects Materials and Tests Unit employees who use, maintain, and transport nuclear density gauges and field construction employees assigned to projects as nuclear gauge operators.

3.0 Reference

This SPP is established in accordance with Occupational Safety and Health Standards for General Industry and the below listed standards, regulations, guidelines, applicable statutes, laws, manufactures Instructions, this should not be considered an all-inclusive list.

10 CFR 20	Standards for Protection Against Radiation	Nuclear Regulatory Commission
29 CFR 1910.1096	Ionizing Radiation	Occupational Safety and Health Administration (OSHA)
29 CFR 1926.53	Ionizing Radiation	OSHA
N.C.G.S. Chapter 104E	North Carolina Radiation Protection Act	NC General Assembly
13 NCAC 07	Office of Occupational Safety and Health	NC Department of Labor (NCDOL)

10 NCAC 15	Radiation Protection Section	NC Department of Health and Human Service (NCDHHS)
Regulations/Guidelines/ Information	Radioactive Materials Section http://www.ncradiation.net	Radioactive Materials Section (RMS)-NCDHHS
Radioactive Materials License	092-0104-1	Division of Highways, NCDOT and RMS-NCDHHS
Manufacture Instructions and Manuals	Item/s by Manufacture	Specific Manufactures Guidance

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, unauthorized handling of radiation sources is strictly prohibited. When radiation hazards exist that cannot be eliminated, then engineering practices, administrative practices, Personal Protective Equipment (PPE), safe work practices, and proper training regarding Ionizing Radiation will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's policy on Ionizing Radiation. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to their supervisor. Specific responsibilities are in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's policy on Ionizing Radiation.

6.1 Definitions

Dose
The quantity of ionizing radiation absorbed, per unit of mass, by the body or by any portion of the body.

Film Badge or Dosimetry
Uses optically stimulated luminescence technology with an aluminum oxide- based detector. Radiation exposure is measured by scanning the dosimetry.

Ionizing Radiation
Electromagnetic or particulate radiation capable of producing ions, directly or indirectly, by interaction with matter.

Nuclear Density Gauge
A piece of equipment with a radioactive source used for density measurements of asphalt, aggregate base course and concrete.

Radiation
Includes alpha, beta, gamma, x-rays, neutrons, electrons, protons, and other atomic particles. This term does not include sound or radio waves, or visible light, or infrared or ultraviolet light.

Radioactive Material
Any material which emits, by spontaneous nuclear disintegration, corpuscular or electromagnetic emanations.

Restricted Area
Any area to which access is controlled by M&T Unit, NCDOT for purposes of protection of individuals from exposure to radiation or radioactive materials.

Radiation Safety Officer (RSO)
A RSO is an individual appointed in writing by the licensee (NCDOT), to be responsible for implementing the radiation protection program. The licensee, through the RSO, shall ensure that radiation safety activities are being performed in accordance with licensee-approved procedures and regulatory requirements. A licensee's management may appoint, in writing, one or more Associate RSOs (ARSO) to support the RSO. The RSO, must assign the specific duties and tasks to each ARSO which are restricted. The RSO may delegate duties and tasks to the ARSO but shall not delegate the authority or responsibilities for implementing the radiation protection program.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Equipment
- Warning Signs
- Personnel Monitoring
- Recordkeeping
- Exposure Reporting Procedure
- Emergency Procedures
- Equipment Security, Damage, Loss, Theft, Misplacement Reporting
- Audits and Inspections

6.2.1 Training

Materials and Tests Unit shall train employees affected by this SPP. The M&T Unit shall certify as nuclear gauge operators those affected employees and will train other employees who handle nuclear gauge equipment. Nuclear gauge operators and other employees may be required to complete other training on associated equipment and other job-related duties. Successful completion of the following classroom and field training is required to become a certified nuclear gauge operator:

Topic	COURSE #	Course Covers
Initial Course	MAT-250 Nuclear Safety and Hazardous Materials	Initial Training Awareness and Information Training
Base Course Type Materials (i.e. ABC, CTBC, FDR, etc.)	MAT 370 - Nuclear Density Testing	Base, FDR, and Select Materials
Field Certification	Field Certification	M&T staff provides one-on-one field training and observation
Asphalt Materials	MAT 380 - Density Gauge Operator	Equipment use and information
Field Certification	Field Certification	M&T staff provides one-on-one field training and observation

Material & Testing Unit staff is responsible for all radiation safety training and training documentation. Future training packages and additional recordkeeping may be included in the Learning Management System (LMS).

Nuclear Gauge Refresher Training **is required every** ***three years (triennially)*** **for any DOT employee actively receiving a film badge, unless directed to be conducted sooner.**

Additional information regarding training classes is provide at the following M&T website: https://connect.ncdot.gov/resources/materials/Pages/default.aspx

6.2.2 Equipment

Nuclear Gauge are the primary piece of ionizing equipment used within NCDOT. Nuclear Gauges are used to determine the density of asphalt and aggregate base course. The radioactive material used to perform these tests is in pellet-form, encapsulated inside the equipment.

Nuclear Gauges must be leak tested every 12 months in accordance with our licensing agreement with the North Carolina Radiation Protection Section.

Materials and Tests Unit will maintain records of all NCDOT Nuclear Gauges in receipt of/transferred to or from/ Disposed of/Procured/Leak Testing/Repairs regardless, of how acquired Owned/ Rental/ Lease. Records must be maintained 5 years after appropriate disposal.

Figures 1, 2, and 3 – Sample Nuclear Gauges Photos

Figure 1 - Humboldt Nuclear Gauge

Figures 2 & 3 - Toxler Nuclear Gauges

6.2.3 Warning Signs/Employee Notice Posters

Any facility storing Nuclear Gauges ***shall*** have signs outside the restricted area notifying employees of the potential dangers. These signs shall contain the standard radiation symbol with the conventional radiation caution signage. When storing in magazines magnetic signs are permitted.

Notice to Employee Poster (Appendix A) must be posted in a sufficient number of places in every establishment where employees perform activities regulated by NC Radiation Protection; to permit employees working in or frequenting any portion of a restricted or controlled area to observe a copy on their way to or from their place of employment.
Figure 4 shows sample Radiation Caution Sign and Notice to Employee Poster.

Figure 4

6.2.4 Personnel Monitoring

All employees who use the Nuclear Gauge will always wear film badges to monitor the amount of radiation to which they may be exposed. Film badges are assigned to a specific person and cannot be shared among individuals. These badges are part of a continuous monitoring program and are replaced quarterly.

Materials and Tests Unit will maintain records of the replacement/testing result of all film badges. See Figure 5 – Sample Film Badge Photo.

Figure 5 – Film Badge

6.2.5 Recordkeeping

Materials and Tests Unit, NCDOT shall maintain records of exposures for employees who are required to wear film badges. Materials and Tests Unit shall disclose exposures to employees upon request from the employee. These records of exposures shall be maintained for a period not less than 30 years from the termination of employment with NCDOT.

6.2.6 Exposure Reporting Procedure

For employees not protected by the NRC, all exposures over the allowable threshold limits shall be reported to the NC Commissioner of Labor or their duly authorized representative. In addition, exposure notification in writing shall be submitted to the NC Commissioner of Labor or the duly authorized representative within 30 days of the original exposure date. A record of all radiation exposures must be made available to future employers at the request of former NCDOT employees. The Director, SRM shall be notified in these cases.

6.2.7 Emergency Procedures

Written emergency procedures for nuclear equipment accidents are maintained by M&T Unit as required by license issued by North Carolina Radiation Protection Section (NCRPS). The Director, SRM shall be provided a copy of these emergency procedures.

6.2.8 Security and Reporting Damage, Loss, Theft, Misplacement

Key control is limited to individuals authorized by the RSO.

Nuclear gauge storage facilities must be secure with access limited to authorized personnel. The following individuals should have access to nuclear gauge storage: Certified nuclear gauge operators, M&T Staff, and Resident Engineer.

Field offices assigned a nuclear gauge must designate a certified nuclear gauge operator to perform a weekly security check on assigned nuclear gauge(s). This process requires visually verifying a nuclear gauge is secure and properly stored.

Each security check must be documented on the utilization log sheet (including name and date). A legible copy of the log sheet(s) must be sent to the M&T Unit with the film badge package when returning used badges.

Immediately report evidence of any issues or security concerns to the M&T Staff listed on the emergency procedures, supervisor, and Director, SRM.

6.2.9 Audits and Inspections

Weekly security check noted on daily utilization log sheet must be maintained for three (3) years after a copy is submitted to the M&T Unit. Scanning and maintaining logs electronically is permissible provided the scanned copy is legible.

Announced audits/inspections may be conducted by RSO, NCDOL, NPS-DHHS, and NRC. Safety Staff should accompany inspectors to learn process. Copy of inspections record to Director, SRM.

Unannounced audits/inspections may be conducted by RSO, NCDOL, NPS-DHHS, and NRC. Safety Staff should accompany to learn process. May be conducted without RSO presence. Copy of inspections record to Director, SRM.

Properly trained and assigned M&T Staff will perform semi-annual physical inventories of all nuclear gauges during June and December per the RADIOACTIVE MATERIALS LICENSE. During the inventory process, storage locations are inspected to verify compliance. The Radioactive Materials License requires completion of a documented physical inventory of all every 6 months.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will be responsible for identifying the employees affected by this SPP. Managers/ Unit Heads will also ensure compliance with this SPP through their auditing process.

The licensee shall institute the provisions of 10A NCAC 15 .1610 when an occupationally exposed woman voluntarily informs her supervisor, in writing, of the pregnancy and the estimated date of conception. The Supervisor's response and actions must be appropriately documented. Both the individual's voluntary information disclosure and Supervisor's response/s must be protected from unauthorized disclosure/release since potentially they may contain Protected Health Information under HIPAA (Health Insurance Portability and Accountability Act). Additionally, this is a personal matter.

6.3.2 Supervisors

Supervisors will ensure that affected employees are trained in the safe use and handling of equipment, instruments or sources which contain ionizing radioactive materials.

The licensee shall institute the provisions of 10A NCAC 15 .1610 when an occupationally exposed woman voluntarily informs her supervisor, in writing, of the pregnancy and the estimated date of conception. The Supervisor's response and actions must be appropriately documented. Both the individual's voluntary information disclosure and Supervisor's response/s must be protected from unauthorized disclosure/release since potentially they may contain Protected Health Information under HIPAA (Health Insurance Portability and Accountability Act). Additionally, this is a personal matter.

Due to added safety concerns and restrictions during pregnancy, M&T requires reassignment of job duties regarding use of a nuclear gauge when a woman declares a pregnancy. Radiation exposure to an unborn fetus must be strictly monitored and controlled. A temporary job duty reassignment for the duration of the pregnancy is the most effective control method.

6.3.3 Employees

Employees shall not operate any equipment without the proper training. Employees shall not operate any equipment or instrument which is damaged or in any other way malfunctioning. Employees will immediately inform their supervisor if any unsafe condition occurs (e.g., leaks, damage, theft, loss, or misplacement).

Additionally, employees shall not remove or otherwise modify any part of any instrument except to perform allowed routine maintenance or service. Employees shall wear film badges as prescribed.

The licensee shall institute the provisions of 10A NCAC 15 .1610 when an occupationally exposed woman voluntarily informs her supervisor, in writing, of the pregnancy and the estimated date of conception.

6.3.4 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this SPP.

Additionally, NCDOT assign Safety Engineers, Consultants, or Officers will provide consultative and audit assistance to ensure effective implementation of this SPP.

6.3.5 Materials and Test Unit

Materials and Tests Unit will provide guidelines for the safe transport of nuclear gauges or other related equipment containing radioactive materials. Materials and Tests Unit will coordinate all training with the North Carolina Radiation Protection Section for the affected employees.

Materials and Test's Radiation Safety Officer must be designated in writing and is responsible for maintaining and updating the radiation license from the Radiation Protection Section with copy forwarded to Director, SRM.

6.4 Reporting Safety Concerns

ANYRISK is a safety reporting tool for NCDOT personnel. NCDOT Employees may report safety concerns anonymously, if desired (24/7/365) to:

1. https://connect.ncdot.gov/anyrisk
2. 1-866-361-1818

Appendix A: Radiation Notice to Employees Poster

NC DEPARTMENT OF HEALTH AND HUMAN SERVICES
Division of Health Service Regulation

NOTICE TO EMPLOYEES

Standards for Protection Against Radiation; Notices; Instructions and Reports to Workers; Inspections

NORTH CAROLINA RADIATION PROTECTION

EMPLOYEE'S RESPONSIBILITY AS A WORKER:
Familiarize yourself with the provisions of the radiation protection regulations and operating procedures that apply to the work in which you are engaged. Observe those provisions for your own protection, the protection of your co-workers and others. If you observe conditions which may lead to violations or have a safety concern, promptly report them to your supervisor.

WHAT IS COVERED BY THESE REGULATIONS?
1. Limits on exposure to radiation and radioactive materials in restricted and unrestricted areas;
2. Measures to be taken after accident exposure;
3. Personnel monitoring, surveys, and equipment;
4. Caution signs, labels and safety interlock equipment; and
5. Exposure records and reports.

YOUR EMPLOYER'S RESPONSIBILITY:
1. Comply with the requirements of North Carolina Regulations for Protection Against Radiation 10A NCAC 15 pertaining to work involving sources of radiation; departmental orders and registration or licensing conditions;
2. Post or otherwise make available to you a copy of the North Carolina Regulations for Protection Against Radiation 10A NCAC 15, certificates, registrations or licenses and the operating procedures that apply to the work you perform, and explain those provisions to you;
3. Post Notices of Violation involving radiological working conditions and orders.
4. Provide adequate radiation safety training to you, including the use of radiation producing devices or radioactive materials you may be expected to use.
5. Keep your radiation exposure as far below the maximum allowable limits as is "reasonably achievable."
6. Provide you with information on your exposure to radiation.

REPORTS ON YOUR RADIATION EXPOSURE HISTORY
Your employer is required to maintain records of your exposure to radiation as required by 10 CFR 20.2106. Your employer is required to provide you with written notification or a report of your exposure history under 10 CFR 19.13 if:
1. Your dose exceeds 100 millirem TEDE or 100 millirem to any organ or tissue over the monitoring year, or if you request your annual dose.
2. You receive an exposure in excess of the annual dose limits. Your employer is required by 10 CFR 20.2205 to give you this report within 30 days of the discovery of the exposure exceeding the dose limits. The exposure limits for occupational workers are found in 10 CFR 20.1201.
3. You are no longer employed by the licensee, and you request your exposure history from your former employer. 10 CFR 19.13(e) requires your former employer to provide you with this report within 30 days of your request, or 30 days after your dose is determined, whichever is later.

POSTING REQUIREMENT
Copies of this notice must be posted in a sufficient number of places in every establishment where employees perform activities regulated by NC Radiation Protection; to permit employees working in or frequenting any portion of a restricted or controlled area to observe a copy on their way to or from their place of employment.

INSPECTIONS
All licensed or registered activities are subject to inspections by representatives of the NC Department of Health and Human Services. During inspections, agency inspectors may confer privately with workers; and workers may bring to the attention of the inspectors any past or present condition which they believe contributed to or caused any violation as described above. The employer must not prevent you from talking with an inspector. If you believe your employer has not corrected violations involving radiological working conditions, you may request an inspection. The request must specify exactly what is wrong and must be signed by the worker or worker representative. The agency will make all reasonable efforts to protect your identity where appropriate and possible.

REPORTING SAFETY CONCERNS
Inquiries dealing with the matters outlined above are to be made to the Radiation Protection Section. Agency representatives may be reached during normal weekday work hours (8 a.m. – 5 p.m.) **by phone at (919) 814-2250 or by mail to: Section Chief, NC Radiation Protection, 5505 Creedmoor Road, Suite 100, 1645 Mail Service Center, Raleigh, NC 27699-1600.**

RADIOACTIVE MATERIALS BRANCH INCIDENT 24 HOUR EMERGENCY LINE:
(919) 602-7151.
After normal hours, calls may be directed to the NC Emergency Management Operation Center at
(800) 858-0368.

EMPLOYMENT DISCRIMINATION
The North Carolina Employment Discrimination Bureau (EDB) enforces the Retaliatory Employment Discrimination Act (REDA). Employees who have questions about the application of REDA or employees who believe they have been discriminated or retaliated against, should contact the EDB information officer. They will advise you of the proper procedures to file a complaint. You may contact them by sending mail to N.C. Department of Labor, Employment Discrimination Bureau, 1101 Mail Service Center, Raleigh, NC 27699-1101 or by fax at (919) 807-2824 or by phone at (800) 625-2267 or fax (919) 807-2856 That website is **http://www.nclabor.com.**

www.ncdhhs.gov • N.C. DHHS is an equal opportunity employer and provider. • 5,000 copies of this public document were printed at a cost of $320.30 or $.06406 per copy. 9/19

Exposure to Hazardous Chemicals in Laboratories SPP# 1910.1450

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to protect North Carolina Department of Transportation (NCDOT) employees who use hazardous chemicals in laboratories.

2.0 Scope and Applicability

NCDOT laboratory employees may handle a variety of hazardous chemicals in their daily activities. Due to their frequent contact with chemicals, overexposure to chemicals may occur if the proper safeguards are not in place and if the proper precautions are not followed.

This safety policy and procedure presents a Chemical Hygiene program to protect NCDOT laboratory employees. It includes provisions for training and presents discussions on permissible exposure levels and employee exposure determination. A model Chemical Hygiene Plan that can be used by all NCDOT laboratories is also presented. Medical, hazard identification, respirator, and recordkeeping requirements are also presented.

This document also details the areas of responsibility for managers/unit heads, supervisors, Chemical Hygiene Officers, employees, and Safety and Loss Control within NCDOT.

This safety policy and procedure affects all the Materials and Tests laboratories that handle hazardous chemicals. Any other laboratory within NCDOT that handles hazardous chemicals is also affected by this safety policy and procedure.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.1450).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, NCDOT laboratory employees who handle hazardous chemicals will not handle such chemicals until they have been trained in NCDOT's Chemical Hygiene program. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Exposure to Hazardous Chemicals in Laboratories will be implemented. These measures will be implemented to minimize hazards in order to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on Exposure to Hazardous Chemicals in Laboratories. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions and identifies specific responsibilities required by NCDOT's safety policy and procedure on Exposure to Hazardous Chemicals in Laboratories.

6.1 Definitions

Action Level
A concentration for a specific substance, calculated as an eight (8)-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

Chemical Hygiene Officer
An employee who is designated and qualified by training or experience to provide technical guidance in the implementation of provisions of the Chemical Hygiene Plan.

Chemical Hygiene Plan
A written program which sets forth procedures, equipment, personal protective equipment and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in that particular workplace.

Combustible liquid
Any liquid having a flashpoint at or above 100^{0}F (37.8 ^{0}C), but below 200^{0}F (93.3^{0}C) except any mixture having components with flashpoints of 200^{0}F or higher, the total of which make up 99 percent or more of the total volume of the mixture.

Compressed Gas
- A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70^{0}F (21.1^{0}C).
- A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130^{0}F (54.4^{0}C) regardless of the pressure at 70^{0}F (21.1^{0}C).
- A liquid having a vapor pressure exceeding 40 psi at 100^{0}F (37.8^{0}C).

Explosive
A chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure or high temperature.

Flammable Aerosol
An aerosol that yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening.

Flammable Gas
A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less.

Flammable Liquid
Any liquid having a flashpoint below 100^{0}F (37.8^{0}C), except any mixture having components with flashpoints of 100^{0}F or higher, the total of which make up 99 percent or more of the total volume of the mixture.

Flammable Solid
A solid, other than a blasting agent or explosive, that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard.

Flashpoint
The minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested.

Hazardous Chemical
A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees.

Laboratory
A facility where the "laboratory use of hazardous chemicals" occurs. It is a workplace where relatively small quantities of hazardous chemicals are used on a non-production basis.

Laboratory Scale
Work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person.

Laboratory-Type Hood
A device located in a laboratory, enclosed on five sides with a movable sash or fixed partial enclosed on the remaining side, constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory; and allows chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee's body other than hands and arms.

Laboratory Use of Hazardous Chemicals
Handling or use of such chemicals in which all of the following conditions are met:

- Chemical manipulations are carried out on a "laboratory scale".
- Multiple chemical procedures or chemicals being used.
- The procedures involved are not part of a production process, nor in any way simulate a production process.
- Protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

Medical Consultation
A consultation which takes place between an employee and a licensed physician for the purpose of determining what medical examinations or procedures, if any, are appropriate in cases where a significant exposure to a hazardous chemical may have taken place.

Oxidizer
A chemical other than a blasting agent or explosive that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

Physical Hazard
A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer pyrophoric, unstable (reactive) or water-reactive.

Protective Laboratory Practices and Equipment
Those laboratory procedures, practices and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

Unstable (Reactive)
A chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperatures, or in contact with certain other chemicals.

Water-Reactive
A chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Permissible Exposure Level
- Employee Exposure Determination
- Chemical Hygiene Plan
- Medical Requirements
- Hazard Identification
- Respirators
- Recordkeeping

6.2.1 Training

Employees who handle hazardous chemicals in laboratories will be trained in:

- Methods and observations that may be used to detect the presence or release of a hazardous chemical (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc)

- The physical and health hazards of chemicals in the work area
- The measures employees can take to protect themselves from these hazards, including specific procedures the employee can take to protect themselves from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used

Additionally, affected employees will be trained on applicable details of NCDOT's written Chemical Hygiene Plan.

Employees must also be informed of:

- The location and availability of their laboratory's Chemical Hygiene Plan
- The permissible exposure limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard
- Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory
- The location and availability of known reference material on the hazards, safe handling, storage and disposal of hazardous chemicals found in the laboratory including, but not limited to, Material Safety Data Sheets received from the chemical supplier

Employees shall be trained at the time of initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations. The frequency of refresher information and training shall be at the discretion of the supervisor.

6.2.2 Permissible Exposure Levels

Employees' exposures to any of hazardous chemicals shall not exceed the permissible exposure level as specified in OSHA's Z tables.

6.2.3 Employee Exposure Determination

Employee exposure monitoring will consist of initial and periodic monitoring. **Initial monitoring** will be conducted if there is suspicion that the exposure levels for a particular substance regularly exceeds the action (or in the absence of an action level, the PEL).

Periodic monitoring shall be conducted if the initial monitoring discloses employee exposure over the action level. The frequency of periodic monitoring will be based on the OSHA Z tables requirements for the subject substance.

6.2.4 Chemical Hygiene Plan

A chemical hygiene plan must be in place for all laboratories that use and handle hazardous chemicals. Appendix A presents a model chemical hygiene plan that can be used by any NCDOT laboratory. The goals of a chemical hygiene plan are to:

- Protect employees from health hazards associated with hazardous chemicals in that laboratory
- Keep exposures below the limits specified in the OSHA Z tables

This Chemical Hygiene Plan will be available to employees and it shall include each of the following elements:

- Standard operating procedures to be followed when laboratory work involves the use of hazardous chemicals
- Criteria to determine and implement control measures to reduce employee exposure to hazardous chemicals including engineering controls, the use of personal protective equipment and hygiene practices
- A requirement that fume hoods and other protective equipment need to be functioning properly
- Provisions for employee information and training
- The circumstances under which a particular laboratory operation, procedure or activity shall require prior approval from Safety and Loss Control
- Provisions for medical consultation and medical examinations
- Designation of a Chemical Hygiene Officer
- Provisions for additional employee protection for work with particularly hazardous substances. These include select carcinogens, reproductive toxins and substances which have a high degree of acute toxicity. Special consideration shall be given to the following provisions which shall be included where appropriate:
  - Establishment of a designated area
  - Use of containment devices such as fume hoods or glove boxes
  - Procedures for safe removal of contaminated waste
  - Decontainment procedures

The Chemical Hygiene Plan shall be reviewed and evaluated at least annually and updated as necessary.

6.2.5 Medical Requirements

Employees who work with hazardous chemicals will be provided an opportunity to receive medical examinations and/or consultation including any follow-up examinations which the examining physician determines to be necessary, under the following circumstances:

- Whenever an employee develops signs or symptoms associated with an exposure to hazardous chemicals in the laboratory
- Where exposure monitoring reveals an exposure level routinely above the action levels (or in the absence of an action level, the PEL) for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements
- Whenever an event takes place in the work area such as a spill, leak, explosion or other occurrence resulting in the likelihood of a hazardous exposure

All medical examinations and consultations shall be performed by or under the direct supervision of a licensed physician and shall be provided without cost to the employee, without loss of pay and at a reasonable time and place.

The following information shall be provided to the physician:

- The identity of the hazardous chemical(s) to which the employee may have been exposed
- A description of the conditions under which the employee was exposed to chemicals
- A description of the signs and symptoms of exposure that the employee is experiencing

Upon completion of the medical examination or consultation, the NCDOT laboratory shall obtain a written opinion from the examining physician which shall include the following:

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

The written opinion shall not reveal specific findings of diagnoses unrelated to occupational exposure. See SPP# 1910.20, Access to Medical Records for related information.

6.2.6 Hazard Identification

Labels on incoming containers of hazardous chemicals must not be removed or defaced.

Additionally, material safety data sheets (MSDS) that are received with incoming shipments of hazardous chemicals must be readily accessible to laboratory employees.

6.2.7 Respirators

If respirators are required to maintain exposures below the PEL, they shall be selected and used per NCDOT's Respiratory Program and SPP# 1910.134, Respiratory Protection.

6.2.8 Recordkeeping

Accurate records of employee exposures and any medical consultation and examination shall be maintained in the employee's file.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of laboratory equipment and supplies to ensure compliance with this safety policy and procedure. They will be also responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will designate a Chemical Hygiene Officer to oversee implementation of their facility's Chemical Hygiene Plan.

Managers/Unit Heads will also ensure compliance with safety policy and procedure through their auditing process.

6.3.2 Laboratory Supervisors

Laboratory supervisors will ensure that laboratory employees follow safe laboratory work practices as outlined in NCDOT's model Chemical Hygiene Plan. The laboratory supervisor will provide laboratory employees information and training about the hazards of chemicals in their work area. Additionally, laboratory supervisors will ensure that laboratory employees are provided with PPE as necessary for their job.

Laboratory supervisors will ensure that all chemical containers are labeled and that Material Safety Data Sheets (MSDS) are readily accessible for the hazardous chemicals in their laboratory.

6.3.3 Laboratory Employees

Laboratory employees shall comply with all applicable guidelines contained in this safety policy and procedure. They will also report any hazardous or unsafe condition immediately to their supervisor.

6.3.4 Chemical Hygiene Officer

The Chemical Hygiene Officer will ensure that the Chemical Hygiene Plan is kept up to date. He or she is also responsible for maintaining monitoring records and providing technical support to managers/unit heads, laboratory supervisors and employees.

6.3.5 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors or others as applicable on any matter concerning this safety policy and procedure. Additionally, Safety and Loss Control will assist in the developing or securing of required training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Model NCDOT Chemical Hygiene Plan

Chemical Hygiene Plan for

Laboratory _____ Division/Unit _____
Location _____ Date _____

Chemical Hygiene Officer

_____ _____
Name Title

_____ _____
Telephone Number Mailing Address

This Chemical Hygiene Plan includes the following components :

- Basic Rules and Procedures for Laboratory work with Chemicals
- Chemical Procurement, Distribution, and Storage
- Housekeeping, Maintenance, and Inspections
- Medical Program
- Protective Apparel and Equipment
- Records
- Signs and Labels
- Spills and Accidents
- Training and Information Program
- Waste Disposal

Basic Rules and Procedures for Laboratory Work with Chemicals

Accident and Spills

Eye Contact :
Promptly flush eyes with water for a prolonged period (15 minutes) and seek medical attention.

Ingestion:
Encourage the victim to drink large amounts of water unless the MSDS advises otherwise.

Skin Contacts:
Promptly flush the affected area with water and remove any contaminated clothing. If symptoms persist after washing, seek medical attention.

Clean-up:
Promptly clean up spills, using appropriate protective apparel and equipment and proper disposal.

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 2

Basic Rules and Procedures for Laboratory Work with Chemicals (Continued)

Avoidance of "routine" exposure

Develop and encourage safe habits. Avoid unnecessary exposure to chemicals by any route. Do not smell or taste chemicals. Vent apparatus which may discharge toxic chemicals (vacuum pumps, distillation columns, etc.) into local exhaust devices.

Inspect gloves and test glove boxes before use. Do not allow release of toxic substances in cold rooms and warm rooms, since these have contained recirculated atmospheres.

Choice of chemicals

Use only those chemicals for which the design of the available ventilation system is appropriate.

Eating, smoking, etc.

Avoid eating, drinking, smoking, gum chewing, or application of cosmetics in areas where laboratory chemicals are present. Wash hands before conducting these activities. Avoid storage, handling, or consumption of food or beverages in storage areas, refrigerators, or in glassware or utensils which are also used for laboratory operations.

Equipment and glassware

Handle and store laboratory glassware with care to avoid damage. Do not use damaged glassware. Use extra care with Dewar flasks and other evacuated glass apparatus. Shield or wrap them to contain chemicals and fragments should implosion occur. Use equipment only for its designed purpose.

Exiting

Wash areas of exposed skin well before leaving the laboratory.

Horseplay

Avoid practical jokes or other behavior which might confuse, startle or distract another worker.

Mouth suction

Do not use mouth suction for pipetting or starting a siphon.

Personal apparel

Confine long hair and loose clothing. Wear shoes at all times in the laboratory but do not wear sandals, perforated shoes, or sneakers.

Personal housekeeping

Keep the work area clean and uncluttered, with chemicals and equipment being properly labeled and stored. Clean up the work area on completion of an operation or at the end of each day.

Personal protection

Assure that appropriate eye protection is worn by all persons, including visitors, where chemicals are stored or handled. Use IR - UV protective eyeware for loading and unloading the muffle furnance.

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 3

Basic Rules and Procedures for Laboratory Work with Chemicals (Continued)

Personal protection (Continued)

Wear appropriate gloves when the potential for contact with toxic materials exists. Inspect the gloves before each use. Wash them before removal, and replace them periodically.
Use appropriate respiratory equipment when air contaminant concentrations are not sufficiently restricted by engineering controls or inspecting the respirator before use.

Use any other protective and emergency apparel and equipment as appropriate.
Avoid use of contact lenses in the laboratory unless necessary. If they are used, inform supervisor so special precautions can be taken. Remove laboratory coats immediately on significant contamination.

Planning

Seek information and advice about hazards, plan appropriate protective procedures, and plan positioning of equipment before beginning any new operation.

Unattended operations

Leave lights on, place an appropriate sign on the door, and provide for containment of toxic substances in the event of failure of a utility service (such as cooling water) to an unattended operation.

Use of hood

Use the hood for operations which might result in release of toxic chemical vapors or dust.
As a rule of thumb, use a hood or other local ventilation device when working with any appreciably volatile substance with TLV of less than 50 PPM.

Confirm adequate hood performance before use; keep hood closed at all times except when adjustments within the hood are being made, keep materials stored in hoods to a minimum and do not allow them to block vents or air flow. Leave the hood "on" when it is not in active use if toxic substances are stored in it or if it is uncertain whether adequate general laboratory ventilation will be maintained when it is "off."

Vigilance

Be alert to unsafe conditions and see that they are corrected when detected.

Waste disposal

Assure that the plan for each laboratory operation includes plans and training for waste disposal.
Deposit chemical waste in appropriately labeled receptacles and follow all other waste disposal procedures of the Chemical Hygiene Plan.

Do not discharge to the sewer concentrate acids or bases, highly toxic, malodorous, or lachrymatory substances or any substances which might interfere with the biological activity of waste water treatment plants, create fire or explosion hazards, cause structural damage, or obstruct flow.

Working alone

Avoid working alone in a building, do not work alone in a laboratory if the procedures being conducted are hazardous.

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 4

Chemical Procurement, Distribution, and Storage

Procurement

Yes	No	
☐	☐	Is information available to employees on proper handling, storage, and disposal on substances when they are received? If not, list the measures to ensure information will be made available to employees. _____ _____

No containers should be accepted without adequate identifying labels.

Stockrooms/Storerooms

Yes	No	
☐	☐	Are toxic substances segregated in well-identified areas with local exhaust ventilation?
☐	☐	Are highly toxic chemicals whose containers have been opened in unbreakable secondary containers?

Stored chemicals should be examined at least annually for replacement, deterioration, and container integrity. Additionally, stockrooms/storerooms should not be used as preparation or repacking areas.

Distribution

When chemicals are hand carried, the container should be placed in an outside container or bucket. Freight-only elevators should be used if possible.

Laboratory Storage

Yes	No	
☐	☐	Are chemicals that are stored in the laboratory in small as possible quantities?
☐	☐	Are periodic inventories conducted with unneeded items discarded or returned to the stockroom/storeroom?

If laboratory storage is permitted, do not store chemicals on bench tops and in hoods. Also, exposure to heat or direct sunlight should be avoided.

Environmental Monitoring

Yes	No	
☐	☐	Is a highly toxic substance stored or used 3 times a week or more?
☐	☐	Are the laboratory hoods or other ventilation devices being tested or redesigned?

If any of the environmental monitoring questions were unanswered "yes," monitoring of airborne concentrations may be required.

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 5

Housekeeping, Maintenance, and Inspections

Cleaning

Floors should be cleaned regularly.

Inspections

Yes	No	
☐	☐	Are formal housekeeping and chemical hygiene inspections conducted quarterly (laboratories with frequent personnel changes) or semiannually?

Informal housekeeping inspections shall be performed continually.

Maintenance

Yes	No	
☐	☐	Are eye wash fountains inspected every 3 months?
☐	☐	Are respirators routinely inspected by the laboratory supervisor?
☐	☐	Are procedures in place to prevent the start-up of out-of-service equipment?

All other safety equipment should be regularly inspected.

Passageways

Yes	No	
☐	☐	Are all accesses to exits, emergency equipment, and utility controls not blocked?

Stairways and hallways should not be used as storage areas.

Medical Program

Routine Surveillance

Yes	No	
☐	☐	Are any employees regularly and frequently handling toxicologically significant quantities of a chemical? If yes, those employees should consult a qualified physician to determine whether a regular schedule of medical surveillance is required?

First Aid

Employees trained in first aid should be available during all working hours.

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 6

Protective Apparel and Equipment

Yes	No	
☐	☐	Is protective clothing available and compatible with the degree of required protection for the substances being handled?

Are these items in place?

Yes	No	
☐	☐	Early accessible drench-type safety shower?
☐	☐	An eyewash fountain?
☐	☐	A fire extinguisher?
☐	☐	Is respiratory protection available?
☐	☐	Are a fire alarm and emergency phone nearby?

Records

Accident records should be written and maintained. These records are maintained by _____ and kept at _____(location).

Yes	No	
☐	☐	Are high risk substances used at this laboratory? If so, document the inventory and usage of these substances.

Signs and Labels

The following signs and labels should be posted in this laboratory:

- Emergency telephone numbers of emergency personnel/facilities, supervisors, and laboratory workers
- Identity labels, showing contents of containers (including waste receptacles) and associated hazards
- Location signs for safety showers, eyewash stations, other safety and first aid equipment, exits and areas where food and beverage consumption and storage are permitted
- Warnings at areas or equipment where special or unusual hazards exist

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 7

Spills and Accidents

Yes	No	
☐	☐	Is a written emergency plan in place (See SPP # 1910.38)? It should include procedures for ventilation failure, medical care, and drills.
☐	☐	Is alarm system in place and operable in all parts of the laboratory facility?
☐	☐	Does it include prevention, containment, cleanup, and reporting provisions?

Training and Information Program

Yes	No	
☐	☐	Are all employees informed about the work in the laboratory, its risks, and what to do if an accident occurs?

Emergency and Personal Protection

Yes	No	
☐	☐	Do employees know the location and use of available protective clothing and equipment?
☐	☐	Are some of the employees trained in the proper use of the emergency equipment procedures?
☐	☐	Do the stockroom/storeroom employees know about the hazards and compatible protective clothing associated with the chemical substances they handle?

Literature/Consultation

Yes	No	
☐	☐	Are literature and consulting advice concerning chemical hygiene available to laboratory employees?

Waste Disposal

Content

The waste disposal program should specify how waste is to be collected, segregated, stored, and transported and include consideration of what materials can be incinerated. Transport from the institution must be in accordance with DOT regulations.

APPENDIX A: Model NCDOT Chemical Hygiene Plan (Continued) 8

Waste Disposal (Continued)

Discarding Chemical Stocks

Unlabeled containers of chemicals and solutions should undergo prompt disposal; if partially used, they should not be opened. Before an employee's employment in the laboratory ends, chemicals for which that person was responsible should be discarded or returned to storage.

Frequency of Disposal

Waste should be removed from laboratories to a central waste storage area at least once per week and from the central waste storage area at regular intervals.

Method of Disposal

Incineration in an environmentally acceptable manner is the most practical disposal method for combustible laboratory waste.

Indiscriminate disposal by pouring waste chemicals down the drain or adding them to mixed refuse for landfill burial is unacceptable.

Hood should not be used as a means of disposal for volatile chemicals
Disposal by recycling or chemical decontamination should be used when possible.

Author:	Paul Roberts	Revision #:	3
Approved By:	Walt Gray	Date Revised:	May 20, 2016

SAFETY POLICY & PROCEDURE

Hazard Communication SPP # 1910.1200

Quick Reference

Select this Link to view latest Revision changes

Contents

1.0 Purpose

The purpose of this safety policy and procedure is the establishment of a program meeting the OSHA Hazard Communication Standard to protect North Carolina Department of Transportation (NCDOT) employees who are exposed to hazardous chemicals during the performance of their job duties.

2.0 Scope and Applicability

NCDOT purchases, stores, and uses a variety of chemicals in its everyday operations. Employees must be provided with information about the hazardous chemicals to which they may be exposed.

This safety policy and procedure provides the NCDOT Hazard Communication program to be used by NCDOT facilities and worksites to protect employees from chemical hazards. It includes provisions for training, discussion of classified chemical hazards, and discussion on the importance and structure of the safety data sheet (SDS), labeling requirements of the OSHA Hazard Communication standard consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS). It also presents information for accessing safety data sheets (SDS).

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Risk Management, Purchasing, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects all NCDOT employees who are exposed to chemical hazards during the performance of their job duties.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.1200 and mandatory Appendices) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.59).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that may cause death or serious physical harm to employees or the public. Therefore, employees will not handle hazardous chemicals until they have been trained in the NCDOT Hazard Communication program. When chemical hazards exist that cannot be eliminated, then engineering practices, administrative controls, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Hazard Communication will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Hazard Communication. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined under Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT safety policy and procedure on Hazard Communication.

6.1 Definitions

Chemical Manufacturer
An employer with a workplace where chemical(s) are produced for use or distribution.

Chemical Name
The scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) or a name that will clearly identify the chemical for the purpose of conducting a hazard classification.

Classification
To identify the relevant data regarding the hazards of a chemical; review those data to ascertain the hazards associated with the chemical; and decide whether the chemical will be classified as hazardous according to the definition of hazardous chemical in this section. In addition, classification for health and physical hazards includes the determination of the degree of hazard, where appropriate, by comparing the data with the criteria for health and physical hazards.

Common Name
Any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.

Container
Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical.

Distributor
Any business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.

Hazard Category
The division of criteria within each hazard class, e.g., oral acute toxicity and flammable liquids include four hazard categories. These categories compare hazard severity within a hazard class and should not be taken as a comparison of hazard categories more generally.

Hazard Class
The nature of the physical or health hazards, e.g., flammable solid, carcinogen, oral acute toxicity.

Hazard Not Otherwise Classified (HNOC)
An adverse physical or health effect identified through evaluation of scientific evidence during the classification process that does not meet the specified criteria for the physical and health hazard classes addressed in the Hazard Communication standard.

Hazard Statement
A statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.

Hazardous Chemical
Any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified.

Health Hazard
A chemical which is classified as posing one of the following hazardous effects:
acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard.

Label
An appropriate group of written, printed or graphic information elements concerning a hazardous chemical that is affixed to, printed on, or attached to the immediate container of a hazardous chemical, or to the outside packaging.

Label Elements
The specified pictogram, hazard statement, signal word and precautionary statement for each hazard class and category.

Physical Hazard
Chemical that is classified as posing one of the following hazardous effects:
explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas.

Pictogram
A composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical. Eight pictograms are designated under the Hazard Communication standard for application to a hazard category.

Precautionary Statement
A phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical or improper storage or handling.

Product Identifier
The name or number used for a hazardous chemical on a label or in the SDS. It provides a unique means by which the user can identify the chemical. The product identifier used shall permit cross-references to be made among the list of hazardous chemicals required in the written hazard communication program, the label and the SDS.

Pyrophoric Gas
A chemical in a gaseous state that will ignite spontaneously in air at a temperature of 130 degrees F (54.4 degrees C) or below.

Safety Data Sheet (SDS)
Written or printed material concerning a hazardous chemical provided by the manufacturer or importer which includes the required information listed in Section 6.2.3 of this procedure.

Signal Word
A word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used are "Danger" and "Warning." "Danger" is used for the more severe hazards, while "Warning" is used for the less severe.

Simple Asphyxiant
A substance or mixture that displaces oxygen in the ambient atmosphere, and can thus cause oxygen deprivation in those who are exposed, leading to unconsciousness and death.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Hazard Classification
- NCDOT Hazard Communication Program
- Safety Data Sheets
- Obtaining Safety Data Sheets
- Labels and Labeling
- Training

6.2.1 Hazard Classification

OSHA requires chemical manufacturers to classify the physical and health hazards of their chemicals, and where appropriate, the category of each class that applies. A hazardous chemical is any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, a combustible dust, a pyrophoric gas, or a hazard not otherwise classified.

Physical hazards pose one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas. Refer to 1910.1200 Appendix B for more Physical Hazard Criteria associated with these materials.

Health hazards can cause health damage either immediately from short term (acute) exposure or slowly through long-term exposure (chronic). Exposures to these chemical hazards can occur through inhalation (breathing dust, vapors, or mists), ingestion (eating or smoking while working around hazardous chemicals), or absorption (chemicals entering the body through cuts, scratches, or broken skin). Refer to 1910.1200 Appendix A for more Health Hazard Criteria associated with these materials.

Combustible dust is fine particles that present an explosion hazard when suspended in air under certain conditions.

A simple asphyxiant displaces oxygen which causes oxygen deprivation to those exposed and can lead to unconsciousness or possible death.

A pyrophoric gas is a chemical in a gaseous state that will ignite spontaneously in air at a temperature of 130 degrees F (54.4 degrees C) or below. Examples of pyrophoric gases are arsine, silane, disilane, dichlorosilane, diborane, and phosphine.

Hazard Not Other Classified (HNOC) is a chemical where adverse physical or health effect identified through evaluation of scientific evidence during the classification process that does not meet the specified criteria for the physical and health hazard classes addressed in the Hazard Communication standard. This hazard classification is intended to ensure that hazards by the previous version of Hazard Communication Standard continue to be covered.

Common types of hazardous chemicals found in NCDOT include but are not limited to:

• Acids	• Flammables	• Pesticides
• Adhesives	• Glues	• Petroleum products
• Caustics	• Greases	• Solders
• Cleaning agents	• Inks	• Strippers
• Compressed Gases	• Lacquers	• Thinners
• Degreasing agents	• Paints	• Sealers
• Dusts		

6.2.2 NCDOT's Written Hazard Communication Program

Appendix A presents NCDOT's Written Hazard Communication Program that can be used by any facility, worksite, work unit, or work location in NCDOT. NCDOT's Hazard Communication Program includes:

- Facility or worksite identification
- Program element contact list
- Chemical list
- Container labeling provisions
- SDS requirements and availability
- Non-routine tasks hazard awareness provisions
- Hazard communication provisions for contractors
- Employee training documentation

Each facility or worksite with a hazard communication program should have a hazard communication program coordinator to oversee all the program elements. Additionally, all employees should know the location and availability of their hazard communication program.

6.2.3 Labels and Workplace Labeling

It is the responsibility of the chemical manufacturer, importer, or distributor to ensure that each container of shipped hazardous chemicals received by NCDOT is labeled, tagged or marked. Hazards not otherwise classified do not have to be addressed on the container. The following information shall be provided on shipped containers received:

1. Product Identifier (Name found on SDS)
2. Signal Word ("**Danger"** for more severe or "**Warning"** for less severe)
3. Hazard Statement (Describes Nature of Hazard)
4. Pictogram (Appendix B displays HCS Pictograms)
5. Precautionary Statement (Measures to minimize exposure to hazards)
6. Chemical Manufacturer name, address, and telephone number

These labels shall not be remove or defaced on incoming containers of hazardous chemicals.

For chemicals transferred from the manufacturer container to portable containers workplace labeling is required. These labels must be prominently displayed and contain product identifier, words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

On individual stationary containers such as storage tanks, signs or placards may be used in place of the labels.

Portable containers of chemicals transferred from labeled containers for intended for immediate use by the employee who performs the transfer are not required to be labeled unless that portable container is transferred for use on another work shift.

6.2.4 Safety Data Sheet (SDS)

The safety data sheet (SDS) is a fact sheet for hazardous chemicals provided by the chemical manufacturer or importer. They must be available for every hazardous chemical in the work area and must contain information about the chemical including: Appendix C presents the minimum SDS information for each of (16) sections listed below:

Safety Data Sheets (SDS) – The 16 Required Sections	
1. Identification	9. Physical and chemical properties
2. Hazard(s) identification	10. Stability and reactivity
3. Composition/ information on ingredients	11. Toxicological information
4. First aid measures	12. Ecological information
5. Fire-fighting measures	13. Disposal considerations
6. Accidental release measures	14. Transport information
7. Handling and storage	15. Regulatory information
8. Exposure controls and personal protection	16. Other information, including date of preparation or last revision

6.2.5 Obtaining SDS Sheets

SDS sheets can be obtained from:

- Internet access through 3E website established for NCDOT
- Call 3E Company for SDS (800-451-8346)
- Send Fax Request to 3E using Fax form. See Appendix D for Fax form.
- Some Units may maintain hard copies of SDS

For Internet access to NCDOT SDS use 3E website set up for NCDOT contact your supervisor or Safety & Risk Management for assistance.

The advantage of this method is that worksites and work locations do not necessarily have to maintain paper copies of SDSs. Rather, the availability and accessibility of SDSs is determined by need.

SDS requests fall into two categories:

- Routine
- Emergency

For routine requests, employees should request SDS from their immediate supervisor. For emergency requests, any employee can call 3E Co. (800-451-8346) to request SDS. If problems are encountered while obtaining a SDS, contact Safety & Risk Management or your unit Safety staff.

New chemical product purchases should result in the SDS being added to the electronic 3E NCDOT database by the location making the purchase.

6.2.6 Training

Employees will be trained to work safely with chemicals. Training will include:

- The Hazard Communication standard and its requirements
- Operations in the work area where hazardous chemicals are present
- The location and availability of the written hazard communication program
- The physical, health, simple asphyxiation, combustible dust and pyrophoric gas hazards, as well as hazards not otherwise classified, of the chemicals in the work area
- Measures employees can take to protect themselves including NCDOT's specific procedures to provide engineering controls, work practices, and Personal Protective Equipment (PPE)
- Methods and observations to detect the presence of a hazardous chemical
- How to read and interpret information on labels and SDS

Employees will be trained at the time of initial employment or assignment and whenever a new chemical hazard is introduced into their workplace. Refresher training shall be provided annually.

All training will be documented. See Appendix E for the training documentation form. A copy of the training documentation shall be placed in the employee's personnel record file. Training may also be documented electronically through LMS.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of equipment and supplies for successful implementation and maintenance of NCDOT's Hazard Communication Program in their work areas. They will be also responsible for appointing a Hazard Communication Coordinator for their work area(s) and for identifying the employees affected by this safety policy and procedure.

Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that labels on hazardous chemicals are legible. They shall also ensure refresher training is provided to employees on NCDOT's Written Hazard Communication Program.

Supervisors will ensure that employees are provided with and instructed on the use of any PPE when working with hazardous chemicals.

6.3.3 Employees

Employees will be trained before working with any hazardous chemicals. They are responsible for reviewing chemical labels for procedures and hazards before using any hazardous chemicals.

Employees shall wear the necessary PPE before working with any hazardous chemical. Also, employees shall report any unlabeled or defaced hazardous chemical containers to their immediate supervisor.

6.3.4 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: NCDOT Hazard Communication Program

NCDOT Hazard Communication Program

Facility/Worksite:

Program Coordinator:

To ensure that information about the dangers of all hazardous chemicals used by NCDOT personnel at this location is known by all affected employees, the following Hazard Communication Program has been established. Under this program, employees will be informed of the contents of the OSHA Hazard Communications standard, the hazardous properties of chemicals with which you work, safe handling procedures, and measures to protect yourself from these chemicals. The requirements of this program are intended to be consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

This program applies to all work operations where employees may be exposed to hazardous chemicals under normal working conditions or during an emergency situation. All work units will participate in the Hazard Communication Program. A copy of this Hazard Communication Program, Chemical List, and Safety Data Sheets shall be made available for review by any interested employee in your work unit.

Facility/Worksite Info

The Hazard Communication Program shall list the facility or worksite and identify the title of program coordinator for your location. The program coordinator is responsible for reviewing and updating this plan and the Chemical List of hazardous chemicals used.

Chemical List

All facilities or worksites shall compile and maintain a Chemical List of hazardous chemicals being used. This list will contain the product name used on the SDS and container label. The Chemical List may be compiled for the workplace as a whole or for individual work areas. It shall be updated as new chemicals are added or existing chemicals are deleted by the designated SDS administrator for the location.

Labels and Labeling System

Manufacturer container labels are sufficient to meet labeling requirements of the Hazard Communication Program. If contents are transferred from the original manufacture container to another container, a labeling system must be used to label the unmarked container with product identity and appropriate hazard information.

APPENDIX A: NCDOT Hazard Communication Program (Continued) 2

Safety Data Sheets (SDS)

SDS information shall be made available for all hazardous chemicals used at a facility or worksite through on-line access or by phone/fax request to NCDOT SDS system provider. Employees who are working with a hazardous chemical may request copy of the SDS from their immediate supervisor. The supervisor can obtain SDS by:

- Internet access through 3E website established for NCDOT
- Call 3E Co. for SDS; 800-451-8346
- Send Fax Request to 3E using Fax form. See Appendix D for Fax form.
- Access to hard copies of SDS if available in unit.

For Internet access to NCDOT SDS use the following hyperlink to 3E website set up for NCDOT; 3E Online NCDOT Access

It is recommended that users create a short cut on computer desk top page for quick access. The advantage of this method is that worksites and work locations do not necessarily have to maintain paper copies of SDSs. Rather, the availability and accessibility of SDSs is determined by need. If problems are encountered while obtaining a SDS, contact Safety & Risk Management or your unit Safety staff.

Hazards of Non-Routine Tasks

Supervisors will inform employees of any special non-routine tasks that may involve possible exposure to hazardous chemicals. Safe work practices, use of required PPE, and standard operating procedures (SOPs) shall be reviewed prior to the start of such tasks.

Contractor Communication

All onsite contractors (and subcontractors) are responsible for adhering to NCDOT's Hazard Communication Program while they are on NCDOT worksites. Information on hazardous chemicals known to be used on the worksite will be exchanged with contractors.

Contractors are required to exchange SDS information with NCDOT personnel as requested. Additionally, all onsite contractors shall be provided a copy of NCDOT's Hazard Communication Program. Contractors will be responsible for providing necessary information to their employees and subcontractors.

APPENDIX B: Hazard Communication Standard Pictograms

HCS Pictograms and Hazards

Health Hazard 	**Flame** 	**Exclamation Mark** 
• Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	• Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	• Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non Mandatory)
Gas Cylinder 	**Corrosion** 	**Exploding Bomb** 
• Gases under Pressure	• Skin Corrosion/ burns • Eye Damage • Corrosive to Metals	• Explosives • Self-Reactives • Organic Peroxides
Flame over Circle 	**Environment (Non Mandatory)** 	**Skull and Crossbones** 
• Oxidizers	• Aquatic Toxicity	• Acute Toxicity (fatal or toxic)

APPENDIX C: Safety Data Sheets (SDS)

A safety data sheet (SDS) shall include the information specified in Table below under the section number and heading indicated for sections 1-16. If no relevant information is found for any given section, the SDS shall clearly indicate that no applicable information is available.

	Section Heading	Information Provided
1.	**Identification**	(a) Product identifier used on the label; (b) Other means of identification; (c) Recommended use of the chemical and restrictions on use; (d) Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party; (e) Emergency phone number.
2.	**Hazard(s) identification**	(a) Classification of the chemical in accordance with paragraph (d) of §1910.1200; (b) Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of §1910.1200. (Hazard symbols may be provided as graphical reproductions in black and white or the name of the symbol, e.g., flame, skull and crossbones); (c) Describe any hazards not otherwise classified that have been identified during the classification process; (d) Where an ingredient with unknown acute toxicity is used in a mixture at a concentration = 1% and the mixture is not classified based on testing of the mixture as a whole, a statement that X% of the mixture consists of ingredient(s) of unknown acute toxicity is required.
3.	**Composition/ information on ingredients**	Except as provided for in paragraph (i) of §1910.1200 on trade secrets: **For Substances** (a) Chemical name; (b) Common name and synonyms; (c) CAS number and other unique identifiers; (d) Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance. **For Mixtures** In addition to the information required for substances: (a) The chemical name and concentration (exact percentage) or concentration ranges of all ingredients which are classified as health hazards in accordance with paragraph (d) of §1910.1200 and (1) are present above their cut-off/concentration limits; or (2) present a health risk below the cut-off/concentration limits. (b) The concentration (exact percentage) shall be specified unless a trade secret claim is made in accordance with paragraph (i) of §1910.1200, when there is batch-to-batch variability in the production of a mixture, or for a group of substantially similar mixtures (See A.0.5.1.2) with similar chemical composition. In these cases, concentration ranges may be used. **For All Chemicals Where a Trade Secret is Claimed** Where a trade secret is claimed in accordance with paragraph (i) of §1910.1200, a statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.

APPENDIX C: Safety Data Sheets (SDS) (Continued) 2

	Section Heading	Information Provided
4.	**First-aid measures**	(a) Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion; (b) Most important symptoms/effects, acute and delayed. (c) Indication of immediate medical attention and special treatment needed, if necessary.
5.	**Fire-fighting measures**	(a) Suitable (and unsuitable) extinguishing media. (b) Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products). (c) Special protective equipment and precautions for fire-fighters.
6.	**Accidental release measures**	(a) Personal precautions, protective equipment, and emergency procedures. (b) Methods and materials for containment and cleaning up.
7.	**Handling and storage**	(a) Precautions for safe handling. (b) Conditions for safe storage, including any incompatibilities.
8.	**Exposure controls/personal protection**	(a) OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available. (b) Appropriate engineering controls. (c) Individual protection measures, such as personal protective equipment.
9.	**Physical and chemical properties**	(a) Appearance (physical state, color, etc.); (b) Odor; (c) Odor threshold; (d) pH; (e) Melting point/freezing point; (f) Initial boiling point and boiling range; (g) Flash point; (h) Evaporation rate; (i) Flammability (solid, gas); (j) Upper/lower flammability or explosive limits; (k) Vapor pressure; (l) Vapor density; (m) Relative density; (n) Solubility (o) Partition coefficient: n-octanol/water; (p) Auto-ignition temperature; (q) Decomposition temperature; (r) Viscosity.
10.	**Stability and reactivity**	(a) Reactivity; (b) Chemical stability; (c) Possibility of hazardous reactions; (d) Conditions to avoid (e.g., static discharge, shock, or vibration); (e) Incompatible materials; (f) Hazardous decomposition products.

APPENDIX C: Safety Data Sheets (SDS) (Continued) 3

	Section Heading	Information Provided
11.	**Toxicological information**	Description of the various toxicological (health) effects and the available data used to identify those effects, including: (a) Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact); (b) Symptoms related to the physical, chemical and toxicological characteristics; (c) Delayed and immediate effects and also chronic effects from short- and long-term exposure; (d) Numerical measures of toxicity (such as acute toxicity estimates). (e) Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest edition), or by OSHA.
12.	**Ecological information**	(a) Eco toxicity (aquatic and terrestrial, where available); (b) Persistence and degradability; (c) Bio accumulative potential; (d) Mobility in soil; (e) Other adverse effects (such as hazardous to the ozone layer).
13.	**Disposal considerations**	Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.
14.	**Transport information**	(a) UN number; (b) UN proper shipping name; (c) Transport hazard class(es); (d) Packing group, if applicable; (e) Environmental hazards (e.g., Marine pollutant (Yes/No)); (f) Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code); (g) Special precautions which a user needs to be aware of, or needs to comply with, in connection with transport or conveyance either within or outside their premises.
15.	**Regulatory information**	Safety, health and environmental regulations specific for the product in question.
16.	**Other information, including date of preparation or last revision**	The date of preparation of the SDS or the last change to it.

APPENDIX D: NCDOT SDS Fax Request Form

Request Type: Emergency (15 mins)_____ Immediate (2 hrs.)_____ Standard (24hrs)_____

FOR MEDICAL EMERGENCIES CALL 1-800 451-8346

FOR ROUTINE SDS FAX REQUESTS;
COMPLETE THE FOLLOWING AND FAX TO (760) 602-8888

REQUESTOR INFORMATION

Date Requested: _____

Name of Person Requesting:_____

Street Address: _____

City: _____, NC Zip: _____

Telephone: (_____)_____ Fax: (_____)_____

MANUFACTURER AND PRODUCT INFORMATION

(PROVIDE AS MUCH INFORMATION AS POSSIBLE.)

Complete Label Name on Product: _____

Manufacturer Product/ Item Number: _____

UPC: _____

Manufacturer's Name: _____

City: _____State: _____

Manufacturer's Phone # (If available): (_____)_____

MEDICAL EMERGENCY INFORMATION

Medical Provider: _____

Medical Provider: Fax No: (___)_____

Medical Provider Phone No: (__)_____

Questions, other than SDS requests, may be directed to:
3E Company, 1905 Aston Avenue, Carlsbad, CA 92008 by calling (800) 360-3220

Appendix D updated 5-11-2016

APPENDIX E: Hazard Communication Training Documentation

Employee Training

Date: _____ **Location:** _____

Instructor: _____ Title: **SAF 130 Hazard Communication**

Program Elements to be Covered

- The Hazard Communication standard and its requirements
- Operations in work area where hazardous chemicals are present
- The location and availability of the written Hazard Communication program
- Physical and health hazards of the chemicals in the work areas
- Measures employees can take to protect themselves including NCDOT's specific procedures to provide engineering controls, work practices, and PPE
- Methods and observations to detect the presence of a hazardous chemical
- How to read and interpret information on labels and SDS

Employees Trained

Name	Title	Employee #	Signature

Author:	Paul Roberts	Revision #:	4
Approved By:	Darryl Bass	Date Revised:	November 2020

Select this Link to view latest Revision changes

SAFETY POLICY & PROCEDURE

Lead in Construction SPP# 1926.62

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish a program to prevent absorption, inhalation, or ingestion of lead by North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Lead exposure can occur in NCDOT job activities that involve the disturbance of lead paint or lead-containing materials. Lead overexposure adversely affects numerous body systems and causes health impairment and disease.

This safety policy and procedure (SPP) provides guidelines to protect NCDOT employees from the immediate and long-term effects of lead exposure. It includes a discussion on training, exposure assessment, and methods of compliance. Requirements are presented for Personal Protective Equipment (PPE), housekeeping, hygiene facilities, signs, and recordkeeping. It also presents provisions for medical surveillance and medical protection.

This safety policy and procedure covers the following job activities within NCDOT:

- Welding, grinding, and torch cutting on bridge projects
- Manual and mechanical removal of lead-based paints

Additionally, this safety policy and procedure covers any other types of work that may expose an employee to lead.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926.62)

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, employees will not perform any lead related job activity without the proper training and PPE. Where lead hazards exist that cannot be eliminated, additional engineering practices, administrative practices, safe work practices, PPE, and proper training will be implemented.

These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Lead in Construction. Specific responsibilities are outlined in Section 8.0.

6.0 Definitions

Action Level (AL)
Airborne concentration of lead at 30 micrograms per cubic meter of air (30 µg/m^3) calculated as an 8-hour time weighted average.

Competent Person
Person who can identify existing and predictable lead hazards in the surroundings or working conditions and has the authority to take prompt corrective measures to eliminate them.

Permissible Exposure Limit (PEL)
Airborne concentration of lead at 50 micrograms per cubic meter of air (50 µg/m^3) calculated as an 8-hour time weighted average.

Qualified Person
Person having the training and experience in lead work, air monitoring, exposure assessment, and workplace evaluations.

7.0 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Initial Exposure Assessment
- Employee Exposures Above the PEL
- Compliance Plans
- Respiratory Protection
- Personal Protective Clothing
- Housekeeping
- Hygiene Facilities
- Signs
- Medical Surveillance Program
- Medical Removal Protection
- Recordkeeping
- Lead Waste Disposal

7.1 Compliance Plans

A written compliance plan shall be developed and implemented prior to beginning any job involving lead to ensure employees are not exposed to lead without proper protections. The lead work supervisor shall submit the plan to the Division Safety Engineer for approval prior to the beginning of work. See *Appendix A: Lead Compliance Plan*

7.2 Training

Employees and with potential job-related lead exposure will be trained by a qualified person prior to their initial job assignment and annually thereafter. Employees and competent persons shall be trained in:

- Specific hazards associated with their work environment
- Protective measures which can be taken against these hazards
- The danger of lead to their bodies and their families

Competent persons shall receive training to identify and predict lead hazards in various working conditions learn of the corrective measures to eliminate. They will receive this training initially and receive retraining if deemed necessary by the Division Safety Engineer. This training shall include as a minimum.

- Symptoms of lead exposure
- Thresholds of airborne and blood level lead concentration
- Lead work procedures
- Lead work area set up
- Disposal of lead waste

The Division Safety Engineer will provide both employee and competent person training or coordinate the training with an acceptable third party.

7.3 Initial Exposure Assessment

Situations that could lead to reasonable suspicion of lead exposure:

- Any painted system on bridges constructed prior to 1985 unless the bridge has been re-painted since 2000.
- Any information or observations of job site which would indicate presence of lead.
- Any previous measurements of airborne lead during similar work.
- Any employee complaints or symptoms which may be attributable to lead exposure.

If lead exposure is a hazard in any work environment; then one of the following shall be done:

- An initial exposure assessment to determine concentration; or,
- Assumption that employee exposure will exceed the action level.

This initial assessment will document the exposure an employee would have without the use of a respirator.

This initial exposure assessment is not required if:

- Objective data is available which can conclusively demonstrate that no employee will be exposed in excess of the action level.
- An exposure assessment has been conducted within the last 12 months for a project with very similar aspects as the project in question.

This initial exposure assessment may be limited to a representative number of employees who are reasonably expected to have the highest exposure levels.

The initial assessment of employee exposure may be categorized as:

- Less than the action level (AL)
- At or above the action level but less than the PEL
- Above the PEL

Employee exposures below the action level require no further monitoring.

Employee exposures at or above the AL but at or below the PEL require monitoring every 6 months. This monitoring shall be continued at the required frequency until at least 2 consecutive measurements, taken at least 7 days apart, are below the AL, at which time monitoring may be discontinued for that activity.

Employee exposures above the PEL require quarterly monitoring. This monitoring shall continue at this frequency until at least 2 consecutive measurements taken at least 7 days apart are at or below the PEL.

Within 5 working days after receiving monitoring results, the employee shall be notified in writing of the exposure results including a description of the corrective action to be taken to reduce exposure below that level. See APPENDIX B: Lead Air Monitoring Notification Letter

7.4 Employee Exposures Above the PEL

Based on exposure data for NCDOT employees, there are four major lead-related tasks/operations that presume employee lead exposure above the PEL:

1. Manual scraping, manual sanding, and power tool cleaning with dust collection systems
2. Inspection of contract lead abatement bridge projects
3. Grinding and power tool cleaning without dust collection systems
4. Welding and torch cutting lead-containing materials

For other lead-related tasks/operations presume lead exposures are above the PEL and implement full lead work protections until exposure assessment can be completed.

7.5 Engineering Controls

Local exhaust or general ventilation shall be provided during any indoor or enclosed area lead work to reduce employee exposures to below the PEL. Mechanical paint scalers should have vacuum attached local exhaust. Torch cutting and welding operations should have general ventilation fans in the work area.

7.6 Respiratory Protection

- Lead operations involving abatement inspection or manual scraping, sanding, or cleaning require (at minimum) a 1/2 face tightly fitting respirator with an assigned protection factor (APF) of 10.
- Lead operations involving power tools, abrasive blasting, welding, or torch cutting require (at minimum) a powered air purifying respirator (PAPR) with a protection factor of at least 25.
- For welding and torch cutting of lead or lead paint containing material, a PAPR with integrated welding shield shall be used.

Refer to **SPP# 1910.134 Respiratory Protection**, and NCDOT's Respiratory Protection Program for additional details on the basic requirement for selection, use, cleaning, and maintenance of respirators

7.7 Protective Clothing

Appropriate protective clothing and equipment shall be provided to employees who are exposed to lead at no cost to the employee. Protective clothing and equipment is necessary to protect employees from transporting lead from work to home. Appropriate protective clothing and equipment can include:

- Disposable coveralls
- Work gloves
- Boots or boot coverlets

If safety toe boots are worn for the job, lead wipes shall be used to remove any lead particles from boots while in the change area. The contaminated lead wipes shall be disposed of as lead waste.

Protective clothing is required to be removed in a change area. The contaminated protective clothing is to be placed in a closed labeled container in the change area or disposed of as lead waste.

7.8 Housekeeping

All surfaces should be maintained as free as practical of lead dust accumulation. Vacuuming these surfaces with high-efficiency particulate air (HEPA) filters is the preferred method of housekeeping. The HEPA filters shall be emptied in a manner which minimizes lead dust reentry into the workplace. Dry or wet sweeping, shoveling or brushing may be used only if vacuuming or equally effective methods are not feasible.

7.9 Hand and Face Washing Facilities

All employees who perform lead-related tasks/operations shall be provided hand and face water and hand soap washing facilities or disposable hand wipes. Employees are prohibited from smoking, eating, drinking and applying lotions in the work areas. Additionally, no tobacco products, food items, or drinks are to be taken to or kept in lead work areas.

7.10 Signs

Warning signs shall be posted in work areas where the exposure of lead exceeds the PEL. These signs shall contain of the following words or phrases:

DANGER
LEAD WORK AREA
MAY DAMAGE FERTILITY OR THE UNBORN CHILD
CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM
DO NOT EAT, DRINK OR SMOKE IN THIS AREA

The employer shall ensure that all warning signs are illuminated and cleaned as necessary, and that no statement appears on or near any sign that contradicts or detracts from the meaning of the required signage.

7.11 Lead Waste Disposal

Prior to start of lead work plastic tarps shall be laid down to prevent lead from contaminating the work environment. At the completion of the work, tarps will be cleaned of debris and carefully rolled up for storage or disposal at the end of the project. All lead waste debris from paint removal shall be collected into barrels for proper hazardous waste disposal.

The empties contents of a HEPA vacuum must also be treated as hazardous lead waste when used during lead activities.

7.12 Medical Surveillance

The purpose of medical surveillance is to prevent lead-related disease. Although controls may be in place to prevent overexposure to lead, control systems may fail and hygiene and respirator programs may be inadequate. Therefore, a medical program with periodic surveillance will help detect those failures.

Medical surveillance provisions include two phases:

Initial medical surveillance is to be provided to employees prior to lead exposure. This initial medical surveillance will consist of an initial medical examination and biological monitoring. The examination will provide information to establish a baseline to which subsequent data can be compared. Biological monitoring consists of blood lead level (BLL) and zinc protoporphyrin (ZPP) level tests.

Annual medical surveillance program is to be provided to employees that are exposed to lead or can reasonably be expected to be exposed to lead at levels above the PEL. Biological monitoring shall be offered during annual training. If an employee's BLL exceeds 25 µg/dl, then the employee shall be notified in writing within 5 working days of the receipt of the test results. See Appendix C: Biological Monitoring Notification Letter.

BLL results are to be kept in the employees' personnel file. Employees may decline the offer for either initial or annual medical surveillance testing. If an employee chooses to deny receiving a test, the Division Safety Engineer will document and keep the documented denial in the employee's personnel file (Appendix D). If an employee is found to have an elevated BLL, follow-up testing may occur more frequently. This will be at the discretion of the Division Safety Engineer.

7.13 Medical Removal Protection

Medical Removal Protection (MRP) is a means of protecting employees when engineering controls, work practices, and respirators have failed to provide the required protection to employees. MRP involves the temporary removal of an employee from lead-related work and transfer to a job with no exposure to lead.

Temporary medical removal can occur:

- When an employee's blood lead level exceeds 25 µg/dl
- Upon the recommendation of the examining physician

Employees who are removed due to an elevated BLL shall receive a **monthly** BLL test. If medical opinion caused employee removal, the employee shall be provided medical tests or examinations that the physician believes to be appropriate. The employee shall not return to normal (i.e. lead-related) work activities until acceptable BLL are returned.

7.14 Recordkeeping

Medical surveillance records shall be retained for the duration of employment plus 30 years. Retained records shall include:

All exposure monitoring records for airborne lead. These records shall include:

- Name and job classification of the employees
- Details of the sampling and analytical techniques
- Results of the sampling
- Type of respiratory protection worn by the person sampled

All biological monitoring and results of medical examinations. These records shall include:

- Names of the employees
- Physician's written opinion
- Copy of the results of the examination

Medical removal protection records as applicable. These records shall include:

- Name of employee
- Employee's personnel number
- Date of employee removal
- Date of employee return
- How the removal was accomplished
- Whether or not the removal was for an elevated blood lead level

Employee and competent persons training records. These records shall include:

- Name and job classification of the employees
- General overview of materials covered
- Date of training

8.0 Specific Responsibilities

8.1 Managers / Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for equipment and supplies to protect employees from lead overexposure.

Managers/Unit Heads will obtain and coordinate the required training for affected employees. They will also designate competent persons for those work activities affected by this safety policy and procedure. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

8.2 Supervisors

Supervisors will ensure that no lead-related task/operation is performed without the appropriate controls being in place as prescribed in this safety policy and procedure. They will also assist competent and qualified persons as requested in the performance of their duties.

8.3 Competent Persons

Competent persons will be responsible for identifying existing and predictable lead hazards in lead-related task/operations. As part of this they shall perform frequent and regular inspections of job sites, materials, and equipment. They will be also responsible for taking prompt corrective measures to eliminate lead hazards.

8.4 Qualified Persons

Qualified persons shall be responsible for conducting lead exposure assessments in accordance with this safety policy and procedure and established exposure assessment protocols.

8.5 Employees

Employees shall comply with the provisions outlined in this safety and procedure. They are also responsible for immediately reporting any task/operation to their supervisor where there is suspicion of lead exposure.

8.6 Safety & Risk Management

Safety and Risk Management (S&RM) will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. S&RM will assist in developing or securing the required training, and revise and update the written program at least annually to reflect the status.

8.7 Division Safety

The Division Safety Engineer will be responsible for providing employee lead training, expertise, and guidance to qualified person to perform lead exposure assessments.

Appendix A: Lead Compliance Plan

1. Job Site: _____ Date: _____

Bridge # or Yard Anticipated Completion Date: _____

2. Personnel: _____ _____

Supervisor Employee

_____

TS I Employee

_____

Employee Employee

_____

Employee Employee

_____

Employee Employee

3. Activities: (check all that apply)

Welding (arc)	_____	Mechanical Cleaning	_____
Welding (gas)	_____	Hand Cleaning	_____
Cutting (torch)	_____	Other	_____

4. Personal Protective Equipment (check all items to be used):

Safety Glasses	_____	Fall Protection	_____
Racal Breath-Easy Resp.	_____	Life Vest	_____
Goggles/Face Shield	_____	Ear Plugs	_____
Gloves	_____	Hard Hat	_____
Coveralls	_____	Safety Shoes	_____

5. Work Practices (check all that apply, initial upon completion):

Water, Soap, Towels	_____	Hazardous Waste Removal	_____
Tarp or Plastic Sheet	_____	Job Site Inspection	_____
Vacuum (end of shift)	_____	Personal Sampling	_____

6. Training:

Lead Video	_____	Needle Gun	_____
Respirator Use	_____	Compliance Plan	_____

7. Comments

_____

_____

_____

_____

Appendix B: Air Monitoring Notification Letter

DATE:

TO: _____

FROM: _____

SUBJECT: **Lead Monitoring Results**

On_____your work exposure to lead was monitored to determine the level of exposure while _____ The airborne lead exposure was_____**micrograms/meter cubed of air** which indicates an exposure below/above the Permissible Exposure level of 50 micrograms/meter cubed of air as set by OSHA. The respirator you were using does provide protection against this level of lead exposure.

Your health is very important to NCDOT. To protect yourself from lead poisoning, please review the lead compliance program with your supervisor and strictly adhere to the following general requirements:

- Always wear your respirator correctly and always wash it after each use. No facial hair shall be allowed between the mask and your skin.
- Always use the HEPA vacuum cleaner to ventilate the tools you are using and for clean-up of the work area.
- Always wash your face and hands immediately after exiting the work area. Never eat, drink or use tobacco products before you have washed.
- Always wear your protective clothing so as to prevent the contamination of your skin and personal clothing.

Work practices and engineering controls will be evaluated on an ongoing basis to reduce the potential exposures to lead. If you have any suggestions as to reduce lead exposures, please discuss them with your supervisor and call me so I can evaluate them.

Thank you for participating in the lead airborne monitoring program. Please sign this letter and return it to your supervisor.

Signed: _____

Appendix C: Biological Monitoring Notification Letter

DATE:

TO: _____

FROM: _____

SUBJECT: **Biological Monitoring Results**

On_____your blood was analyzed for lead levels. Your blood contained _____ micrograms of lead per deciliter of whole blood, which is below the limit of 40 micrograms per deciliter of whole blood as set by OSHA. It was below/above the level of 25 micrograms per deciliter of whole blood as the level that NC Public Health Dept. of Epidemiology considers acceptable. The average adult who is not exposed to lead has a lead level of between 4 and 8 micrograms per deciliter of whole blood.

Your health is very important to NCDOT. To protect yourself from lead poisoning, please review the lead compliance program with your supervisor and strictly adhere to the following general requirements:

- Always use the Powered Air Purifying Respirator (PAPR) correctly and assure it wash it after each use. It should be stored in a clean container.
- It is highly recommended that you be provided with a general ventilation fan.
- Always wash your face and hands immediately after exiting the work area. Never eat, drink or use tobacco products before washing. Disposable hand wipes are acceptable.
- Always wear of protective clothing so as to prevent the contamination of the skin and personal clothing. Please use either disposable fire resistant coveralls or washable cotton coveralls.
- Please restrict your exposure to lead until you have been re-tested. Your blood-lead test should be below 25 micrograms per deciliter of whole blood prior to returning to work on surfaces contaminated with lead paints.

Thank you for participating in the blood lead monitoring program. Please sign this letter and return it to your supervisor.

Signed: _____

Appendix D: BLL Test Denial Documentation Example

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

ERIC BOYETTE
SECRETARY

Date:

From: Division Safety Engineer

Subject: Decline Blood Lead Monitoring

As a part of the Lead program, the employer is required to make available to all employees exposed to lead in the workplace a blood test every six months to determine the amount of lead in the blood system.

The primary exposures for NCDOT employees are from welding, cutting, or grinding on metal surfaces painted with lead-based paints. Typical operations are activities involving I-beams, diaphragms, bolts, or stripping of lead-based paints. All workers who currently do this type of work are offered and are encouraged to be tested.

The following employee has been offered this test and has declined at this time to be tested:

NAME:

SIGNATURE:

DATE:

Please place the signed copy in the employee's personal file in lieu of the blood-lead results. Send a copy to Division Engineer for recordkeeping as required by law.

Mailing Address:

Telephone:
Fax:
Customer Service:

Location:

Website: www.ncdot.gov

Respirable Crystalline Silica SPP# 1926.1153

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish a program to prevent inhalation of harmful quantities of respirable crystalline silica by North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Silica exposure can occur in NCDOT job activities that involve road building and concrete construction where sand, gravel, and concrete are used. Additionally, some construction related activities including cutting, drilling, grinding, grouting operations, and use of heavy equipment during demolition activities involving silica-containing materials can also contribute to crystalline silica exposure.

The Permissible Exposure Limit (PEL) for worker exposures to silica is 50 micrograms of respirable crystalline silica per cubic meter of air ($\mu g/m^3$) as an 8-hour time-weighted average (TWA).

Respiratory crystalline silica overexposure adversely affects the lungs and may cause silicosis, lung cancer, or other diseases. This safety policy and procedure provides guidelines to protect NCDOT employees from the immediate and long-term effects of respirable crystalline silica. Included are exposure assessment, written exposure control plan, methods of exposure control, training, and medical surveillance. If methods of exposure control are not sufficient to limit exposure requirements, Personal Protective Equipment (PPE) shall be provided. The exception is where employee exposure will remain below the action level of 25 $\mu g/m^3$ as an 8-hour TWA under any foreseeable conditions.

This document also details the areas of responsibility for managers/unit heads, supervisors, competent persons, qualified persons, employees, and Safety & Risk Management within NCDOT.

This safety policy and procedure covers the following job activities within NCDOT:

- Abrasive blasting is conducted using crystalline silica- containing blasting agents, or where abrasive blasting is conducted on substrates that contain crystalline silica.
- Sawing, cutting, drilling, crushing, jackhammering, of concrete materials.
- Grouting operations

Additionally, this safety policy and procedure is applicable to any other employees who in the performance of duties are exposed to respirable crystalline silica.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926.1153).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, employees shall not perform any silica related job activity without the proper training, and use of engineering controls, safe work practices, and respiratory protection to ensure the safety of exposed employees.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on silica in construction. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions and identifies responsibilities required by NCDOT's safety policy and procedure on silica in construction.

6.1 Definitions

Action Level
Airborne concentration of silica at 25 micrograms per cubic meter of air (25 µg/m^3) calculated as an 8-hour time weighted average.

Competent Person
An individual who is capable of identifying existing and predictable respirable crystalline silica hazards in the in the workplace, and who has authorization to take prompt corrective measures to eliminate them.

Employee Exposure
The exposure to airborne respirable crystalline silica that would occur if the employee were not wearing a respirator.

High Efficiency Particulate Filter (HEPA)
A filter that is at least 99.97% efficient in removing particles of 0.3 micrometers in diameter.

Permissible Exposure Limit (PEL)
Airborne concentration of respirable crystalline silica at 50 micrograms per cubic meter of air (50 µg/m^3) calculated as an 8-hour time weighted average.

Physician or Other Licensed Health Care Professional (PLHCP)
An individual whose 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 particular health care services required for medical surveillance including initial examination and periodic examinations for past, present, and anticipated exposure to respirable crystalline silica.

Respirable Crystalline Silica
Any quartz, cristobalite, and/or tridymite contained in airborne particles that are determined to be respirable by a sampling device designed to meet the characteristics for respirable-particle-size-selective samplers specified in the *International Organization for Standardization (ISO) 7708:1995: Air Quality – Particle Size Fraction Definitions for Health-Related Sampling.*

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Specific Exposure Control Methods
- Alternative Exposure Control Methods
- Respiratory Protection
- Written Exposure Control Plan
- Medical Surveillance
- Communication of Respirable Crystalline Silica Hazards to Employees
- Recordkeeping

6.2.1 Specific Exposure Control Methods

For each NCDOT employee engaged in a task identified on Table 1, the supervisor shall fully and properly implement the engineering controls, work practices, and respiratory protection specified for that task in the table when applicable.

Water dust suppression is the preferred and most effective engineering control and work practice for minimizing exposure to respirable crystalline silica for NCDOT operations. Refer to Table 1 for specific engineering controls for common equipment and tasks. For operations where water dust suppression cannot be used, local exhaust ventilation utilizing a dust collection or vacuum system should be used to capture generated respirable crystalline silica dust. A hood or shroud should be used for saws, drills, and grinders to ensure a dust cloud is not visible. If neither of these methods is effective in controlling visible silica dust exposure, respiratory protection shall be used.

TABLE 1:
SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(i) Stationary masonry saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
(ii) Handheld power saws (any blade diameter)	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. – When used outdoors. – When used indoors or in an enclosed area.	None APF 10	APF 10 APF 10
(iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	*For tasks performed outdoors only:* Use saw equipped with commercially available dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.	None	None

TABLE 1: (continued next page)

TABLE 1: (continued) 2

SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(iv) Walk-behind saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. – When used outdoors. – When used indoors or in an enclosed area.	None APF 10	None APF 10
(v) Drivable saws	*For tasks performed outdoors only:* Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
(vi) Rig-mounted core saws or drills	Use tool equipped with integrated water delivery system that supplies water to cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None

TABLE 1: (continued next page)

TABLE 1: (continued) 3
SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)	Use drill equipped with commercially available shroud or cowling with dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes.	None	None
(viii) Dowel drilling rigs for concrete	*For tasks performed outdoors only:* Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes.	APF 10	APF 10
ix) Vehicle-mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector. **-OR-** Operate from within an enclosed cab and use water for dust suppression on drill bit.	None	None

TABLE 1: (continued next page)

TABLE 1: (continued) 4
SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(x) Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact.		
	– When used outdoors.	None	APF 10
	– When used indoors or in an enclosed area.	APF 10	APF 10
	-OR-		
	Use tool equipped with commercially available shroud and dust collection system.		
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		
	Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.		
	– When used outdoors.	None	APF 10
	– When used indoors or in an enclosed area.	APF 10	APF 10

TABLE 1: (continued next page)

TABLE 1: (continued) 5
SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xi) Handheld grinders for mortar removal (i.e., tuck-pointing)	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	APF 10	APF 25
(xii) Handheld grinders for uses other than mortar removal	*For tasks performed outdoors only:* Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. **-OR-**	None	None

TABLE 1: (continued next page)

TABLE 1: (continued) 6
SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xii) Handheld grinders for uses other than mortar removal (Continued)	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.		
	− When used outdoors.	None	None
	− When used indoors or in an enclosed area.	None	APF 10

TABLE 1: (continued next page)

TABLE 1: (continued) 7
SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xiii) Walk-behind milling machines and floor grinders	Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. **-OR-** Use machine equipped with dust collection system recommended by the manufacturer. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes.	None None	None None
(xiv) Small drivable milling machines (less than half-lane)	Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.	None	None

TABLE 1: (continued next page)

SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

TABLE 1: SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA			
Equipment / Task	**Engineering and Work Practice Control Methods**	**Required Respiratory Protection and Minimum Assigned Protection Factor (APF)**	
		≤ 4 hours /shift	**> 4 hours /shift**
(xv) Large drivable milling machines (half-lane and larger)	*For cuts of any depth on asphalt only:* Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions. *For cuts of four inches in depth or less on any substrate:* Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions. **-OR-** Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.	None None None	None None None

TABLE 1: (continued next page)

TABLE 1: (continued) 9
SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xvi) Crushing machines	Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points). Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions. Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote-control station.	None	None
(xvii) Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	Operate equipment from within an enclosed cab. When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.	None None	None None
(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions. **-OR-** When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None None	None None

When implementing the control measures specified in Table 1, the supervisor shall:

1. For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust;
2. For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust;
3. For measures implemented that include an enclosed cab or booth, ensure that the enclosed cab or booth:
    a. Is maintained as free as practicable from settled dust;
    b. Has door seals and closing mechanisms that work properly;
    c. Has gaskets and seals that are in good condition and working properly;
    d. Is under positive pressure maintained through continuous delivery of fresh air;
    e. Has intake air that is filtered through a filter that is 95% efficient in the 0.3-10.0 µm range (e.g., MERV-16 or better);
    f. Has heating and cooling capabilities.

Where an employee performs more than one task on Table 1 during the course of a shift, and the total duration of all tasks combined is more than four hours, the required respiratory protection for each task is the respiratory protection specified for more than four hours per shift. If the total duration of all tasks on Table 1 combined is less than four hours, the required respiratory protection for each task is the respiratory protection specified for less than four hours per shift.

6.2.2 Alternative Exposure Control Methods

For tasks not listed in Table 1, or where engineering controls, work practices, and respiratory protection described in Table 1 have not been fully implemented, the following Alternative Exposure Control Methods shall be implemented:

1. Exposure assessment: NCDOT shall assess the exposure of each employee who is or may reasonably be expected to be exposed to respirable crystalline silica at or above the action level of 25 µg/m^3, calculated as an 8-hour TWA. Refer to Appendix A for OSHA sampling guidelines. NCDOT will utilize one of the following options:
    a) Performance option. NCDOT shall assess the 8-hour TWA exposure for each employee based on any combination of air monitoring data or objective data sufficient to accurately characterize employee exposures to respirable crystalline silica.
    b) Scheduled monitoring option.
        i. NCDOT shall perform initial monitoring to assess the 8-hour TWA exposure for each employee based on one or more personal breathing zone air samples that reflect the exposures of employees performing tasks involving respirable crystalline silica-containing materials. Where several employees perform the same tasks, a representative employee who is expected to have the highest exposure to respirable crystalline silica shall be sampled.
        ii. If initial monitoring indicates that employee exposures are below the action level, discontinue monitoring for those employees whose exposures are represented by such monitoring.
        iii. Where the most recent exposure monitoring indicates that employee exposures are at or above the action level but at or below

the PEL, repeat monitoring within six months of the most recent monitoring.

iv. Where the most recent exposure monitoring indicates that employee exposures are above the PEL, repeat monitoring within three months of the most recent monitoring.

v. Where the most recent (non-initial) exposure monitoring indicates that employee exposures are below the action level, repeat such monitoring within six months of the most recent monitoring until two consecutive measurements, taken seven or more days apart, are below the action level, at which time NCDOT may discontinue monitoring for those employees whose exposures are represented by such monitoring.

vi. NCDOT shall reassess exposures whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the action level, or when there is any reason to believe that new or additional exposures at or above the action level have occurred.

vii. NCDOT shall ensure that all samples taken to satisfy the monitoring requirements are evaluated by an Accredited laboratory that analyzes air samples for respirable crystalline silica in accordance with the procedures in Appendix A of 29 CFR 1926.1153.

viii. Within five working days after completing an exposure assessment NCDOT shall individually notify each affected employee in writing of the results of that assessment or post the results in an appropriate location accessible to all affected employees.

ix. Whenever an exposure assessment indicates that employee exposure is above the PEL, NCDOT shall describe in the written notification the corrective action being taken to reduce employee exposure to or below the PEL.

x. Affected employees shall be allowed to observe any monitoring of employee exposure to respirable crystalline silica.

2. Methods of Compliance: NCDOT shall use engineering and work practice controls, preferably water for dust suppression, dust collection systems, and enclosed cabs on equipment, to reduce and maintain employee exposure to respirable crystalline silica to or below the PEL. Where engineering and work control practices are not sufficient to reduce employee exposure to or below the PEL, respiratory protection shall be used. For abrasive blasting, NCDOT shall not use respirable crystalline silica-containing media.

6.2.3 Respiratory Protection

Use Table 1 as a reference for tasks using engineering and work practice controls to determine if and when respirators must be worn. For tasks not listed in Table 1 or where NCDOT does not fully and properly implement the engineering controls, work practices, and respiratory protection described in Table 1, respirators shall be worn. After an exposure assessment is performed, respirator usage may not be required if the resulting TWA concentration of silica is below the PEL. Exposure at or above the PEL will require respirator usage. Respirator selection shall be determined based on the Assigned Protection Factor (APF) and the actual TWA from monitoring exposure levels for the task. If visible dust is present for tasks involving respirable crystalline silica-containing materials,

exposure sampling should be conducted to determine TWA levels. Refer to Appendix A for the OSHA sampling guidelines.

Refer to SPP# 1910.134 Respiratory Protection, and NCDOT's Respiratory Protection Program for additional details on the basic requirement for selection, use, cleaning, and maintenance of respirators.

6.2.4 Housekeeping

The employer shall not allow dry sweeping or dry brushing where such activity could contribute to employee exposure to respirable crystalline silica unless wet sweeping, HEPA-filtered vacuuming, or other methods that minimize the likelihood of exposure are not feasible.

Compressed air shall not be used to clean clothing or surfaces where exposure to respirable crystalline silica exceeds the PEL unless a ventilation system is used to effectively capture the dust cloud and no alternative method is available.

6.2.5 Written Exposure Control Plan

The NCDOT Written Silica Exposure Control Plan applies to all NCDOT employees who are potentially exposed to airborne concentrations of respirable crystalline silica during work activities. The plan will include at a minimum the following:

1. Work activities or tasks at NCDOT job sites that involve exposure to respirable crystalline silica, including:
    a. Operating roadway maintenance and construction activity heavy equipment such as drivable milling machines, excavators, motor graders, skid steer with pavement grinder, broom tractor, etc.
    b. Operating other equipment for roadway maintenance and construction activities such as concrete sawing, concrete grinding, concrete breaking, jackhammering, and abrasive blasting
2. Engineering controls and work practices to limit employee exposure to respirable crystalline silica for each task:
    a. Integrated water delivery system that continuously feeds water for equipment and/or tools where application is feasible. Existing equipment and/or tools should be retrofitted with integrated water delivery systems. Any leased equipment and/or tools for construction tasks where respirable crystalline silica dust may be generated should also be equipped with integrated water delivery systems if available.
    b. Application of water to worksite to minimize dust emissions.
    c. Shrouds and dust collection systems should be used for tools or equipment where integrated water delivery system not feasible.
    d. Drivable equipment should be equipped with enclosed cabs that have air conditioning and filtration system which limits respirable silica dust exposure below Action Level.
    e. Operating other equipment for roadway maintenance and construction activities such as concrete sawing, concrete grinding, concrete breaking, jackhammering, and abrasive blasting

3. A description of the housekeeping measures used to limit employee exposure to respirable crystalline silica.
4. A description of the procedures used to restrict access to work areas, when necessary, to minimize the number of employees exposed to respirable crystalline silica and their level of exposure, including exposures generated by other employers or sole proprietors.
5. **Refer SPP 1926.1153A for the NCDOT Written Silica Exposure Control Plan serves as a stand-alone document all Divisions shall utilize.**

6.2.6 Medical Surveillance Program

The purpose of medical surveillance is to prevent silica-related diseases. NCDOT shall make medical surveillance available at no cost to the employee, and at a reasonable time and place, for each employee required to wear a respirator due to occupational silica exposure, for 30 or more days per year. Employees performing activities in which engineering or administrative controls do not lower the TWA concentration of silica to below the PEL of 50 µg/m^3 are required to wear a respirator. ANY duration of respirator usage during a work day counts toward the 30-day number. NCDOT shall ensure that all medical examinations and procedures required by this section are performed by a PLHCP.

1. **Initial Examination:** an initial (baseline) medical examination within 30 days after initial assignment, unless the employee has received a medical examination that meets the requirements of this section within the last three years. The examination shall consist of:
    a) A medical and work history, with emphasis on: past, present, and anticipated exposure to respirable crystalline silica, dust, and other agents affecting the respiratory system, any history of respiratory system dysfunction including signs and symptoms of respiratory disease (e.g., shortness of breath, cough, wheezing), history of tuberculosis, and smoking status and history.
    b) A physical examination with special emphasis on the respiratory system.
    c) A chest X-ray.
    d) A pulmonary function test.
    e) Testing for latent tuberculosis infection.
    f) Any other tests deemed appropriate by the PLHCP.

2. **Periodic Examinations:** NCDOT shall make available medical examinations that include the procedures used for the initial examination at least every three years, or more frequently if recommended by the PLHCP.
3. **Additional Examinations:** If the PLHCP's written medical opinion indicates that an employee should be examined by a specialist, the employer shall make available a medical examination by a specialist within 30 days after receiving the PLHCP's written opinion.
4. Appendix B further details the requirements and conditions associated with medical examinations.

6.2.7 Communication of Respirable Crystalline Silica Hazards to Employees

1. **Hazard Communication.** NCDOT shall include respirable crystalline silica in the program established to comply with the hazard communication standard (HCS) 29 CFR 1910.1200. The employer shall ensure that each employee has access to labels and safety data sheets (SDS) on containers of material containing crystalline silica and is trained in accordance with the provisions of the HCS. The following hazards shall be addressed: Cancer, lung effects, immune system effects, and kidney effects.
2. **Employee information and training**. NCDOT shall ensure that each employee potentially exposed to silica will go through a silica awareness training. This will be administered by Division Safety Staff or Safety and Risk Management. The training will ensure each employee can demonstrate knowledge and understanding of at least the following:
    a) The health hazards associated with exposure to respirable crystalline silica.
    b) Specific tasks in the workplace that could result in exposure to respirable crystalline Silica.
    c) Specific measures the employer has implemented to protect employees from exposure to respirable crystalline silica, including engineering controls, work practices, and respirators to be used.

6.2.8 Recordkeeping

The following records shall be maintained:

1. Air monitoring records of all exposure measurements taken to assess employee exposure to respirable crystalline silica to include the following information:
    a) Name and job classification of all employees represented by the monitoring, indicating which employees were monitored.
    b) The date of measurement for each sample taken.
    c) The task monitored.
    d) Sampling and analytical methods used.
    e) Number, duration, and results of samples taken.
    f) Identity of the laboratory that performed the analysis.
    g) Type of respiratory protection worn by the employee monitored.
    h) Exposure monitoring records shall be retained for 30 years.
2. **Medical Surveillance.** NCDOT shall maintain records for each employee covered by medical surveillance to include
    a) Name and social security number or employee/Beacon number.
    b) A copy of the PLHCPs' and specialists' written medical opinions
    c) A copy of the information provided to the PLHCPs and specialists.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for equipment and supplies to protect employees from silica overexposure.

Managers/Unit Heads will obtain and coordinate the required training for affected employees. They will also designate competent persons for those work activities affected by this safety policy and procedure. Managers/Unit Heads will ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that no respirable crystalline silica-related task/operation is performed without the appropriate engineering controls safe work practices in place as prescribed in this safety policy and procedure (reference Table 1). They will also act as the competent and qualified persons in the performance of their duties.

6.3.3 Competent Persons

Competent persons will be responsible for identifying existing and predictable respirable crystalline silica hazards in silica-related task/operations. They will also be responsible for taking prompt corrective measures to eliminate silica hazards. During each activity, a competent person will be designated prior to activity commencement. All supervisors on job sites where silica exposure is a concern will be competent person trained. Competent person training will be arranged by the respective Division Safety Staff or Safety and Risk Management, and will be in accordance with the OSHA standard.

Appendix A: Methods of sample analysis

This appendix specifies the procedures for analyzing air samples for respirable crystalline silica, as well as the quality control procedures that employers must ensure that laboratories use when performing an analysis required under 29 CFR 1926.1153 (d)(2)(v). Employers must ensure that such a laboratory:

1. Evaluates all samples using the procedures specified in one of the following analytical methods: OSHA ID-142; NMAM 7500; NMAM 7602; NMAM 7603; MSHA P-2; or MSHA P7;
2. Is accredited to ANS/ISO/IEC Standard 17025:2005 with respect to crystalline silica analyses by a body that is compliant with ISO/IEC Standard 17011:2004 for implementation of quality assessment programs;
3. Uses the most current National Institute of Standards and Technology (NIST) or NIST traceable standards for instrument calibration or instrument calibration verification;
4. Implements an internal quality control (QC) program that evaluates analytical uncertainty and provides employers with estimates of sampling and analytical error;
5. Characterizes the sample material by identifying polymorphs of respirable crystalline silica present, identifies the presence of any interfering compounds that might affect the analysis, and makes any corrections necessary in order to obtain accurate sample analysis; and
6. Analyzes quantitatively for crystalline silica only after confirming that the sample matrix is free of uncorrectable analytical interferences, corrects for analytical interferences, and uses a method that meets the following performance specifications:
    a. Each day that samples are analyzed, performs instrument calibration checks with standards that bracket the sample concentrations;
    b. Uses five or more calibration standard levels to prepare calibration curves and ensures that standards are distributed through the calibration range in a manner that accurately reflects the underlying calibration curve; and
    c. Optimizes methods and instruments to obtain a quantitative limit of detection that represents a value no higher than 25 percent of the PEL based on sample air volume.

Appendix B: Medical Surveillance Guidelines

This Appendix is to provide medical information and recommendations to aid physicians and other licensed health care professionals (PLHCPs) regarding compliance with the medical surveillance provisions of the respirable crystalline silica standard (29 CFR 1926.1153). Appendix B is for informational and guidance purposes only and none of the statements in Appendix B should be construed as imposing a mandatory requirement on employers that is not otherwise imposed by the standard.

Medical screening and surveillance allow for early identification of exposure-related health effects in individual employee and groups of employees, so that actions can be taken to both avoid further exposure and prevent or address adverse health outcomes. Silica-related diseases can be fatal, encompass a variety of target organs, and may have public health consequences when considering the increased risk of a latent tuberculosis (TB) infection becoming active. Thus, medical surveillance of silica-exposed employees requires that PLHCPs have a thorough knowledge of silica-related health effects.

This Appendix is divided into seven sections. Section 1 reviews silica-related diseases, medical responses, and public health responses. Section 2 outlines the components of the medical surveillance program for employees exposed to silica. Section 3 describes the roles and responsibilities of the PLHCP implementing the program and of other medical specialists and public health professionals. Section 4 provides a discussion of considerations, including confidentiality. Section 5 provides a list of additional resources and Section 6 lists references. Section 7 provides sample forms for the written medical report for the employee, the written medical opinion for the employer and the written authorization.

1. Recognition of Silica-Related Diseases.

1.1. Overview. The term "silica" refers specifically to the compound silicon dioxide (SiO_2). Silica is a major component of sand, rock, and mineral ores. Exposure to fine (respirable size) particles of crystalline forms of silica is associated with adverse health effects, such as silicosis, lung cancer, chronic obstructive pulmonary disease (COPD), and activation of latent TB infections. Exposure to respirable crystalline silica can occur in industry settings such as foundries, abrasive blasting operations, paint manufacturing, glass and concrete product manufacturing, brick making, china and pottery manufacturing, manufacturing of plumbing fixtures, and many construction activities including highway repair, masonry, concrete work, rock drilling, and tuck-pointing. New uses of silica continue to emerge. These include countertop manufacturing, finishing, and installation (Kramer et al. 2012; OSHA 2015) and hydraulic fracturing in the oil and gas industry (OSHA 2012).

Silicosis is an irreversible, often disabling, and sometimes fatal fibrotic lung disease. Progression of silicosis can occur despite removal from further exposure. Diagnosis of silicosis requires a history of exposure to silica and radiologic findings characteristic of silica exposure. Three different presentations of silicosis (chronic, accelerated, and acute) have been defined. Accelerated and acute silicosis are much less common than chronic silicosis. However, it is critical to recognize all cases of accelerated and acute silicosis because these are life-threatening illnesses and because they are caused by substantial overexposures to respirable crystalline silica. Although any case of silicosis indicates a breakdown in prevention, a case of acute or accelerated silicosis implies current high exposure and a very marked breakdown in prevention.

In addition to silicosis, employees exposed to respirable crystalline silica, especially those with accelerated or acute silicosis, are at increased risks of contracting active TB

and other 3 infections (ATS 1997; Rees and Murray 2007). Exposure to respirable crystalline silica also increases an employee's risk of developing lung cancer, and the higher the cumulative exposure, the higher the risk (Steenland et al. 2001; Steenland and Ward 2014). Symptoms for these diseases and other respirable crystalline silica-related diseases are discussed below.

1.2. Chronic Silicosis. Chronic silicosis is the most common presentation of silicosis and usually occurs after at least 10 years of exposure to respirable crystalline silica. The clinical presentation of chronic silicosis is:

1.2.1. Symptoms - shortness of breath and cough, although employees may not notice any symptoms early in the disease. Constitutional symptoms, such as fever, loss of appetite and fatigue, may indicate other diseases associated with silica exposure, such as TB infection or lung cancer. Employees with these symptoms should immediately receive further evaluation and treatment.

1.2.2. Physical Examination - may be normal or disclose dry rales or rhonchi on lung auscultation.

1.2.3. Spirometry - may be normal or may show only a mild restrictive or obstructive pattern.

1.2.4. Chest X-ray - classic findings are small, rounded opacities in the upper lung fields bilaterally. However, small irregular opacities and opacities in other lung areas can also occur. Rarely, "eggshell calcifications" in the hilar and mediastinal lymph nodes are seen.

1.2.5. Clinical Course - chronic silicosis in most cases is a slowly progressive disease. Under the respirable crystalline silica standard, the PLHCP is to recommend that employees with a 1/0 category X-ray be referred to an American Board-Certified Specialist in Pulmonary Disease 4 or Occupational Medicine. The PLHCP and/or Specialist should counsel employees regarding work practices and personal habits that could affect employees' respiratory health.

1.3. Accelerated Silicosis. Accelerated silicosis generally occurs within 5-10 years of exposure and results from high levels of exposure to respirable crystalline silica. The clinical presentation of accelerated silicosis is:

1.3.1. Symptoms - shortness of breath, cough, and sometimes sputum production. Employees with exposure to respirable crystalline silica, and especially those with accelerated silicosis, are at high risk for activation of TB infections, atypical mycobacterial infections, and fungal superinfections. Constitutional symptoms, such as fever, weight loss, hemoptysis (coughing up blood), and fatigue may herald one of these infections or the onset of lung cancer.

1.3.2. Physical Examination - rales, rhonchi, or other abnormal lung findings in relation to illnesses present. Clubbing of the digits, signs of heart failure, and cor pulmonale may be present in severe lung disease.

1.3.3. Spirometry - restrictive or mixed restrictive/obstructive pattern.

1.3.4. Chest X-ray - small rounded and/or irregular opacities bilaterally. Large opacities and lung abscesses may indicate infections, lung cancer, or progression to complicated silicosis, also termed progressive massive fibrosis.

1.3.5. Clinical Course - accelerated silicosis has a rapid, severe course. Under the respirable crystalline silica standard, the PLHCP can recommend referral to a Board-Certified Specialist in either Pulmonary Disease or Occupational

Medicine, as deemed appropriate, and referral to a Specialist is recommended whenever the diagnosis of accelerated silicosis is being considered.

1.4. Acute Silicosis. Acute silicosis is a rare disease caused by inhalation of extremely high levels of respirable crystalline silica particles. The pathology is similar to alveolar proteinosis with lipoproteinaceous material accumulating in the alveoli. Acute silicosis develops rapidly, often, within a few months to less than 2 years of exposure, and is almost always fatal. The clinical presentation of acute silicosis is as follows:

1.4.1. Symptoms - sudden, progressive, and severe shortness of breath. Constitutional symptoms are frequently present and include fever, weight loss, fatigue, productive cough, hemoptysis (coughing up blood), and pleuritic chest pain.

1.4.2. Physical Examination - dyspnea at rest, cyanosis, decreased breath sounds, inspiratory rales, clubbing of the digits, and fever.

1.4.3. Spirometry - restrictive or mixed restrictive/obstructive pattern.

1.4.4. Chest X-ray - diffuse haziness of the lungs bilaterally early in the disease. As the disease progresses, the "ground glass" appearance of interstitial fibrosis will appear.

1.4.5. Clinical Course - employees with acute silicosis are at especially high risk of TB activation, nontuberculous mycobacterial infections, and fungal superinfections. Acute silicosis is immediately life-threatening. The employee should be urgently referred to a Board-Certified Specialist in Pulmonary Disease or Occupational Medicine for evaluation and treatment. Although any case of silicosis indicates a breakdown in prevention, a case of acute or accelerated silicosis implies a profoundly high level of silica exposure and may mean that other employees are currently exposed to dangerous levels of silica.

1.5. COPD. COPD, including chronic bronchitis and emphysema, has been documented in silica-exposed employees, including those who do not develop silicosis. Periodic spirometry tests are performed to evaluate each employee for progressive changes consistent with the 6 development of COPD. In addition to evaluating spirometry results of individual employees over time, PLHCPs may want to be aware of general trends in spirometry results for groups of employees from the same workplace to identify possible problems that might exist at that workplace. (See Section 2 of this Appendix on Medical Surveillance for further discussion.) Heart disease may develop secondary to lung diseases such as COPD. A recent study by Liu et al. 2014 noted a significant exposure-response trend between cumulative silica exposure and heart disease deaths, primarily due to pulmonary heart disease, such as cor pulmonale.

1.6. Renal and Immune System. Silica exposure has been associated with several types of kidney disease, including glomerulonephritis, nephrotic syndrome, and end stage renal disease requiring dialysis. Silica exposure has also been associated with other autoimmune conditions, including progressive systemic sclerosis, systemic lupus erythematosus, and rheumatoid arthritis. Studies note an association between employees with silicosis and serologic markers for autoimmune diseases, including antinuclear antibodies, rheumatoid factor, and immune complexes (Jalloul and Banks 2007; Shtraichman et al. 2015).

1.7. TB and Other Infections. Silica-exposed employees with latent TB are 3 to 30 times more likely to develop active pulmonary TB infection (ATS 1997; Rees and Murray 2007). Although respirable crystalline silica exposure does not cause TB infection,

individuals with latent TB infection are at increased risk for activation of disease if they have higher levels of respirable crystalline silica exposure, greater profusion of radiographic abnormalities, or a diagnosis of silicosis. Demographic characteristics, such as immigration from some countries, are associated with increased rates of latent TB infection. PLHCPs can review the latest Centers for Disease Control and Prevention (CDC) information on TB incidence rates and high risk populations online (See Section 5 of this Appendix). Additionally, silica-exposed employees are 7 at increased risk for contracting nontuberculous mycobacterial infections, including Mycobacterium avium-intracellulare and Mycobacterium kansaii.

1.8. Lung Cancer. The National Toxicology Program has listed respirable crystalline silica as a known human carcinogen since 2000 (NTP 2014). The International Agency for Research on Cancer (2012) has also classified silica as Group 1 (carcinogenic to humans). Several studies have indicated that the risk of lung cancer from exposure to respirable crystalline silica and smoking is greater than additive (Brown 2009; Liu et al. 2013). Employees should be counseled on smoking cessation.

2. Medical Surveillance.

PLHCPs who manage silica medical surveillance programs should have a thorough understanding of the many silica-related diseases and health effects outlined in Section 1 of this Appendix. At each clinical encounter, the PLHCP should consider silica-related health outcomes, with particular vigilance for acute and accelerated silicosis. In this Section, the required components of medical surveillance under the respirable crystalline silica standard are reviewed, along with additional guidance and recommendations for PLHCPs performing medical surveillance examinations for silica-exposed employees.

2.1. History.

2.1.1. The respirable crystalline silica standard requires the following: A medical and work history, with emphasis on: past, present, and anticipated exposure to respirable crystalline silica, dust, and other agents affecting the respiratory system; any history of respiratory system dysfunction, including signs and symptoms of respiratory disease (e.g., shortness of breath, cough, wheezing); history of TB; and smoking status and history.

2.1.2. Further, the employer must provide the PLHCP with the following information:

2.1.2.1. A description of the employee's former, current, and anticipated duties as they relate to the employee's occupational exposure to respirable crystalline silica;

2.1.2.2. The employee's former, current, and anticipated levels of occupational exposure to respirable crystalline silica;

2.1.2.3. A description of any personal protective equipment used or to be used by the employee, including when and for how long the employee has used or will use that equipment; and

2.1.2.4. Information from records of employment-related medical examinations previously provided to the employee and currently within the control of the employer.

2.1.3. Additional guidance and recommendations: A history is particularly important both in the initial evaluation and in periodic examinations. Information on past and current medical conditions (particularly a history of kidney disease, cardiac disease, connective tissue disease, and other immune diseases), medications, hospitalizations and surgeries may uncover health risks, such as immune suppression, that could put an employee at increased health risk from exposure to silica. This information is important when counseling the employee on risks and safe work practices related to silica exposure.

2.2. Physical Examination.

2.2.1. The respirable crystalline silica standard requires the following: A physical examination, with special emphasis on the respiratory system. The physical examination must be performed at the initial examination and every three years thereafter.

2.2.2. Additional guidance and recommendations: Elements of the physical examination that can assist the PHLCP include: an examination of the cardiac system, an extremity 9 examination (for clubbing, cyanosis, edema, or joint abnormalities), and an examination of other pertinent organ systems identified during the history.

2.3. TB Testing.

2.3.1. The respirable crystalline silica standard requires the following: Baseline testing for TB on initial examination.

2.3.2. Additional guidance and recommendations:

2.3.2.1. Current CDC guidelines (See Section 5 of this Appendix) should be followed for the application and interpretation of Tuberculin skin tests (TST). The interpretation and documentation of TST reactions should be performed within 48 to 72 hours of administration by trained PLHCPs.

2.3.2.2. PLHCPs may use alternative TB tests, such as interferon-γ release assays (IGRAs), if sensitivity and specificity are comparable to TST (Mazurek et al. 2010; Slater et al. 2013). PLHCPs can consult the current CDC guidelines for acceptable tests for latent TB infection.

2.3.2.3. The silica standard allows the PLHCP to order additional tests or test at a greater frequency than required by the standard, if deemed appropriate. Therefore, PLHCPs might perform periodic (e.g., annual) TB testing as appropriate, based on employees' risk factors. For example, according to the American Thoracic Society (ATS), the diagnosis of silicosis or exposure to silica for 25 years or more are indications for annual TB testing (ATS 1997). PLHCPs should consult the current CDC guidance on risk factors for TB (See Section 5 of this Appendix).

2.3.2.4. Employees with positive TB tests and those with indeterminate test results should be referred to the appropriate agency or specialist, depending on the test results and clinical 10 picture. Agencies, such as local public health departments, or specialists, such as a pulmonary or infectious disease specialist, may be the appropriate referral. Active TB is a nationally notifiable disease. PLHCPs should be aware of the reporting requirements for their region. All States have TB Control Offices that can be contacted for further information. (See Section 5 of this Appendix for links to CDC's TB resources and State TB Control Offices.)

2.3.2.5. The following public health principles are key to TB control in the U.S. (ATSCDC-IDSA 2005): (1) Prompt detection and reporting of persons who

have contracted active TB; (2) Prevention of TB spread to close contacts of active TB cases; (3) Prevention of active TB in people with latent TB through targeted testing and treatment; and (4) Identification of settings at high risk for TB transmission so that appropriate infection-control measures can be implemented.

2.4. Pulmonary Function Testing.

2.4.1. The respirable crystalline silica standard requires the following: Pulmonary function testing must be performed on the initial examination and every three years thereafter. The required pulmonary function test is spirometry and must include forced vital capacity (FVC), forced expiratory volume in one second (FEV1), and FEV1/FVC ratio. Testing must be administered by a spirometry technician with a current certificate from a National Institute for Occupational Health and Safety (NIOSH)-approved spirometry course.

2.4.2. Additional guidance and recommendations: Spirometry provides information about individual respiratory status and can be used to track an employee's respiratory status over time or as a surveillance tool to follow individual and group respiratory function. For quality 11 results, the ATS and the American College of Occupational and Environmental Medicine (ACOEM) recommend use of the third National Health and Nutrition Examination Survey (NHANES III) values, and ATS publishes recommendations for spirometry equipment (Miller et al. 2005; Townsend 2011; Redlich et al. 2014). OSHA's publication, Spirometry Testing in Occupational Health Programs: Best Practices for Healthcare Professionals, provides helpful guidance (See Section 5 of this Appendix). Abnormal spirometry results may warrant further clinical evaluation and possible recommendations for limitations on the employee's exposure to respirable crystalline silica.

2.5. Chest X-ray.

2.5.1. The respirable crystalline silica standard requires the following: A single posteroanterior (PA) radiographic projection or radiograph of the chest at full inspiration recorded on either film (no less than 14 x 17 inches and no more than 16 x 17 inches) or digital radiography systems. A chest X-ray must be performed on the initial examination and every three years thereafter. The chest X-ray must be interpreted and classified according to the International Labour Office (ILO) International Classification of Radiographs of Pneumoconioses by a NIOSH-certified B Reader. Chest radiography is necessary to diagnose silicosis, monitor the progression of silicosis, and identify associated conditions such as TB. If the B reading indicates small opacities in a profusion of 1/0 or higher, the employee is to receive a recommendation for referral to a Board-Certified Specialist in Pulmonary Disease or Occupational Medicine.

2.5.2. Additional guidance and recommendations: Medical imaging has largely transitioned from conventional film-based radiography to digital radiography systems. The ILO Guidelines for the Classification of Pneumoconioses has historically provided film-based chest 12 radiography as a referent standard for comparison to individual exams. However, in 2011, the ILO revised the guidelines to include a digital set of referent standards that were derived from the prior film-based standards. To assist in assuring that digitally-acquired radiographs are at least as safe and effective as film radiographs, NIOSH has prepared guidelines, based upon accepted contemporary professional recommendations (See Section 5 of this Appendix). Current research from Laney

et al. 2011 and Halldin et al. 2014 validate the use of the ILO digital referent images. Both studies conclude that the results of pneumoconiosis classification using digital references are comparable to film-based ILO classifications. Current ILO guidance on radiography for pneumoconioses and B-reading should be reviewed by the PLHCP periodically, as needed, on the ILO or NIOSH websites (See Section 5 of this Appendix).

2.6. Other Testing. Under the respirable crystalline silica standards, the PLHCP has the option of ordering additional testing he or she deems appropriate. Additional tests can be ordered on a case-by-case basis depending on individual signs or symptoms and clinical judgment. For example, if an employee reports a history of abnormal kidney function tests, the PLHCP may want to order a baseline renal function tests (e.g., serum creatinine and urinalysis). As indicated above, the PLHCP may order annual TB testing for silica-exposed employees who are at high risk of developing active TB infections. Additional tests that PLHCPs may order based on findings of medical examinations include, but is not limited to, chest computerized tomography (CT) scan for lung cancer or COPD, testing for immunologic diseases, and cardiac testing for pulmonary-related heart disease, such as cor pulmonale.

3. Roles and Responsibilities.

3.1. PLHCP. The PLHCP designation refers to "an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently 13 provide or be delegated the responsibility to provide some or all of the particular health care services required" by the respirable crystalline silica standard. The legally permitted scope of practice for the PLHCP is determined by each State. PLHCPs who perform clinical services for a silica medical surveillance program should have a thorough knowledge of respirable crystalline silica-related diseases and symptoms. Suspected cases of silicosis, advanced COPD, or other respiratory conditions causing impairment should be promptly referred to a Board-Certified Specialist in Pulmonary Disease or Occupational Medicine.

Once the medical surveillance examination is completed, the employer must ensure that the PLHCP explains to the employee the results of the medical examination and provides the employee with a written medical report within 30 days of the examination. The written medical report must contain a statement indicating the results of the medical examination, including any medical condition(s) that would place the employee at increased risk of material impairment to health from exposure to respirable crystalline silica and any medical conditions that require further evaluation or treatment. In addition, the PLHCP's written medical report must include any recommended limitations on the employee's use of respirators, any recommended limitations on the employee's exposure to respirable crystalline silica, and a statement that the employee should be examined by a Board-Certified Specialist in Pulmonary Disease or Occupational medicine if the chest X-ray is classified as 1/0 or higher by the B Reader, or if referral to a Specialist is otherwise deemed appropriate by the PLHCP.

The PLHCP should discuss all findings and test results and any recommendations regarding the employee's health, worksite safety and health practices, and medical referrals for further evaluation, if indicated. In addition, it is suggested that the PLHCP offer to provide the employee with a complete copy of their examination and test results, as some employees may want this information for their own records or to provide to their personal physician or a future PLHCP. Employees are entitled to access their medical records.

Under the respirable crystalline silica standard, the employer must ensure that the PLHCP provides the employer with a written medical opinion within 30 days of the employee examination, and that the employee also gets a copy of the written medical opinion for the employer within 30 days. The PLHCP may choose to directly provide the employee a copy of the written medical opinion. This can be particularly helpful to employees, such as construction employees, who may change employers frequently. The written medical opinion can be used by the employee as proof of up-to-date medical surveillance. The following lists the elements of the written medical report for the employee and written medical opinion for the employer. (Sample forms for the written medical report for the employee, the written medical opinion for the employer, and the written authorization are provided in Section 7 of this Appendix.)

3.1.1. The written medical report for the employee must include the following information:

3.1.1.1. A statement indicating the results of the medical examination, including any medical condition(s) that would place the employee at increased risk of material impairment to health from exposure to respirable crystalline silica and any medical conditions that require further evaluation or treatment;

3.1.1.2. Any recommended limitations upon the employee's use of a respirator;

3.1.1.3. Any recommended limitations on the employee's exposure to respirable crystalline silica; and

3.1.1.4. A statement that the employee should be examined by a Board-Certified Specialist in Pulmonary Disease or Occupational Medicine, where the standard requires or where 15 the PLHCP has determined such a referral is necessary. The standard requires referral to a Board-Certified Specialist in Pulmonary Disease or Occupational Medicine for a chest X-ray B reading indicating small opacities in a profusion of 1/0 or higher, or if the PHLCP determines that referral to a Specialist is necessary for other silica-related findings.

3.1.2. The PLHCP's written medical opinion for the employer must include only the following information:

3.1.2.1. The date of the examination;

3.1.2.2. A statement that the examination has met the requirements of this section; and

3.1.2.3. Any recommended limitations on the employee's use of respirators.

3.1.2.4. If the employee provides the PLHCP with written authorization, the written opinion for the employer shall also contain either or both of the following: (1) Any recommended limitations on the employee's exposure to respirable crystalline silica; and (2) A statement that the employee should be examined by a Board Certified Specialist in Pulmonary Disease or Occupational Medicine if the chest X-ray provided in accordance with this

section is classified as 1/0 or higher by the B Reader, or if referral to a Specialist is otherwise deemed appropriate.

3.1.2.5. In addition to the above referral for abnormal chest X-ray, the PLHCP may refer an employee to a Board-Certified Specialist in Pulmonary Disease or Occupational Medicine for other findings of concern during the medical surveillance examination if these findings are potentially related to silica exposure.

3.1.2.6. Although the respirable crystalline silica standard requires the employer to ensure that the PLHCP explains the results of the medical examination to the employee, the standard 16 does not mandate how this should be done. The written medical opinion for the employer could contain a statement that the PLHCP has explained the results of the medical examination to the employee.

3.2. Medical Specialists. The silica standard requires that all employees with chest X-ray B readings of 1/0 or higher be referred to a Board-Certified Specialist in Pulmonary Disease or Occupational Medicine. If the employee has given written authorization for the employer to be informed, then the employer shall make available a medical examination by a Specialist within 30 days after receiving the PLHCP's written medical opinion.

3.2.1. The employer must provide the following information to the Board-Certified Specialist in Pulmonary Disease or Occupational Medicine:

3.2.1.1. A description of the employee's former, current, and anticipated duties as they relate to the employee's occupational exposure to respirable crystalline silica;

3.2.1.2. The employee's former, current, and anticipated levels of occupational exposure to respirable crystalline silica;

3.2.1.3. A description of any personal protective equipment used or to be used by the employee, including when and for how long the employee has used or will use that equipment; and

3.2.1.4. Information from records of employment-related medical examinations previously provided to the employee and currently within the control of the employer.

3.2.2. The PLHCP should make certain that, with written authorization from the employee, the Board-Certified Specialist in Pulmonary Disease or Occupational Medicine has any other pertinent medical and occupational information necessary for the specialist's evaluation of the employee's condition.

3.2.3. Once the Board-Certified Specialist in Pulmonary Disease or Occupational Medicine has evaluated the employee, the employer must ensure that the Specialist explains to the employee the results of the medical examination and provides the employee with a written medical report within 30 days of the examination. The employer must also ensure that the Specialist provides the employer with a written medical opinion within 30 days of the employee examination. (Sample forms for the written medical report for the employee, the written medical opinion for the employer and the written authorization are provided in Section 7 of this Appendix) .

3.2.4. The Specialist's written medical report for the employee must include the following information:

3.2.4.1. A statement indicating the results of the medical examination, including any medical condition(s) that would place the employee at increased risk of material impairment to health from exposure to respirable crystalline silica and any medical conditions that require further evaluation or treatment;

3.2.4.2. Any recommended limitations upon the employee's use of a respirator; and

3.2.4.3. Any recommended limitations on the employee's exposure to respirable crystalline silica.

3.2.5. The Specialist's written medical opinion for the employer must include the following information:

3.2.5.1. The date of the examination; and

3.2.5.2. Any recommended limitations on the employee's use of respirators.

3.2.5.3. If the employee provides the Board-Certified Specialist in Pulmonary Disease or Occupational Medicine with written authorization, the written medical opinion for the employer 18 shall also contain any recommended limitations on the employee's exposure to respirable crystalline silica.

3.2.5.4. Although the respirable crystalline silica standard requires the employer to ensure that the Board-Certified Specialist in Pulmonary Disease or Occupational Medicine explains the results of the medical examination to the employee, the standard does not mandate how this should be done. The written medical opinion for the employer could contain a statement that the Specialist has explained the results of the medical examination to the employee.

3.2.6. After evaluating the employee, the Board-Certified Specialist in Pulmonary Disease or Occupational Medicine should provide feedback to the PLHCP as appropriate, depending on the reason for the referral. OSHA believes that because the PLHCP has the primary relationship with the employer and employee, the Specialist may want to communicate his or her findings to the PLHCP and have the PLHCP simply update the original medical report for the employee and medical opinion for the employer. This is permitted under the standard, so long as all requirements and time deadlines are met.

3.3. Public Health Professionals. PLHCPs might refer employees or consult with public health professionals as a result of silica medical surveillance. For instance, if individual cases of active TB are identified, public health professionals from state or local health departments may assist in diagnosis and treatment of individual cases and may evaluate other potentially affected persons, including coworkers. Because silica-exposed employees are at increased risk of progression from latent to active TB, treatment of latent infection is recommended. The diagnosis of active TB, acute or accelerated silicosis, or other silica-related diseases and infections should serve as sentinel events suggesting high levels of exposure to silica and may require consultation with the appropriate public health agencies to investigate potentially 19 similarly exposed coworkers to assess for disease clusters. These agencies include local or state health departments or OSHA. In addition, NIOSH can provide assistance upon request through their Health Hazard Evaluation program.

4. Confidentiality and Other Considerations.

The information that is provided from the PLHCP to the employee and employer under the medical surveillance section of OSHA's respirable crystalline silica standard differs from that of medical surveillance requirements in previous OSHA standards. The standard requires two separate written communications, a written medical report for the employee and a written medical opinion for the employer. The confidentiality requirements for the written medical opinion are more stringent than in past standards. For example, the information the PLHCP can (and must) include in his or her written medical opinion for the employer is limited to: the date of the examination, a statement that the examination has met the requirements of this section, and any recommended limitations on the employee's use of respirators.

If the employee provides written authorization for the disclosure of any limitations on the employee's exposure to respirable crystalline silica, then the PLHCP can (and must) include that information in the written medical opinion for the employer as well. Likewise, with the employee's written authorization, the PLHCP can (and must) disclose the PLHCP's referral recommendation (if any) as part of the written medical opinion for the employer. However, the opinion to the employer must not include information regarding recommended limitations on the employee's exposure to respirable crystalline silica or any referral recommendations without the employee's written authorization. The standard also places limitations on the information that the Board Certified Specialist in Pulmonary Disease or Occupational Medicine can provide to the employer without the 20 employee's written authorization. The Specialist's written medical opinion for the employer, like the PLHCP's opinion, is limited to (and must contain): the date of the examination and any recommended limitations on the employee's use of respirators. If the employee provides written authorization, the written medical opinion can (and must) also contain any limitations on the employee's exposure to respirable crystalline silica. The PLHCP should discuss the implication of signing or not signing the authorization with the employee (in a manner and language that he or she understands) so that the employee can make an informed decision regarding the written authorization and its consequences. The discussion should include the risk of ongoing silica exposure, personal risk factors, risk of disease progression, and possible health and economic consequences. For instance, written authorization is required for a PLHCP to advise an employer that an employee should be referred to a Board Certified Specialist in Pulmonary Disease or Occupational Medicine for evaluation of an abnormal chest X-ray (B-reading 1/0 or greater). If an employee does not sign an authorization, then the employer will not know and cannot facilitate the referral to a Specialist and is not required to pay for the Specialist's examination. In the rare case where an employee is diagnosed with acute or accelerated silicosis, co-workers are likely to be at significant risk of developing those diseases as a result of inadequate controls in the workplace. In this case, the PLHCP and/or Specialist should explain this concern to the affected employee and make a determined effort to obtain written authorization from the employee so that the PLHCP and/or Specialist can contact the employer. Finally, without written authorization from the employee, the PLHCP and/or Board Certified Specialist in Pulmonary Disease or Occupational Medicine cannot provide feedback to an employer regarding control of workplace silica exposure, at least in relation to an individual 21 employee. However, the regulation does not prohibit a PLHCP and/or Specialist from providing an employer with general recommendations regarding exposure controls and prevention programs in relation to silica exposure and silica-related illnesses, based on the information that the PLHCP receives from the employer such as employees' duties and exposure levels. Recommendations may include increased frequency of medical surveillance examinations, additional medical surveillance components, engineering and work practice controls, exposure monitoring and personal protective equipment. For instance, more frequent medical surveillance examinations may be a recommendation to employers for employees who do abrasive blasting with silica because of the high exposures associated with that operation.

Author:	John Cala/Paul Roberts	Revision #:	3
Approved By:	Bobby Lewis	Date Issued:	March 2020

Select this Link to view latest Revision changes

SAFETY POLICY & PROCEDURE

Silica Exposure Control Plan SPP# 1926.1153A

NCDOT Written Silica Exposure Control Plan

Created: March 2018
Last Reviewed: March 2020
Reviewed By: John Cala, CIH
Revision: 3

Select this Link to view
latest Revision changes

NCDOT Written Silica Exposure Control Plan

Introduction

This Written Exposure Control Plan is to be used department-wide by NCDOT, along with SPP 1926.1153, to ensure compliance with OSHA's 29 CFR 1926.1153 Respirable Crystalline Silica Standard for Construction, 29 CFR 1910.1053 Respirable Crystalline Silica Standard for General Industry, and Maritime regulations for respirable crystalline silica. The establishment and implementation of this plan specifically satisfies the w*ritten exposure control plan* requirements described in 29 CFR 1926.1153(g) and 29 CFR 1910.1053(f)(2). This plan will be reviewed and redistributed at least annually.

This plan describes all foreseeable tasks that could reasonably be expected to expose employees to hazardous levels of respirable crystalline silica. For each task, a general description of the following is provided:

- Tasks that involve potential exposure
- Engineering and work practice controls
- Respiratory protection / other PPE
- Housekeeping
- Procedures for restricting work access

This Written Exposure Control Plan is to be made readily available for examination and copying, upon request, to each employee covered by Safety Policy and Procedure (SPP) 1926.1153, their designated representatives, the Assistant Secretary, and the Director. When performing the listed activities, strict adherence to this Written Exposure Control Plan is required to ensure the protection of employees. If the controls for a listed task are unable to be implemented, or if a potentially hazardous silica-related activity is not listed in this plan, please contact the divisional safety engineer or one of the following Safety and Risk Management personnel:

John Cala, CIH
(919) 814.2182
jmcala@ncdot.gov

Paul Roberts, CSP, AOES
(919) 814.2184
proberts@ncdot.gov

Jarvis Gray, Deputy Director, SRM
(919) 814.2185
jkgray1@ncdot.gov

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Acronyms/Definitions

- **APF**: Assigned Protection Factor; the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program.

- **APF = 10**: Any air purifying particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter- mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100.

- **APF = 25**: Any loose-fitting powered air-purifying respirator with a high-efficiency particulate filter.

- **HEPA**: (High Efficiency Particulate Air) a HEPA filter is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH particulate filters are the N100, R100, and P100 filters.

- **PAPR: (**Powered Air Purifying Respirator) a loose-fitting, positive pressure, battery-powered respirator which does not require a fit test.

- **SPP 1926.1153**: NCDOT's internal Safety Policy and Procedure on Silica in Construction, based on OSHA standard 29 CFR 1926.1153.

- **SPP 1910.134**: NCDOT's internal Safety Policy and Procedure on Respiratory Protection, based on OSHA standard 29 CFR 1910.134.

- **Table I**: OSHA-provided guidance for specific task engineering controls necessary for compliance with the silica standard. *Table I is provided as an attachment to this plan.*

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Abrasive blasting of concrete bridge deck joints during bridge maintenance operations. ®

Engineering and Work Practice Controls:

- *Table I in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction does not include this task.*
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task. Employees will be informed of the hazards associated with the operation and controls to be utilized to eliminate or reduce the risk of silica exposure. A competent person will be designated to monitor the operation and perform re-assessments when necessary.

Respiratory Protection:

- Respiratory protection will be required at all times, regardless of the duration of the operation.
- Respiratory protection is to consist of a supplied air respirator with helmet and protective apron.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.
- The supplied breathing (compressed) air shall be tested periodically (Grade D air testing).

Other PPE:

- Employees may consider the use of other protective clothing (e.g. disposable protective coveralls).

Housekeeping:

- When possible, the work area should be wet cleaned; dry sweeping is not permitted.

Procedures for Restricting Access to Work Areas:

- Other employees working near the operation should maintain an adequate distance from the operation to avoid exposure to airborne silica. Restricted access may be necessary.
- Public access restrictions (traffic cones, drums, or tape) are to be utilized.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Materials and Testing (M&T) quality assurance testing of concrete materials (includes sifting/transferring of aggregate, operation of Gilson/Silent Sifter machinery, and drilling of concrete cores).

Engineering and Work Practice Controls:

- *This activity falls under the General Industry (29 CFR 1910.1053) regulation.*
- Aggregate sifting is only to be performed in a designated "shaker room," which will maintain properly shut doors.
- The employee will only be in the shaker room when necessary, i.e. during filling and emptying/weighing of aggregate. The shaker room will be vacated while the machines are in operation.
- The shaker room must be equipped with local exhaust ventilation (LEV) suitable for the size of the room. Outdoor exhaust is the preferred method, but properly implemented recycling systems equipped with a filter are acceptable.
- The LEV system must be used in accordance with the manufacturer's specification and must be rated to handle dust.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required for this activity.
- If employees decide to voluntarily wear a respirator, they must comply with the requirements of the voluntary respirator usage (NCDOT SPP# 1910.134 Appendix D).

Other PPE:

- Employees should consider the use of other protective clothing (e.g. disposable protective coveralls, hearing protection).

Housekeeping:

- The shaker room and nearby areas should be cleaned regularly to prevent the buildup of dust.
- Cleaning should be performed with a HEPA vacuum, sweeping compound, or comparable system.
- Compressed air is not to be used to clean surfaces or clothing.

Procedures for Restricting Access to Work Areas:

- There should not be other employees working regularly in the vicinity of the shaking/sifting activities.
- Designated shaker rooms should have access limited to the pertinent employee(s) and are to have warning signs posted at all entrances.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Hand-mixing pre-packaged, bagged grout, quikrete or concrete (all cementitious, silica-containing material) for outdoor road and bridge maintenance and repair operations. ®

Engineering and Work Practice Controls:

- *Table I in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction does not include this task.*
- A reference to this type of task is noted in the OSHA 2017 publication, Small Entity Compliance Guide for the Respirable Crystalline Silica for Construction, which reads, "Employee exposures can reasonably be anticipated to remain below 25 micrograms per cubic meter of air (mg/m^3) as an 8-hour TWA (time weighted average) when performing certain tasks that involve only minimal exposure to respirable crystalline silica. Such tasks include: Mixing concrete for post holes; pouring concrete footers, slab foundations and foundation walls; and removing concrete formwork. When these tasks are performed in isolation from tasks that generate silica, the standard does not apply."
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review the material's Safety Data Sheet (SDS). Employees will be informed of the hazards associated with the material and controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and perform re-assessments when necessary.
- Water or vacuum systems for dust suppression are not an option during outdoor hand-mixing of bagged cementitious material, therefore alternative exposure control methods will be utilized to determine employee exposure.
- The use of ready-mixed products is the preferred method of using cementitious silica-containing products/materials, however the amount of material needed (2 yards is typically the minimum order requirement) and the accessibility of the work site (amount of space needed to maneuver a large concrete delivery truck) may be prohibitive to using ready-mixed materials.
- For grouting operation, only those employees *on* the grouting unit (performing the opening/emptying and mixing) are considered to be exposed. Other employees, including those applying the wet grout mixture, are to remain clear (>20 feet) from the emptying process and potential dust exposure.
- Employees engaged in the opening/emptying of material bags are not to perform that task for a duration greater than 4 hours.

Respiratory Protection:

- Unless an exposure determination has been completed, all employees engaged in the opening/emptying or mixing of bagged cementitious, silica -

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

containing materials are **required to use respiratory protection at all times**, regardless of the duration of the operation.

- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.
    - Individuals are not to share their respirator with other employees.

Other PPE:

- Employees may consider the use of other protective clothing (e.g. disposable protective coveralls).

Housekeeping:

- The work area around the hand-mixing operation should be wet cleaned when possible after the task has been completed.
- Compressed air is not to be utilized to clean employee clothing or surfaces.

Procedures for Restricting Access to Work Areas:

- Other employees working near the operation should maintain an adequate distance (>20 feet) and remain up-wind of visible airborne dust.
- Public access restrictions (traffic cones, drums or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Using a **rotary or hammer drill** to drill holes in asphalt or concrete (includes installation of sign posts and flexible delineators, drilling holes for anchor bolts required for mounting traffic signal cabinets, and drilling anchor bolt holes and during concrete form work construction during bridge maintenance operations). †

Engineering and Work Practice Controls:

- Table I (vii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- The dust suppression system for the drill shall include a commercially available collection system which shall be operated and maintained in accordance with the manufacturer's instructions to minimize dust emissions.
- The dust collector must provide 25 cubic feet per minute of airflow or greater as recommended by the tool manufacturer and have a filter with 99% or greater efficiency and cyclonic pre-separator or filter-cleaning mechanism. The shroud or cowling must be intact and installed and the hose connecting the tool to the vacuum must be intake and without kinks or tight bends. The filters must be cleaned or changed in accordance with the manufacturer's instructions. Dust collection bags must be emptied to avoid overfilling.
- A HEPA-filtered vacuum must be used when cleaning holes. Compressed air can be used to clean holes when used in conjunction with a HEPA-filtered vacuum to capture the dust or a hole-cleaning kit designed for use with compressed air.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using the drill indoors or outdoors.

Housekeeping:

- When using the drill indoors or in an enclosed area, additional exhaust must be provided to minimize the accumulation of visible airborne dust.

Procedures for Restricting Access to Work Areas:

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Using a **rotary or hammer drill** to drill holes in asphalt or concrete *without the use of a dust suppression system.* ®

Engineering and Work Practice Controls:

- This activity should only be performed when the Table 1 controls (dust suppression system) cannot be feasibly implemented fully.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- The use of applied water for dust suppression should be considered.
- A HEPA-filtered vacuum must be used when cleaning holes. Compressed air can be used to clean holes when used in conjunction with a HEPA-filtered vacuum to capture the dust or a hole-cleaning kit designed for use with compressed air.

Respiratory Protection:

- Respiratory protection (APF10 or better) should be implemented for the duration of this activity by all employees in the vicinity.

Housekeeping:

- When using the drill indoors or in an enclosed area, additional exhaust must be provided to minimize the accumulation of visible airborne dust.

Procedures for Restricting Access to Work Areas:

- Activity access will be limited to those necessary to perform the task.
- The work area will be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Using a **dowel drill** to drill holes in asphalt or concrete (i.e. gang drilling). † ®

Engineering and Work Practice Controls:

- Table I (viii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- Dowel drilling rigs are not permitted to be used indoors.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- The dust suppression system for the drill shall include a commercially available shroud and collection system which shall be operated and maintained in accordance with the manufacturer's instructions to minimize dust emissions.
- The dust collector must provide airflow equal or greater to that recommended by the tool manufacturer and have a filter with 99% or greater efficiency and cyclonic pre-separator or filter-cleaning mechanism. The shroud or cowling must be intact and installed and the hose connecting the tool to the vacuum must be intake and without kinks or tight bends. The filters must be cleaned or changed in accordance with the manufacturer's instructions. Dust collection bags must be emptied to avoid overfilling.
- A HEPA-filtered vacuum must be used when cleaning holes. Compressed air can be used to clean holes when used in conjunction with a HEPA-filtered vacuum to capture the dust or a hole-cleaning kit designed for use with compressed air.

Respiratory Protection:

- Respiratory protection is required at all times for this activity.
- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Housekeeping:

- The work area around the drilling operation should be wet cleaned when possible after the task has been completed.
- Compressed air is not to be utilized to clean employee clothing or surfaces.

Procedures for Restricting Access to Work Areas:

- Access should be limited to those employees engaged in the activity.
- Public access restrictions (traffic cones, drums or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Manually clearing bridge shoulders with shovels and blowers.

Engineering and Work Practice Controls:

- Periodic bridge maintenance includes the clearing of dirt and debris buildup on the bridge shoulders. Material is manually removed with brooms and shovels and then cleared away with a blower (typically a backpack blower). Each bridge takes ~15 minutes to clear. For safety and convenience reasons a sweeper machine nor wet methods are practical options to perform this activity.
- Employees manually clearing the shoulders must remain appropriately distanced from the employee blowing the shoulders clean (>35 feet).
- Each employee can operate the blower for a maximum of 3 bridges and then must switch roles with another employee.
- Be mindful of wind direction and, if possible, keep employees upwind of the blowing operation.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required.
- Respiratory protection is required when the blower is operated by a specific employee for 4 or more hours or on 4 or more bridges.
- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation.

Housekeeping:

- Keep equipment and employees properly distanced from the blowing operation.
- Removed dirt and debris should be deposited a safe distance from the roadways before or after the bridge, not strewn over the side.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Using **handheld grinders** for scoring, grinding and shaping concrete (e.g. bridge substructure repair). †

Engineering and Work Practice Controls:

- Table I (xii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- A dust suppression system for the grinder may include either (1) a commercially developed integrated water delivery system that continuously feeds water to the blade or (2) a commercially available dust collection system. For use of either system, operate and maintain the grinder in accordance with the manufacturer's instructions to minimize dust emissions.
- If using an integrated water delivery system, the system can be a free-flowing water system designed for blade cooling as well as manufacturers' systems designed for dust suppression alone. This option applies only when grinders are used outdoors.
- When the use of water is not feasible for the operation/task, a grinder equipped with a commercially available dust collection system will be utilized. The dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism. The shroud or cowling must be intact and installed and the hose connecting the tool to the vacuum must be intact and without kinks or tight bends. The filters must be cleaned or changed in accordance with the manufacturer's instructions. Dust collection bags must be emptied to avoid overfilling.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using the grinder outdoors. No respiratory protection is required when the grinder is used indoors or in an enclosed area if the work-shift is less than 4 hours.
- Respiratory protection is required when the grinder is used indoors or in an enclosed area when the work-shift exceeds 4 hours.
- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25)

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

may be used as well.

- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.

Housekeeping:

- When working indoors or in an enclosed area, slurry generated during the use of water suppression systems will be cleaned up using a wet vacuum and the slurry transferred into a closed container for disposal.
- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate air-borne dust.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Spray application of aggregate-pitch mixture for spot patching (e.g. *Durapatching*).

Engineering Controls:

- The exposure assessment for this activity showed that there is no exposure at or above the action level of 25 µg/m3, and therefore no engineering controls are required.

Work Practice Controls:

- Aggregate must be washed prior to use to limit amount of dust.
- Employees must remain behind the application hose during use so that no stone or pitch is blown into their breathing zone.
- This activity must be performed outdoors.
- If a large visible plume of dust results from the task, the competent person may want to reevaluate the task and consider rewashing the aggregate or performing the task on a windier day.
- Employees should limit handling or shoveling aggregate whenever possible (e.g. shoveling aggregate into hopper from dump truck).

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required for this activity.

Housekeeping:

- Dry sweeping of dust covered areas is not permitted.
- Avoid opening vehicle doors or windows to prevent interior dust accumulation.

Procedures for Restricting Access to Work Areas:

- The work area will be restricted to other employees not directly involved in the task by the supervisor or crew lead.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Using **handheld grinders** for mortar removal (i.e. tuckpointing). † ®

Engineering and Work Practice Controls:

- Table I (xi) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- The dust suppression system for the grinder must include a commercially available dust collection system that is operated and maintained in accordance with the manufacturer' s instructions to minimize dust emissions.
- The dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism. The shroud or cowling must be intact and installed and the hose connecting the tool to the vacuum must be intact and without kinks or tight bends. The filters must be cleaned or changed in accordance with the manufacturer's instructions. Dust collection bags must be emptied to avoid overfilling.
- If a visible plume of dust results from the task, all activity must be stopped by the competent person and the engineering controls must be re-evaluated.

Respiratory Protection:

- Respiratory protection is required at all times for this activity.
- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation if the activity duration is less than 4 hours per shift.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) must be used if the activity duration exceeds 4 hours per shift.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.

Housekeeping:

- Dry sweeping of dust covered areas is not permitted; wet the area before

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

cleaning to eliminate air-borne dust.

Procedures for Restricting Access to Work Areas:

- The work area will be restricted to other employees not directly involved in the task by the supervisor or crew lead.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Sawing/cutting concrete or asphalt slabs, pavement, sidewalks or curb using a **handheld power saw** during road and bridge maintenance operations or maintenance of signal loops (wet methods). †

Engineering and Work Practice Controls:

- Table I (ii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- A dust suppression system for the saw will consist of a commercially developed integrated water delivery system that continuously feeds water to the blade that will be operated and maintained in accordance with the manufacturer's instructions to minimize dust emissions.
- When using the integrated water system, ensure the water spray nozzle is working properly to apply water at the point of dust generation, the spray nozzle is not clogged or damaged and all hoses and connections are intact.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using the saw outdoors for less than 4 hours per shift.
- Respiratory protection is required at all times when using the saw indoors or in an enclosed area, or when used indoors for 4 or more hours per shift.
- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.
    - Individuals are not to share their respirator with other employees.

Housekeeping:

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

- When working indoors or in an enclosed area, slurry generated during the use of water suppression systems will be cleaned up using a wet vacuum and the slurry transferred into a closed container for disposal.
- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate air-borne dust.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Sawing/cutting concrete, brick, or asphalt using a **handheld power saw** where neither water integration nor vacuum system is feasible. ®

Engineering and Work Practice Controls:

- *Table I in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction does not include this task.*
- **Dry sawing without a dust collection system or water suppression is a *last resort* activity and must not exceed 15 minutes.**
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- All employees not integral to the activity are to stay a suitable distance away and upwind from the activity to prevent exposure.

Respiratory Protection:

- Respiratory protection is required at all times during this activity.
- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) is recommended.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory Protection SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.
    - Tight fitting respirators are not to be shared among employees.

Housekeeping:

- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate air-borne dust or use a sweeping compound.

Procedures for Restricting Access to Work Areas:

- Work access are should be restricted to those employees directly involved in the task.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Sawing/cutting concrete, brick, or asphalt using a **handheld power saw** with vacuum system and blade diameter <8 inches. †

Engineering and Work Practice Controls:

- Table I (iii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- In some Division Bridge Maintenance operations use of water is not feasible (e.g. patching bridge decks) due to the type of materials utilized for filling the sawed-out area. In those cases, a saw equipped with a commercially available dust collection system will be utilized. The dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with a 99% or greater efficiency. The shroud or cowling must be intact and installed. The hose connecting the saw to the vacuum must be intact and without kinks or tight bends. The filter(s) on the vacuum must be cleaned or changed to prevent clogging and the collection bags regularly emptied to avoid clogging or over-filling.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- A dust suppression system for the saw will consist of a commercially available dust collection system operated in accordance with the manufacturer's instructions to minimize dust emissions.
- *The operation is not to exceed four hours.*

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required for equipment operators or others who assist during the operation.

Housekeeping:

- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate air-borne dust.
- Minimize or prevent dust buildup on tools and equipment.

Procedures for Restricting Access to Work Areas:

- Work access are should be restricted to those employees directly involved in the task.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Sawing/cutting concrete, brick, or asphalt using a **handheld power saw** with integrated vacuum system and blade diameter >8 inches.

Engineering and Work Practice Controls:

- *Table I in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction does not include this task.*
- Although OSHA's Table I does not list dust vacuum collection systems for handheld saws with a blade diameter larger than 8 inches, commercially developed systems are available. In those cases, a saw equipped with a commercially available dust collection system will be utilized. The dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with a 99% or greater efficiency. The shroud or cowling must be intact and installed. The hose connecting the saw to the vacuum must be intact and without kinks or tight bends. The filter(s) on the vacuum must be cleaned or changed to prevent clogging and the collection bags regularly emptied to avoid clogging or over-filling.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- A dust suppression system for the saw will consist of a commercially available dust collection system operated in accordance with the manufacturer's instructions to minimize dust emissions. Specific questions may need to be answered by the manufacturer's customer service department.
- Homemade or makeshift vacuum systems are not to be utilized.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required for equipment operators or others who assist during the operation ***if the operation duration is less than 1 hour.***
- Respiratory protection is required if the duration exceeds 1 hour for this activity.
    - A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees.
    - A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
    - If used, the respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
        - Only employees that have been medically cleared are permitted to use a respirator.
        - The respirator shall be inspected prior to use and

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

cleaned after each use.

Housekeeping:

- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate air-borne dust or use a sweeping compound.
- Minimize or prevent dust buildup on tools and equipment.

Procedures for Restricting Access to Work Areas:

- Work access are should be restricted to those employees directly involved in the task.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Using heavy equipment and utility vehicles (dozers, track hoes, backhoes, sweepers) for **grading and excavating during road and bridge maintenance and construction operations.** This includes the operation of a motor grader for blading gravel roads. †

Engineering and Work Practice Controls :

- Table I (xviii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- If the only employee engaged in the task, the equipment operator must be in an enclosed, filtered cab that is maintained as free as practicable from settled dust, has door seals and closing mechanisms that work properly, has gaskets and seals that are in good conditions and work properly, is under positive pressure maintained through continuous delivery of filtered air, has intake air that is filtered through a pre-filter that is at least 95% efficient (e.g. MERV-16 or better), and has heating and cooling capabilities.
- If the equipment cab is not enclosed, or when employees outside the equipment cab are engaged in the operation, apply water and/or dust suppressants as necessary to minimize dust emissions (e.g. use of water truck and spray hose).

Housekeeping:

- Equipment cabs must be maintained as free as possible from air-borne dust; wet cleaning methods should be utilized (e.g. wet-sponge/cloth, water hose, etc.).
- The use of a HEPA vacuum system is also an acceptable method for interior cleaning of the equipment cab.
- Dry sweeping the cab is not permitted.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required for equipment operators or others who assist during the operation.

Procedures for Restricting Access to Work Areas:

- The use of heavy equipment will inherently require restricted access to other employees.
- Public access restrictions (cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Using **heavy equipment and utility vehicles (e.g. hoe-ram, rock-ripper)** for the fracturing or abrading of rock and soil, demolishing concrete masonry structures, or loading, dumping, and removing demolition debris during road and bridge maintenance and construction operations. †

Engineering and Work Practice Controls:

- Table I (xvii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessment s when necessary.
- Equipment operators must be in an enclosed, filtered cab that is maintained as free as practicable from settled dust, has door seals and closing mechanisms that work properly, has gaskets and seals that are in good conditions and work properly, is under positive pressure maintained through continuous delivery of filtered air, has intake air that is filtered through a pre-filter that is at least 95% efficient (e.g. MERV-16 or better), and has heating and cooling capabilities.
- When employees outside the equipment cab are engaged in the operation, apply water and/or dust suppressants as necessary to minimize dust emissions (e.g. use of water truck and spray hose).

Housekeeping:

- Equipment cabs must be maintained as free as possible from airborne dust; wet cleaning methods should be utilized (e.g. water hose)
- Dry sweeping the cab is not permitted.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required for equipment operators or others who assist during the operation.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Inspection of contract operations which generate silica dust as outlined in OSHA' s 1926.1153, Respirable Crystalline Silica Standard for Construction.

Engineering and Work Practice Controls:

- *Table I in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction does not include this task.*
- The NCDOT technician will conduct a tailgate safety meeting prior to the beginning of the operation in order to identify silica exposure hazards associated with the contractor's operation.
- Visible dust is an indication of a failed or non-existent dust suppression system. The technician should maintain adequate distance from airborne dust to avoid inhalation and notify the contractor's competent person of the requirement for dust suppression during operations that generate airborne silica dust.
- If the contractor is unable to comply with the requirements of OSHA's Table I, the technician shall consider the use of a respirator based upon the tasks and tools and respiratory requirements listed in Table I.
- The technician should be trained as a NCDOT competent person for respirable crystalline silica.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required.

Housekeeping:

- Vehicles must be maintained as free from silica dust as possible; vacuum or wet cleaning methods (e.g. wet sponge/cloth) should be utilized.
- Dry sweeping of vehicle cabs is not permitted.
- The NCDOT technician should communicate any housekeeping issues or concerns to the contractor.

Procedures for Restricting Access to Work Areas:

- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.
- The NCDOT technician should communicate any access issues or concerns to the contractor.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Using **jackhammers and/or handheld powered chipping tools** for road, bridge and traffic services maintenance, repair, and installation operations (including bridge repair and maintenance: decks, barrier rails, parapet, beams, approach slabs and piers, median barrier rails, roadway repairs and maintenance: sidewalks, curb and gutter, minor drainage structures or manholes, islands, median and shoulder drainage ditches, and traffic services: traffic sign installation) with an integrated water suppression or dust collection system. †

Engineering and Work Practice Controls:

- Table I (x) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- A dust suppression system for the jackhammer or handheld powered chipping tool may include either (1) a commercially developed integrated water delivery system that continuously feeds water to the blade or (2) a commercially available shroud and dust collection system. For use of either system, operate and maintain the tool in accordance with the manufacturer's instructions to minimize dust emissions.
- If using an integrated water system, ensure the water spray nozzle is working properly to apply water at the point of dust generation, the spray nozzle is not clogged or damaged, and all hoses and connections are intact.
- If using a shroud and dust collection system, the collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with a 99% or greater efficiency. The shroud or cowling must be intact and installed, the hose connecting the jackhammer or tool to the vacuum must be intact and without kinks or tight bends, and the filter(s) on the vacuum must be cleaned or changed to prevent clogging and the collection bags regularly emptied to avoid clogging or over-filling.
- Makeshift or homemade dust suppression systems are not to be utilized.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using jackhammers or chipping tools outdoors unless the operation/task exceeds a 4-hour shift.
- Respiratory protection is required if the jackhammer or chipping tools are used indoors or in an enclosed area for any duration or used outdoors for over 4 hours per shift.
    - When required, a respirator with an assigned protection factor (APF)

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

of 10 will be utilized by the employee.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.

Housekeeping:

- When working indoors or in an enclosed area, slurry generated during the use of water suppression systems will be cleaned up using a wet vacuum and the slurry transferred into a closed container for disposal.
- When working outdoors, collection of generated slurry options should be explored.
- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate airborne dust or use a sweeping compound.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Using a **small drivable milling machine** (less than half-lane) with integrated water suppression system for milling asphalt pavement during road and bridge maintenance operations, and for the removal of pavement marking paint or thermoplastic during traffic services operations. This includes the use of a skid steer with milling attachment. †

Engineering and Work Practice Controls:

- Table I (xiv) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- The machine must be operated and maintained in accordance with the manufacturer's instructions to minimize dust emissions.
- The machine must be equipped with supplemental water sprays designed to suppress dust. Water should be combined with a surfactant (cleaning agents/soaps/detergents).
- An adequate supply of water for dust suppression must be used, the spray nozzles must be working properly and produce a pattern that applies water at the point of dust generation, the spray nozzles must not be clogged or damaged, and all hoses and connections must be intact.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using the machine.

Housekeeping:

- When using the machine indoors or in enclosed areas, additional exhaust must be provided to prevent the accumulation of visible airborne dust.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Grinding to remove pavement marking paint or thermo-plastic from asphalt or concrete roadways using a **walk-behind milling machine** during traffic services operations with either an integrated water suppression or dust collection system. †

Engineering and Work Practice Control:

- Table I (xiii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- A dust suppression system for the machine may include either (1) a commercially developed integrated water delivery system that continuously feeds water to the cutting surface or (2) a commercially available shroud and dust collection system. For use of either system, operate and maintain the saw in accordance with the manufacturer's instructions to minimize dust emissions.
- If using an integrated water system ensure an adequate supply of water for dust suppression is used, the spray nozzles are working properly and produce a pattern that applies water at the point of dust generation, spray nozzles are not clogged or damaged, and all hoses and connections are intact.
- When the use of water is not feasible for the operation/task, a machine equipped with a commercially available dust collection system will be utilized. The dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow and have a filter with a 99% or greater efficiency and a filter-cleaning mechanism. The hose connecting the machine to the vacuum must be intact and without kinks or tight bends. The filter(s) on the vacuum must be cleaned or changed to prevent clogging and the collection bags regularly emptied to avoid clogging or over-filling.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using the machine outdoors or indoors for less than 4 hours per shift.
- Respiratory protection is required if the milling machine is used indoors or in an enclosed area for over 4 hours per shift.
    - When required, a respirator with an assigned protection factor (APF) of 10 will be utilized by the employee.
    - A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
    - The respirator shall be used in accordance to the

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).

- Only employees that have been medically cleared are permitted to use a respirator.
- The respirator shall be inspected prior to use and cleaned after each use.

Housekeeping:

- When working indoors or in an enclosed area, loose dust must be cleaned with a HEPA-filtered vacuum in between passes of the machine to prevent the loose dust from being re-suspended. Additional ventilation must be provided as needed to minimize the accumulation of visible airborne dust.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Sawing/cutting concrete or asphalt slabs, pavement, sidewalks, or curbs using a **walk behind saw** with integrated water suppression system during road and bridge maintenance operations. †

Engineering and Work Practice Controls:

- Table I (iv) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessment s when necessary.
- A dust suppression system for the saw must include a commercially developed integrated water delivery system that continuously feeds water to the blade. The saw will be operated and maintained in accordance with the manufacturer's instructions to minimize dust emissions.
- Ensure the water spray nozzle is working properly to apply water at the point of dust generation, the spray nozzle is not clogged or damaged and all hoses and connections are intact.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using the saw outdoors.
- Respiratory protection is required at all times when using the saw indoors or in an enclosed area.
    - A respirator with an assigned protection factor (APF) of 10 will be utilized by the employee.
    - A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
    - The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
        - Only employees that have been medically cleared are permitted to use a respirator
        - The respirator shall be inspected prior to use and cleaned after each use

Housekeeping:

- When working indoors or in an enclosed area, slurry generated during the use of water suppression systems will be cleaned up using a wet vacuum and the slurry transferred into a closed container for disposal.
- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate airborne dust.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

TABLE 1:
SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(i) Stationary masonry saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
(ii) Handheld power saws (any blade diameter)	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. – When used outdoors. – When used indoors or in an enclosed area.	None APF 10	APF 10 APF 10
(iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	*For tasks performed outdoors only:* Use saw equipped with commercially available dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(iv) Walk-behind saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. − When used outdoors. − When used indoors or in an enclosed area.	None APF 10	None APF 10
(v) Drivable saws	*For tasks performed outdoors only:* Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
(vi) Rig-mounted core saws or drills	Use tool equipped with integrated water delivery system that supplies water to cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)	Use drill equipped with commercially available shroud or cowling with dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes.	None	None
(viii) Dowel drilling rigs for concrete	*For tasks performed outdoors only:* Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes.	APF 10	APF 10
ix) Vehicle-mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector. -**OR-** Operate from within an enclosed cab and use water for dust suppression on drill bit.	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(x) Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. − When used outdoors. − When used indoors or in an enclosed area. **-OR-** Use tool equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. − When used outdoors. − When used indoors or in an enclosed area.	None APF 10 None APF 10	APF 10 APF 10 APF 10 APF 10

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xi) Handheld grinders for mortar removal (i.e., tuck-pointing)	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	APF 10	APF 25
(xii) Handheld grinders for uses other than mortar removal	*For tasks performed outdoors only:* Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. **-OR-**	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xii) Handheld grinders for uses other than mortar removal (Continued)	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.		
	− When used outdoors.	None	None
	− When used indoors or in an enclosed area.	None	APF 10

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xiii) Walk-behind milling machines and floor grinders	Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. **-OR-** Use machine equipped with dust collection system recommended by the manufacturer. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes.	None None	None None
(xiv) Small drivable milling machines (less than half-lane)	Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xv) Large drivable milling machines (half-lane and larger)	*For cuts of any depth on asphalt only:* Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions.	None	None
	For cuts of four inches in depth or less on any substrate: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions.	None	None
	-OR- Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xvi) Crushing machines	Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points). Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions. Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station.	None	None
(xvii) Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	Operate equipment from within an enclosed cab. When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.	None None	None None

(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions. **-OR-** When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None None	None None

Chromium (VI) SPP# 1926.1126

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish a program to prevent absorption, inhalation, or ingestion of hexavalent chromium by North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Chromium is an elemental metal that can occur in many different oxidative states. Chromium in the hexavalent (+6) state, also called "hex chrome," is a recognized human carcinogen when inhaled. Hexavalent chromium exposure can occur in NCDOT job activities that involve the disturbance of hexavalent chromium paint or hexavalent chromium containing materials. This safety policy and procedure provides guidelines to protect NCDOT employees from the immediate and long-term effects of hexavalent chromium. It includes a discussion on training, exposure assessment, and methods of compliance. Requirements are presented for Personal Protective Equipment (PPE), housekeeping, and hygiene facilities, signage, and recordkeeping.

This safety policy and procedure covers the following job activities within NCDOT:

- Welding, grinding, and torch cutting on chromium-containing metals or with chromium-containing rods/electrodes
- Application and removal of chromium-based paints or coatings

Additionally, this safety policy and procedure covers any other types of work that exposes an employee to hexavalent chromium. The applicability of this SPP to different work activities will be objectively be determined by an industrial hygienist and/or a safety engineer.

Three exemptions to this SPP include:

- Application of pesticides
- Exposures to Portland cement
- Activities with objective data demonstrating hexavalent chromium exposures cannot exceed 1/10th of the PEL

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926.1126), Occupational Safety and Health Standards for the Shipyard Employment (29 CFR 1915.1026) and General Industry (29 CFR 1910.1026).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, employees will not perform any hexavalent chromium related job activity without the proper training and proper Personal Protective Equipment (PPE). Where hexavalent chromium hazards exist that cannot be eliminated, additional engineering practices, administrative practices,

safe work practices, Personal Protective Equipment (PPE), and proper training will be implemented.
These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on hexavalent chromium in Construction. Specific responsibilities are outlined in Section 8.0.

6.0 Definitions

Action Level (AL)
Airborne concentration of hexavalent chromium at 2.5 micrograms per cubic meter of air ($\mu g/m^3$) calculated as an 8-hour time weighted average.

Hexavalent Chromium (Cr(VI))

Chromium with a valence of positive six, in any form, chemical compound, or state of matter in which it occurs.

High-efficiency particulate air [HEPA] filter

A filter that is at least 99.97 percent efficient in removing mono-dispersed particles of 0.3 micrometers in diameter or larger.

Permissible Exposure Limit (PEL)
Airborne concentration of hexavalent chromium at 5 micrograms per cubic meter of air ($\mu g/m^3$) calculated as an 8-hour time weighted average.

7.0 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Determination
- Regulated Areas
- Methods of Compliance – Engineering Controls
- Respiratory Protection
- Protective Work Clothing and Equipment
- Hygiene Areas and Practices
- Prohibited Activities
- Housekeeping
- Medical Surveillance Program
- Medical Removal Protection
- Recordkeeping
- Hexavalent Chromium Waste Disposal

7.1 Training

Employees with potential job-related hexavalent chromium exposure will be trained prior to their initial job assignment. Employees shall be trained in:

- Specific hazards associated with exposure to hexavalent chromium and understand the measures they can take to protect themselves.
- Hazard Communication Standard components applicable to hexavalent chromium
- The purpose and description of medical surveillance program.

7.2 Exposure Determination

As previously mentioned, potential exposure to hexavalent chromium can be potentially expected from the following activities:

- Welding, grinding, and torch cutting on chromium-containing metals or with chromium-containing rods/electrodes.
- Application and removal of chromium-based paints or coatings.

For these activities, or if hexavalent chromium is present in any work environment, then an initial scheduled monitoring exposure assessment shall be performed to determine employee exposure as an 8-hour time-weighted average (TWA). This initial assessment will document the exposure an employee would have without the use of a respirator.

This initial exposure assessment is not required if:

- Objective data is available demonstrating that a specific process, operation, or activity involving chromium cannot release dusts, fumes, or mists of hexavalent chromium in concentrations at or above 0.5 µg/m3 as an 8-hour time-weighted average (TWA) under any expected conditions of use.
- An exposure assessment has been conducted within the last 12 months for a project with very similar aspects as the project in question.

This initial exposure assessment may be limited to a representative number of employees who are reasonably expected to have the highest exposure levels.

The initial assessment of employee exposure may be categorized as:

- **Less than the action level:**
  Employee exposures below the action level require no further monitoring.
- **At or above the action level but less than the PEL:**
  Employee exposures at or above the action level but at or below the PEL require monitoring every 6 months. If periodic monitoring indicates that employee exposures are below the action level, and the result is confirmed by the result of another monitoring taken at least seven days later, the employer may discontinue the monitoring for those employees whose exposures are represented by such monitoring.
- **Above the PEL:**
  Employee exposures above the PEL require quarterly monitoring. If periodic monitoring indicates that employee exposures are below the action level, and the

result is confirmed by the result of another monitoring taken at least seven days later, the employer may discontinue the monitoring for those employees whose exposures are represented by such monitoring.

Within 5 working days after receipt of the exposure assessment results, the employee shall be notified in writing of the exposure results with a description of the corrective action to be taken to reduce exposure below that level, if necessary (See APPENDIX A: Hexavalent Chromium Air Monitoring Notification Letter).

7.3 Regulated Areas

Under General Industry settings (not required for construction or shipyard activities), a regulated area must be distinguished where hexavalent chromium exposure is reasonably expected to be above the PEL based on sampling data or historical activity knowledge. The regulated area must be clearly marked with signage and/or barricades. Only designated employees are to enter the regulated areas and must don proper PPE.

Warning signs shall be posted in General Industry regulated areas. These signs should contain comparable verbiage to the following:

DANGER
HEXAVALENT CHROMIUM
CANCER HAZARD

Construction and shipyard activities where hexavalent chromium at or above the PEL is reasonably expected should also have warning signage of similar language.

7.4 Methods of Compliance – Engineering Controls

Local exhaust or general ventilation shall be provided during any hexavalent chromium work to reduce employee exposures to below the PEL. Engineering controls must be implemented or explored *prior* to relying on respiratory protection. Welding operations should have general ventilation fans in the work area or local exhaust ventilation if in a confined or indoor area.

NCDOT shall not rotate employees to different jobs to achieve compliance with the PEL.

7.5 Respiratory Protection

For welding and torch cutting, a PAPR (protection factor of at least 25) with integrated welding shield shall be used. Other operations involving hexavalent chromium may utilize tight-fitting air purifying respirator such as a half-face or full-face. Hexavalent chromium is a particulate so high-efficiency particulate air (HEPA) filters should be used (e.g. P100 cartridges). The specific exposure concentration should dictate the minimum protection factor of the respirator.

Respiratory protection shall be used only when engineering controls are infeasible, engineering controls are in the process of being implemented, or when engineering controls are unable to lower exposure to below the PEL.

Refer to SPP#1910.134, Respiratory Protection, and NCDOT's Respiratory Protection Program for additional details on the basic requirement for selection, use, cleaning, and maintenance of respirators

7.6 Protective Work Clothing and Equipment

Appropriate protective clothing and equipment shall be provided to employees who are exposed to hexavalent chromium. Protective clothing and equipment are necessary to protect employees from skin or eye contact with hexavalent chromium. Appropriate protective clothing and equipment can include:

- Disposable coveralls
- Work gloves
- Eye protection

Protective clothing is required to be removed in a change area. The contaminated protective clothing is to be placed in sealed impermeable bags or closed impermeable containers in the change area.

7.8 Housekeeping

For General Industry only, all surfaces should be maintained as free as practical of hexavalent chromium dust accumulation. Vacuuming these surfaces with high-efficiency particulate air (HEPA) filters is the preferred method of housekeeping. The HEPA filters shall be emptied in a manner which minimizes dust reentry into the workplace.

Waste, scrap, debris, and any other materials contaminated with hexavalent chromium that are consigned for disposal must be disposed of in sealed, impermeable bags or other closed, impermeable containers. All hexavalent chromium waste debris shall be collected into properly labeled sealed containers for hazardous waste disposal.

7.9 Hygiene Areas and Practices

Where protective clothing and equipment are required, change rooms shall be provided equipped with separate storage for protective clothing and street clothes to prevent cross contamination.

All employees who perform hexavalent chromium-related tasks/operations shall be provided washing facilities to remove hexavalent chromium from skin. Employees are required to wash their hands and faces at the end of work shift or prior to eating, drinking, smoking, chewing tobacco or gum, applying cosmetics or using toilet.

Eating and drinking areas shall be maintained free as practical of hexavalent chromium.

7.10 Prohibited Activities

Employees are prohibited from smoking, eating, and drinking in the work areas. No tobacco products, food items, drink are to be brought into or stored in hexavalent chromium work areas.

7.11 Medical Surveillance

Medical Surveillance shall be made available to the following NCDOT employees engaged in operations with hexavalent chromium exposure where:

- Employees who are exposed at or above the AL for thirty (30) or more days a year
- Employees experiencing signs or symptoms of adverse health effects associated with hexavalent chromium exposure
- Exposed in an emergency

A medical evaluation must be performed by a professionally licensed healthcare physical (PLHCP) and be offered at no cost to the employee. The PLHCP will be provided:

- A description of the employee's past, present, and anticipated future duties in relation to hexavalent chromium exposure
- Information regarding the employee's past, present, and anticipated hexavalent chromium exposure levels
- A description of the personal protective equipment used by the employee
- Information from previous employment-related medical evaluations

NCDOT shall provide a copy of the PLHCP's written opinion to the examined employee within two weeks of receiving it.

7.15 Recordkeeping

These records shall be retained for the duration of employment plus 30 years.

All exposure monitoring records for airborne hexavalent chromium. These records shall include:

- Name and job classification of the employees
- Details of the sampling and analytical techniques
- Results of the sampling
- Type of respiratory protection worn by the person sampled

Results of medical surveillance examinations shall be retained. These records shall include:

- Names of the employees
- Physician's written opinion
- Copy of the results of the examination

8.0 Specific Responsibilities

8.1 Managers / Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for equipment and supplies to protect employees from hexavalent chromium overexposure.

Managers/Unit Heads will obtain and coordinate the required training for affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

8.2 Supervisors

Supervisors will ensure that no hexavalent chromium-related task/operation is performed without the appropriate controls being in place as prescribed in this safety policy and procedure. They will also assist qualified persons as requested in the performance of their duties.

8.3 Employees

Employees shall comply with the provisions outlined in this safety and procedure. They are also responsible for immediately reporting any task/operation to their supervisor where there is suspicion of hexavalent chromium exposure.

8.4 Safety & Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist or perform the required training and/or exposure assessment(s) based on the specific units' needs or requests.

8.5 Division Safety Engineer

The Division Safety Engineer will be responsible for providing employee hexavalent chromium training, expertise, and guidance related to hexavalent chromium safety. The Division Safety Engineer will also perform exposure assessments or request the assessments from Safety and Risk Management to perform hexavalent chromium exposure assessments.

Appendix A: Air Monitoring Notification Letter

DATE:

TO:

FROM:

SUBJECT: Hexavalent Chromium Monitoring Results

On _____ [DATE] your work exposure to hexavalent chromium was monitored to determine the level of exposure while _____ [ACTIVITY].

The airborne hexavalent chromium exposure was _____ **micrograms/meter cubed of air** which indicates an exposure below/above the Permissible Exposure level of 5 micrograms/meter cubed of air as set by OSHA. The respirator you were using does/does not provide protection against this level of hexavalent chromium exposure.

Your health is very important to NCDOT. To protect yourself from hexavalent chromium poisoning, please review the hexavalent chromium compliance program with your supervisor and strictly adhere to the following general requirements:

- Always wear your respirator correctly and always wash it after each use. No facial hair shall be allowed between the mask and your skin if the respirator is tight-fitting.
- Always use the HEPA vacuum cleaner to ventilate the tools you are using and for clean-up of the work area.
- Always wash your face and hands immediately after exiting the work area. Never eat, drink or use tobacco products before you have washed.
- Always wear your protective clothing so as to prevent the contamination of your skin and personal clothing.

Work practices and engineering controls will be evaluated on an ongoing basis to reduce the potential exposures to hexavalent chromium. If you have any suggestions as to reduce hexavalent chromium exposures, please discuss them with your supervisor.

Thank you for participating in the Hexavalent chromium airborne monitoring program. Please sign this letter and return it to your supervisor.

Signed_____

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Ladders SPP# 1910.25

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the safe use of ladders throughout North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

Ladders are used when employees need to move up or down between two different levels. Slips, trips, and falls are significant contributors to NCDOT's accidents. Slips, trips, and falls can occur when wrong ladder selection is made and when improper climbing techniques and/or defective ladders are used.

This safety policy and procedure provides guidelines for the safe use of ladders. It presents discussion on the types of ladders, the use of ladders, and inspection and maintenance requirements.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

This safety policy and procedure applies to all NCDOT employees who use ladders.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.25-27) and Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926.1053).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore in NCDOT, the appropriate ladder will be used for the corresponding job and defective ladders will not be used. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding ladders will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Ladders. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT's safety policy and procedure on Ladders.

6.1 Definitions

Cage
A guard that may be referred to as a cage or basket guard which is an enclosure that is fastened to the side rails of the fixed ladder or to the structure to encircle the climbing space of the ladder for the safety of the person who must climb the ladder.

Extension Ladder
Non-self-supporting portable ladder adjustable in length. It consists of two or more sections traveling in guides or brackets so arranged as to permit length adjustment. Its size is designated by the sum of the lengths of the sections measured along the side rails.

Fixed Ladder
Ladder permanently attached to a structure, building, or equipment.

Individual-Rung Ladder
Fixed ladder each rung of which is individually attached to a structure, building, or equipment.

Ladder
An appliance usually consisting of two side rails joined at regular intervals by cross-pieces called steps, rungs, or cleats, on which a person may step in ascending or descending.

Ladder Safety Device
Device, other than a cage or well, designed to eliminate or reduce the possibility of accidental falls and which may incorporate such features as life belts, friction brakes, and sliding attachments.

Pitch
The included angle between the horizontal and the ladder, measured on the opposite side of the ladder from the climbing side.

Platform Ladder
A self-supporting ladder of fixed size with a platform provided at the working level. The size is determined by the distance along the front rail from the platform to the base of the ladder.

Rail Ladder
Fixed ladder consisting of side rails joined at regular intervals by rungs or cleats and fastened in full length or in sections to a building, structure, or equipment.

Railings
A railing is any one or a combination of those railings constructed in accordance with 1910.23. A standard railing is a vertical barrier erected along exposed edges of floor openings, wall openings, ramps, platforms, and runways to prevent falls of persons.

Rungs
Ladder cross-pieces of circular or oval cross-section on which a person may step in ascending or descending.

Section Ladder
Non-self-supporting portable ladder, nonadjustable in length, consisting of two or more sections of ladder so constructed that the sections may be combined to function as a single ladder. Its size is designated by the overall length of the assembled sections.

Side-Step Ladder
A ladder in which an individual getting off at the top must step sideways in order to reach the landing.

Single Ladder
Non-self-supporting portable ladder, nonadjustable in length, consisting of but one section. Its size is designated by the overall length of the side rail.

Special-Purpose Ladder
Portable ladder which represents either a modification or a combination of design or construction features in one of the general-purpose types of ladders previously defined, in order to adapt the ladder to special or specific uses.

Stepladder
Self-supporting portable ladder, nonadjustable in length, having flat steps and a hinged back. Its size is designated by the overall length of the ladder measured along the front edge of the side rails.

Steps
Flat cross-pieces of a ladder on which a person may step in ascending or descending.

Through Ladder
A ladder in which an individual getting off at the top must step through in order to reach the landing.

Well
A permanent complete enclosure around a fixed ladder, which is attached to the walls of the well. Proper clearances for a well will give the person who must climb the ladder the same protection as a cage.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Ladder Types
- Ladder Hazards
- Ladder Use
- Ladder Safety Devices
- Inspection
- Maintenance

6.2.1 Training

Employees using the ladders shall be trained in:

- The proper use of the ladders
- What kind of ladder to use
- How to set up ladders
- Ladder inspection
- Proper maintenance

This training shall be done upon initial employment and/or job assignment. Refresher training shall be provided to employees at the discretion of their supervisor.

6.2.2 Ladder Types

There are many types of ladders used in NCDOT. They are classified by material of construction (wood, metal), load capacity, function, and design.

Ladder designs can include portable or fixed in-place ladders. Common types of portable ladders are step, platform, straight, and extension ladders. Figure 1 illustrates examples of common portable step ladders.

Fixed ladders are permanently attached to a structure or building and can also be constructed of different materials. Appendix A presents design requirements for fixed ladders.

Figure 1

6.2.3 Ladder Hazards

There are inherent hazards associated with ladder use. Typical ladder hazards include:

- Insufficient surface resistance on ladder rungs and steps
- Ladder structural failure
- Ladders tipping sideways, backwards, or slipping out at the bottom
- Ladder spreaders not fully opened and locked, causing the ladder to "walk", twist or close up when a load is applied to the ladder
- Using metal ladders around electricity
- Using deteriorated ladders
- Using fixed ladders without cages or fall protection

6.2.4 Ladder Use

Employees should follow certain rules when placing, ascending, and descending ladders which include:

- Hold on with both hands when going up or down. If material must be handled, raise or lower it with a rope either before going down or after climbing to the desired level.
- Always face the ladder when ascending or descending.
- Never slide down a ladder.
- Be sure shoes are not greasy, muddy, or slippery before climbing.
- Do not climb higher than the third rung from the top on straight or extension ladder, or the second tread from the top on stepladders.
- Carry tools on a tool belt not in the hand.
- Never lean too far to the sides. Keep your belt buckle within the side rails.

Other recommended general practices include:

- Use a 4 to 1 ratio when leaning a single or extension ladder. (e.g. place a 12 foot ladder so that the bottom is 3 feet away from the object the ladder is leaning against.)
- Inspect ladder for defects before using.
- Never use a defective ladder. Tag or mark it so that it will be repaired or destroyed.
- Never splice or lash a short ladder together.
- Never use makeshift ladders, such as cleats fastened across a single rail.
- Be sure that a stepladder is fully open and the metal spreader locked before starting to climb.
- Keep ladders clean and free from dirt and grease.

- Never use ladders during a strong wind except in an emergency and then only when they are securely fastened.
- Never leave placed ladders unattended.
- Never use ladders as guys, braces, or skids, or for any other purpose other than their intended purposes.
- Never attempt to adjust a ladder while a user is standing on the ladder.
- Never jump from a ladder. Always dismount from the bottom rung.

6.2.5 Ladder Safety Devices

Safety devices are available for both portable and fixed ladders to prevent a climber from falling. Safety devices for portable ladders include slip-resistant bases, safety tops, and any other device to increase the ladder stability. A portable ladder positioned at a location where it may be tipped over by work activities shall be securely fastened at the bottom and top.

Safety devices for fixed ladders include cages (which enclose the stairwell) or a restraint belt attached to a sliding fixture anchored to the ladder. Figure 2 presents a typical restraint belt configuration for fixed ladders.

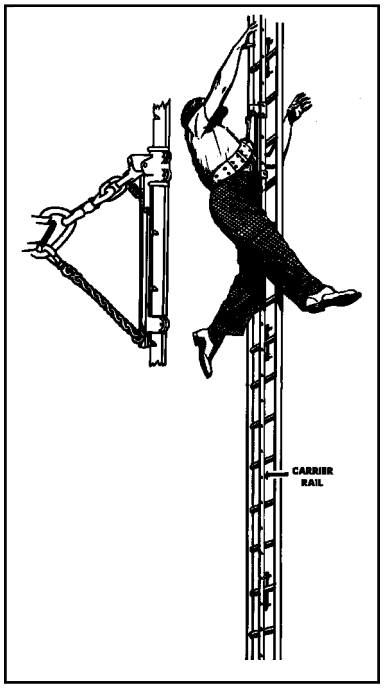


Figure 2

6.2.6 Inspection

An inspection program should be set up by which all ladders are inspected once every three months. Appendix B presents a general inspection form. Ladders that are weak, improperly repaired, damaged, have missing rungs, or appear unsafe shall be removed from the job or site for repair or disposal. Before discarding a wood ladder, cut it up so no one can use it again.

Additionally, portable ladders must be maintained in good condition at all times and inspected frequently. Tag any ladders that have developed defects with DANGEROUS--DO NOT USE, and remove from service for repair or disposal.

For portable wood ladders, all wood parts shall be free from sharp edges and splinters; sound and free from accepted visual inspection from shake, wane, compression failures, decay, or other irregularities.

For portable metal ladders, the design shall be without structural defects or accident hazards such as sharp edges, burrs, etc. The selected metal shall be of sufficient strength to meet the test requirements and shall be protected against corrosion.

For fixed ladders, all wood parts shall meet the criteria of wood ladders. All metal parts shall meet the criteria of metal ladders.

6.2.8 Maintenance

Portable wood ladders may be coated with a water-repellent preservative to provide a suitable protective material. Metal ladders and metal parts on wood ladders should be corrosion-resistant and kept free from nicks. If nicks occur, they should be promptly treated to prevent possible metal fatigue due to rust.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of ladders in their areas. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors are responsible for ensuring that all ladders (fixed and portable) are regularly inspected and properly maintained. They will also be responsible for tagging ladders in need of repair and removing defected ladders from service for repair or destruction.

Supervisors will audit for compliance with this safety policy and procedure during their facility and jobsite audits.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

Employees are also responsible for reporting immediately suspected unsafe conditions or ladders to their supervisor. Employees are to inspect ladders before using and are to keep ladders clean and in good condition.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors or others as applicable on any matter concerning this safety policy and procedure. Additionally, Safety and Loss Control will assist in developing or securing of required training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased ladders comply with this safety policy and procedure and current safety regulations.

6.3.5 Central Equipment Unit

Central Equipment Unit will ensure that ladders are available through inventory and will maintain a supply of replacement parts for ladders that can be repaired.

APPENDIX A: Miscellaneous Requirements for Ladders

Load Requirements

- The minimum design live load shall be a single concentrated load of 200 pounds.
- The number and position of additional concentrated live-load units of 200 pounds each as determined from anticipated usage of the ladder shall be considered in the design.
- The live loads imposed by persons occupying the ladder shall be considered to be concentrated at such points as will cause the maximum stress in the structural member being considered.
- The weight of the ladder and attached appurtenances together with the live load shall be considered in the design of rails and fastenings.

Design Stresses

- Design stresses for wood components of portable wood ladders shall not exceed those specified in SPP# 1910.25. All wood parts of fixed ladders shall meet the requirements of 1910.25(b).
- For fixed ladder consisting of wood side rails and wood rungs or cleats, used at a pitch in the range 75 degrees to 90 degrees, and intended for use by no more than one person per section, single ladders as described in 1910.25(c)(3) (ii) are acceptable.

General Use Requirements

- Portable stepladders longer than 20 feet shall not be used.
- Type I - Industrial ladders shall be the type used in NCDOT operations except Type II may be used in office environments for painting or light duty operations.
- Type III (household ladders) will not be used in NCDOT operations.

APPENDIX B: Ladder Inspection Checklist

General Item to Be Checked	Needs Repair	Condition OK
Loose steps or rungs (considered loose if they can be moved at all with the hand).....	☐	☐
Loose nails, screws, bolts, or other metal parts.....	☐	☐
Cracked, split, or broken uprights, braces, steps, or rungs.....	☐	☐
Slivers on uprights, rungs, or steps.....	☐	☐
Damaged or worn nonslip bases.....	☐	☐
Rusted or corroded spots.....	☐	☐
Stepladders		
Wobbly (from side strain).....	☐	☐
Loose or bent hinge spreaders.....	☐	☐
Stop on hinge spreaders broken.....	☐	☐
Broken, split, or worn steps.....	☐	☐
Loose hinges.....	☐	☐
Extension Ladders		
Loose, broken, or missing extension locks.....	☐	☐
Defective locks that do not seat properly when the ladder is extended.....	☐	☐
Deterioration of rope, from exposure to weather, acid or other destructive agents.....	☐	☐
Fixed Ladders		
Loose, worn, or damaged rungs or side rails.....	☐	☐
Damaged or corroded parts of cage.....	☐	☐
Corroded bolts and rivet heads on inside of metal stacks.....	☐	☐
Damaged or corroded handrails or brackets on platforms.....	☐	☐
Weakened or damaged rungs on brick or concrete slabs.....	☐	☐
Base of ladder obstructed.....	☐	☐

Scaffolds SPP# 1910.28

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the protection of North Carolina Department of Transportation (NCDOT) employees who work on scaffold work surfaces.

2.0 Scope and Applicability

Scaffolding has a variety of applications. It is used in new construction, alteration, routine maintenance, renovation, painting, repairing, and removal activities. Scaffolding offers a safer and more comfortable work arrangement compared to leaning over edges, stretching overhead, and working from ladders. Scaffolding provides employees safe access to work locations, level and stable working platforms, and temporary storage for tools and materials for performing immediate tasks.

Scaffolding accidents mainly involve personnel falls and falling materials caused by equipment failure, incorrect operating procedures, and environmental conditions. Additionally, scaffolding overloading is a frequent single cause of major scaffold failure.

This safety policy and procedure provides guidelines for the safe use of scaffolds. It includes training provisions and guidelines for scaffold erection and use.

Additionally, it lists the types of scaffolds used in NCDOT and details general safety requirements for all scaffolds.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Loss Control, and Central Equipment Unit within NCDOT.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.28) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.451).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, scaffolds shall be erected, moved, dismantled, or altered only under the supervision of a competent person and will have guardrails and toeboards installed. When scaffolding hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Scaffolds will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Scaffolds. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Scaffolds.

6.1 Definitions

Brace
A tie that holds one scaffold member in a fixed position with respect to another member. Brace also means a rigid type of connection holding a scaffold to a building or structure.

Coupler
A device for locking together the component tubes of a tube and coupler scaffold.

Harness
A design of straps which is secured about the employee in a manner to distribute the arresting forces over at least the thighs, shoulders, and pelvis, with provisions for attaching a lanyard, lifeline, or deceleration device.

Hoist
A mechanical device to raise or lower a suspended scaffold. It can be mechanically powered or manually operated.

Maximum Intended Load
The total load of all employee, equipment, tool, materials, transmitted, wind, and other loads reasonably anticipated to be applied to a scaffold or scaffold component at any one time.

Mechanically Powered Hoist
A hoist which is powered by other than human energy.

Outriggers
The structural member of a supported scaffold used to increase the base width of a scaffold in order to provide greater stability for the scaffold.

Platform
The horizontal working surface of a scaffold.

Safety Belt
A strap with means for securing about the waist or body and for attaching to a lanyard, lifeline, or deceleration device.

Scaffold
Any temporary elevated or suspended platform and its supporting structure used for supporting employees or materials or both, except this term does not include crane or derrick suspended personnel platforms.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Safe Scaffold Erection and Use
- Types of Scaffolds Used in NCDOT
- Safety Requirements for Scaffolds

6.2.1 Training

Employees should receive instruction on the particular types of scaffolds which they are to use. Training should focus on proper erection, handling, use, inspection, and care of the scaffolds. Training must also include the installation of fall protection, guardrails, and the proper use and care of fall arrest equipment.

This training should be done upon initial job assignment. Retraining shall be done when job conditions change. Periodic refresher training shall be done at the discretion of the supervisor.

The competent person(s) should receive additional training regarding the selection of scaffolds, recognition of site conditions, recognition of scaffold hazards, protection of exposed personnel and public, repair and replacement options, and requirements of standards.

6.2.2 Safe Scaffold Erection and Use

Safe scaffold erection and use is important in minimizing and controlling the hazards associated with their use. Scaffold work practices and rules should be based on:

- Sound design
- Selecting the right scaffold for the job
- Assigning personnel
- Fall protection
- Guidelines for proper erection
- Guidelines for use
- Guidelines for alteration and dismantling
- Inspections
- Maintenance and storage

Adherence to the above criteria will help control the hazards associated with scaffold use.

6.2.3 Types of Scaffolds

There are many different types of scaffolds used in NCDOT. The three major categories are:

- Self-supporting scaffolds
- Suspension scaffolds
- Special use scaffolds

Self-supporting scaffolds are one or more working platforms supported from below by outriggers, brackets, poles, legs, uprights, posts, frames, or similar supports. The types of self-supporting scaffolds include:

- Fabricated Frame
- Tube and Coupler
- Mobile
- Pole

Suspension scaffolds are one or more working platforms suspended by ropes or other means from an overhead structures(s). The types of suspension scaffolds include:

- Single-Point Adjustable (Boatswain's Chairs)
- Two-Point Adjustable (Swing Stage)
- Multiple-Point Adjustable
- Multi-Lend
- Category
- Float (Ship)
- Interior Hung
- Needle Beam

Special use scaffolds and assemblies are capable of supporting their own weight and at least 4 times the maximum intended load. The types of special use scaffolds include:

- Form and Carpenter Bracket
- Roof Bracket
- Outrigger
- Pump Jack
- Ladder Jack
- Window Jack
- Horse
- Crawling Boards
- Step, Platforms, and Trestle Ladder

Detailed information on these types of scaffolds can be found in manufacturer's literature.

6.2.4 Safety Requirements for Scaffolds

Scaffolds are to be erected for persons engaged in work that cannot be done safely from the ground or from ladders. Therefore, several general requirements apply to all types of scaffolds. Appendix A lists the general requirements applicable to all scaffold types.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure adequate funds are available and budgeted for the purchase of scaffolds in their areas. They will also identify the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities related to scaffold erection and/or dismantling.

Supervisors will communicate appropriate needs to managers/unit heads and/or supervisors.

Supervisors will ensure that employees are provided with PPE as necessary for their job.

Supervisors will ensure that a competent person is in charge of scaffold erection according to the manufacturer's specifications.

6.3.3 Competent Person

The competent person will oversee the scaffold selection, erection, use, movement, alteration, dismantling, maintenance, and inspection. The competent person will be knowledgeable about proper selection, care, and use of the fall protection equipment. Additionally, the competent person shall assess hazards.

6.3.4 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

Employees will report damaged scaffolds, accessories, and missing or lost components. Employees will assist with inspections as requested.

6.3.4 Safety and Loss Control

Safety and Loss Control will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Loss Control will assist in developing or securing required training. Safety and Loss Control will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased scaffolds comply with current safety regulations and this safety policy and procedure.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.6 Central Equipment Unit

Central Equipment Unit will be responsible for ensuring that purchased scaffolds meet or exceed current safety regulations.

APPENDIX A: Safety Requirements for Scaffolds

- The footing or anchorage for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose brick, or concrete blocks shall not be used to support scaffolds or planks.

- No scaffold shall be erected, moved, dismantled, or altered except under the supervision of competent persons or as requested for corrective reasons by Safety and Loss Control Personnel.

- Guardrails and toeboards shall be installed on all open sides and ends of platforms more than 10 feet above the ground or floor, except needle beam scaffolds and floats. Scaffolds 4 feet to 10 feet in height having a minimum horizontal dimension in either direction of less than 45 inches shall have standard guardrails installed on all open sides and ends of the platform.

- Guardrails must be 2 X 4 inches, or the equivalent, not less than 36 inches or more than approximately 42 inches high, with a midrail,when required, of 1 X 4 inch lumber, or the equivalent. Supports must be at intervals not to exceed 8 feet. Toeboard and the guardrail shall extend along the entire opening.

- Scaffolds and their components must be capable of supporting without failure at least 4 times the maximum intended load.

- Any scaffold, including accessories such as braces, brackets, trusses, screw legs, ladders, couplers, etc., damaged or weakened from any cause must be repaired or replaced immediately, and shall not be used until repairs have been completed.

- All load-carrying timber members of scaffold framing shall be a minimum of 1,500 fiber (Stress Grade) construction grade lumber.

- All planking must be Scaffold Grades, or equivalent, as recognized by approved grading rules for the species of wood used. The maximum permissible span for 2 X 9 inch or wider planks is shown in the following:

	Full Thickness Undressed Lumber			Nominal Thickness Lumber	
Working load (p.s.f.)	25	50	75	25	50
Permissible span (ft.)	10	8	6	8	6

- The maximum permissible span for 1-1/4 X 9 inch or wider plank of full thickness shall be 4 feet with medium duty loading of 50 p.s.f.

APPENDIX A: Safety Requirements for Scaffolds (Continued) 2

- All planking or platforms must be overlapped (minimum 12 inches) or secured from movement.
- An access ladder or equivalent safe access must be provided.
- Scaffold plank must extend over their end supports not less than 6 inches nor more than 18 inches.
- The poles, legs, or uprights of scaffolds must be plumb and securely and rigidly braced to prevent swaying and displacement.
- Overhead protection must be provided for men on a scaffold exposed to overhead hazards.
- Slippery conditions on scaffolds shall be eliminated immediately after they occur.
- No welding, burning, riveting, or open flame work shall be performed on any staging suspended by means or fiber of synthetic rope. Only treated or protected fiber or synthetic ropes shall be used for or near any work involving the use of corrosive substances or chemicals.
- Wire, synthetic, or fiber rope used for scaffold suspension shall be capable of supporting at least 6 times the intended load.
- Scaffolds shall be provided with a screen between the toeboard and guardrail, extending along the entire opening, consisting of No. 18 gauge U.S. Standard wire one-half inch mesh or the equivalent, when personnel are required to work or pass underneath the scaffolds.
- A safe distance from energized power lines shall be maintained.
- Tag lines shall be used to hoist materials to prevent contact.
- Suspension ropes shall be protected from contact with heat sources (welding, cutting, etc.) and from acids or other corrosive substances.
- Scaffolds shall not be used during high wind and storms.
- Ladders and other devices shall not be used to increase working heights on scaffold platforms.
- Scaffolds shall not be moved while employees are on them.
- Loose materials, debris, and/or tools shall not be accumulated to cause a hazard.
- Employees working on suspended scaffolds shall employ a fall-arrest system.
- Scaffold components shall not be mixed or forced to fit which may reduce design strength.
- Scaffolds and components shall be inspected at the erection location. Scaffolds shall be inspected before each workshift, after changing weather conditions, or after prolonged work interruptions.

APPENDIX A: Safety Requirements for Scaffolds (Continued) 3

- Casters and wheel stems shall be pinned or otherwise secured in scaffold legs. Casters and wheels must be positively locked if in a stationary position.
- Tube and coupler scaffolds shall be tied to and securely braced against the building at intervals not to exceed 30 feet horizontally and 26 feet vertically.

Fall Protection SPP# 1926.500

Select this Link to view latest Revision changes

Quick Reference

Select this Link to view latest Revision changes

1.0 Purpose

The purpose of this safety policy and procedure is to identify fall protection controls to be used on construction projects by North Carolina Department of Transportation (NCDOT) employees to prevent falls from elevated walking/working surfaces 6 feet or more above a lower level.

2.0 Scope and Applicability

This policy and procedure sets forth minimum requirements for fall protection for NCDOT employees engaged in construction work on a walking/working surface 6 feet or more above a lower level. If work occurs in areas other than defined walking/working surfaces (e.g. trailers or shear rock cliffs) contact the Safety Engineer or Safety and Risk Management to develop specialized procedures. Fall protection, related to facility maintenance work or inspection work prior to or after a construction project is complete, is required for elevated walking/working surfaces 4 feet or more above a lower level.

This policy does not apply to mobile elevating work platforms (MEWPs), ladders, scaffolds, stairs, vehicles, or trailers; however, there are other safety policies and procedures that do address these items.

This safety policy and procedure provides minimum guidelines for the proper selection and use of conventional fall protection systems as well as fall protection plans. It also contains training provisions for fall protection.

This safety policy and procedure details the areas of responsibility for managers/unit heads, supervisors, qualified persons, competent persons, safety monitors, employees, Safety and Risk Management, Safety Consultants, and the Central Equipment Unit within NCDOT.

3.0 Reference

This safety policy and procedure is established in accordance with 29 CFR 1926.500 - 503, Fall Protection and incorporates parts of 1926.750 Steel Erection and 1926.701(b) Concrete and Masonry Construction. ANSI/ASSE Z359 Fall Protection Code is also referenced as recognized industry best practice.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees. When fall hazards exist that cannot be eliminated, then engineering practices, administrative practices, Personal Protective Equipment (PPE), and proper training regarding Fall Protection will be implemented.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Fall Protection. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure for Fall Protection.

6.1 Definitions

Active Fall Protection Systems
A fall protection system that requires authorized persons to wear or use fall protection equipment and that requires training.

Administrative Controls
Employer-mandated safe work practices or procedures that are designed to prevent exposure to a fall by signaling or warning an employee to avoid approaching a fall hazard.

Anchorage
A secure connecting point or a terminating component of a fall protection system or rescue system capable of safely supporting the impact forces applied by a fall protection system or anchorage subsystem.

Arrest Distance
The total vertical distance required to arrest a fall. The arrest distance includes the deceleration distance and activation distance.

Attachment Element
A connector integral to the body support that provides a point on the body harness to which other components or connecting subsystems may be attached. *The D-Ring is the most common attachment element.*

Authorized Person
A person assigned by the employer to perform duties at a location where the person will be exposed to a fall hazard.

Body Belt
A belt with 2 side D-rings made of synthetic materials. ***NCDOT employees shall not use body belts.***

Body Support (Harness)
An assembly of webbing arranged to support the human body for fall protection purposes, including during and after fall arrest.

Clearance
The distance from a specified reference point, such as the working platform or anchorage of a fall arrest system, to the lower level that a worker might encounter during a fall.

Clearance Requirement (Fall Arrest)
The distance below an authorized person that must remain clear of obstructions in order to ensure that the authorized person does not make contact with any objects that would cause injury in the event of a fall. The clearance requirement includes total fall distance; the deflection of anchorage and anchorage connectors; the length and elongation of the full body harness and the body; the vertical component of any swing fall and a clearance safety factor.

Competent Person

An individual designated by the employer to be responsible for the immediate supervision, implementation and monitoring of the employer's fall protection program who, through training and knowledge, is capable of identifying, evaluating and addressing existing and potential fall hazards, and who has the employer's authority to take prompt corrective action with regard to such hazards.

Connector

A component or element that is used to couple parts of the system together. A connector may be an independent component (such as a carabiner) of a system or it may be an integral element of a component, hybrid component, subsystem or system (such as a buckle or D-Ring sewn into a body support or a snap hook spliced or sewn into a lanyard or self-retracting lanyard). Connectors are sometimes referred to as hardware.

Controlled Access Zone

An area where certain types of work may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems where access to and within the zone is controlled by a safety monitor. *Use of controlled access zones is not recommended and requires a project specific written fall protection plan.*

Deceleration Distance

The vertical distance between the user's fall arrest attachment at the onset of fall arrest forces during a fall, and after the fall arrest attachment comes to a complete stop.

Energy (Shock) Absorber

A component whose primary function is to dissipate energy and limit deceleration forces which the system imposes on the body during fall arrest.

Fall Arrest

The action or event of stopping a free fall or the instant where the downward free fall has been stopped.

Free Fall

The act of falling before a personal fall arrest system begins to apply force to arrest the fall.

Free Fall Distance

The vertical distance an employee travels before the fall arrest system begins to operate. The vertical distance is measured from the attachment point of the lanyard or lifeline on the employee's body harness before the onset of the fall to the point just before the fall arrest system begins to apply force to stop the fall. The distance measured does not include deceleration distance or lifeline/lanyard elongation but does include self-retracting lifeline/lanyard extension/slide distance before they grab or apply arrest forces.

Gate

The element of a connector that opens to receive an object and closes when released to retain the object.

Guardrail System

A passive system of horizontal rails and vertical posts that prevents a person from reaching a fall edge.

Harness (Full Body)
A body support designed to contain the torso and distribute the fall arrest forces over at least the upper thighs, pelvis, chest, and shoulders.

Hole
A gap or void 2 inches or more in its least dimension in a floor, roof, or other walking/working surface.

Lanyard
A component consisting of a flexible rope, wire rope, or strap, which typically has a connector at each end for connecting to the body support and to a fall arrester, energy absorber, anchorage connector or anchorage.

Leading Edge
The edge of a floor, roof, or formwork for a floor or other walking/working surface (such as a deck) which changes location as additional decking, floor, roof, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.

Lifeline
A component of a fall protection system consisting of a flexible line designed to hang either vertically (vertical lifeline), or for connection to anchorages or anchorage connectors at both ends to span horizontally (horizontal lifeline).

Low-Slope Roof
A roof that has a slope less than or equal to 4 in 12 (vertical to horizontal).

Lower Levels
An area or level below the working surface that an employee can fall to. These areas include but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, materials, water, equipment, structures, or portions of such surfaces.

Openings
Any opening or gap 30 inches or more high and 18 inches or more wide in a wall or partition through which an employee can fall through to a lower level.

Overhand Bricklaying and Related Work
The process of laying bricks and masonry units in a manner that the wall to be jointed is on the opposite side of the wall from the mason. This requires the mason to lean over the wall to complete the work. Related work includes mason tending and electrical installation incorporated into the brick wall during the overhand bricklaying process.

Personal Fall Arrest System
A system used to stop an employee in a fall from a working level. It consists of an anchorage, connectors, and a body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. *Body belts are not to be used as part of a personal fall arrest system.*

Positioning Device System
A body harness system rigged with lanyards 2 feet long that support an employee on an elevated vertical surface, such as a wall or reinforcing steel. This system allows an employee to work with both hands freely while leaning or being supported by the system.

Qualified Person
A person who by possession of a recognized degree, certificate or professional standing or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to fall protection.

Rope Grab
A deceleration device that travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee.

Roof
The exterior surface on the top of a building that does not include floors or formwork that may temporarily become the top surface of the building while under construction.

Roofing Work
The hoisting, storage, application, and removal of roofing materials and equipment including related insulation, sheet metal, and vapor barrier work. It does not include the construction of the roof deck itself.

Safety Monitoring Systems
A safety system in which a competent person is responsible for recognizing and warning employees of fall hazards. Safety monitors are required to monitor entry into a controlled access zone as well as to monitor the safety of employees working in the controlled access zone.

Self-Retracting Lifeline/Lanyard
A deceleration device containing a drum-wound line which can be slowly extracted from or retract onto the drum under slight tension during normal employee movement. This device automatically locks the drum and stops the fall typically within 2 feet of the onset of the fall.

Snap hook
A connector comprised of hook-shaped member with a closed keeper which may be opened to receive an object such as a D-ring, and, when released, automatically closes to retain the object. Locking snap hooks have a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connecting or disconnecting. *Only locking snap hooks are permitted for use with fall arrest systems, travel restraint, and work positioning device systems.*

Steep Roof
A roof with a slope greater than 4 in 12 (vertical to horizontal).

Toeboard
A low protective barrier, that prevents material, equipment, and personnel from falling off of a working surface to a lower level.

Unprotected Sides and Edges
Any side or edge of a walking/working surface (except at entrances to points of access) such as a floor, roof, ramp, or runway where there is not wall or guardrail system at least 39 inches high.

Walking/Working Surface
Any surface, whether horizontal or vertical, on which an employee walks or works, including, but not limited to, floors, platforms, decks, roofs, ramps, bridges, runways, formwork, concrete reinforcing steel, and steel erection. It does not include ladders, stairs, and vehicles or trailers on which employees must be located in order to perform their job duties.

Warning Line System
A barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge. This line designates an area where roofing work on low slope roofs may take place without the use of a guardrail system, a personal fall arrest system or a safety net system. *Warning line systems are not recommended as a primary fall protection control.*

6.2 Fall Protection General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Hierarchy of Controls
- Training
- Safety Requirements for Elevated Walking/Working Surfaces
- Conventional Fall Protection Systems Criteria and Use
- Fall Protection Plans Criteria and Use

6.2.1 Hierarchy of Controls

When encountering potential fall hazards, elimination of the hazard shall always be the first measure of control. Elimination of a fall hazard can include reordering of a job process, replacement of equipment or job materials, performing an activity at ground level, or using equipment that doesn't require employees to work at a height greater than 6 feet.

If elimination is not feasible, then other means of controls should be considered in the following order of preference:

1. Elimination/Substitution
2. Guardrail System
3. Travel Restraint
4. Personal Fall Arrest System
5. Safety Net
6. Warning Line, Controlled Access Zone, & Safety Monitor

6.2.2 Training

There are three levels of employee fall protection training: Awareness, Authorized Person, and Competent Person.

Awareness Level
Employees with limited to no exposure to fall hazards and will not use fall protection PPE. Participants gain knowledge and skills necessary to identify and avoid hazards associated with elevated work locations.

Authorized Person
Employees exposed to fall hazards shall receive training regarding:

- Fall hazard recognition
- Fall prevention and control measures
- Applicable standards
- Responsibilities of designated persons under this policy
- Understanding fall protection and rescue plans
- Inspection, use, and care of fall protection equipment and systems

Authorized Person training shall be conducted by, at minimum, a competent person. This training should be completed before an employee begins working in an area where fall hazards exist. Retraining is recommended every two years, but shall occur when equipment, fall protection program, or job conditions change. Retraining should also occur if there is an indication or incident that suggests lack of knowledge or skill.

Competent Person
Training for NCDOT designated competent person shall include:

- Fall protection hierarchy of controls
- Applicable fall protection regulations and standards
- Surveying of fall hazards
- Responsibilities of designated persons under this policy
- Detailed inspection of equipment components and systems
- Fall protection system assessments and determining when a system is safe or unsafe for use
- Implementing fall protection and rescue procedures

Competent Person training shall be conducted by a designated employee who has completed a competent person train-the-trainer course. This training should be completed before an employee is assigned Competent Person duties. Retraining must occur every two years or when equipment, fall protection program, or job conditions change. Retraining should also occur if there is an indication or incident that suggests lack of knowledge or skill.

6.2.3 Safety Requirements for Elevated Walking/Working Surfaces

When working at heights 6 feet or greater above a lower level, employees must be protected from falling by using one or more fall protection systems.

Each type of walking/working surface presents different challenges and hazards. The following is a discussion of the different types of walking/working surfaces and the safety requirements for each.

All surfaces: Structural Integrity
Prior to beginning work on any elevated walking/working surface, the structural integrity and strength of the surface must be evaluated at minimum by a competent person, to determine if it is sufficient to support both the worker(s) and any needed equipment.

Unprotected Sides and Edges
Each employee on a walking/working surface with an unprotected side or edge which is 6 feet or more above a lower level shall be protected from falling by guardrail systems, travel restraint system, and/or personal fall arrest systems.

Leading Edge
Each employee who is constructing a leading edge 6 feet or more above lower levels shall be protected from falling by guardrail systems, travel restraint system, and/or personal fall arrest systems.

Each employee on a walking/working surface where leading edges are under construction, but *who is not engaged* in the leading-edge work, may be protected by a fall protection plan and controlled access zone. Guardrail systems and fall protection PPE are preferred.

Bridge
Each employee working on a bridge shall be protected from falling 6 feet or more to a lower level by a guardrail system, travel restraint system, or personal fall arrest system. NCDOT has evaluated portable clamp-on bridge guardrail systems for temporary bridge work and identified three that perform well on the majority of bridges within North Carolina. The top three recommended models include:

- The Bodyguard Rail
    - Model #CC120
    - Model #MCC130
- ParaClamp by BlueWater

Hoist Areas
Each employee in a hoist area shall be protected from falling 6 feet or more to a lower level by a guardrail system, travel restraint system, or personal fall arrest system. If the guardrail systems are removed to facilitate the hoisting operation and the employee must lean out over the edge of the access opening; then that employee shall be protected from fall hazards by a travel restraint system or personal fall arrest system.

Holes
All holes will be protected to prevent employees from tripping or falling through. These covers are also used to prevent objects from falling through to lower levels. These covers must be capable of supporting twice the weight of a worker, equipment, or load that may be imposed on the cover. All covers shall be secured to prevent disengagement and shall be marked with the word “HOLE” or “COVER.”

If covering a hole is infeasible (e.g. skylights), cages, guardrail systems, travel restraint systems, or personal fall arrest systems may be used.

Formwork and Reinforcing Steel
Each employee on the face of formwork or reinforcing steel shall be protected from falling 6 feet or more to lower levels by personal fall arrest systems and/or work positioning device systems.

All protruding reinforcing steel that an employee could fall onto or into shall be guarded or covered to eliminate the hazard of impalement.

Ramps, Runways, Headwalls, and Other Walkways
Each employee on ramps, runways, and other walkways shall be protected from falling 6 feet or more to lower levels by guardrail systems.

Excavations, Caissons, Pits, Shafts
Each employee at the edge of an excavation 6 feet or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barriers.

Each employee at the edge of a caisson, pit, shaft, or similar opening 6 feet or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers.

Steel Erection
Each employee working on steel erection projects shall be protected from falls of 6 feet or more by the use of a guardrail system, work positioning system, travel restraint system, and/or personal fall arrest system.

Overhand Bricklaying and Related Work
Employees engaged in overhand bricklaying and related work 6 feet more above lower levels shall be protected by a guardrail system, travel restraint system, and/or a personal fall arrest system, or, if justified, a controlled access zone as outlined by a job specific fall protection plan.

Any employee engaged in overhand bricklaying work 6 feet more above lower levels, where they must reach 10 inches or more below the level of the walking/working surface on which they are working, shall be protected by a guardrail system, personal fall arrest system.

Roofing

- **Low-slope roofs (Slope less than 4 in 12)**
  Each employee engaged in roofing activities on low-slope roofs, with unprotected sides and edges 6 feet or more above lower levels shall be protected from falling by guardrail systems, travel restraint system, or personal fall arrest system. If all of these measures are determined infeasible a safety net, warning line system, and safety monitoring system may be considered with a specific fall protection plan.

- **Steep roofs (Slope greater than 4 in 12)**
  Each employee on a steep roof with unprotected sides and edges 6 feet or more above lower levels shall be protected from falling by using a guardrail system with toeboards, travel restraint system, or a personal fall arrest system.

Pre-Cast Concrete Erection

Each employee engaged in the erection of pre-cast concrete members (including, but not limited to the erection of bridge beams and columns) who is 6 feet or more above lower levels shall be protected from falling by either a guardrail system, travel restraint system, or a personal fall arrest system. If, however, a qualified person, can demonstrate that it is infeasible or creates a greater hazard to use these systems, then the qualified person shall develop and implement a specific fall protection plan.

Wall Openings

Employees working on, at, above or near wall openings, including those with chutes attached, where the outside bottom edge of the wall openings is 6 feet or more above a lower level and the inside bottom edge of the wall opening is less than 39 inches above the walking/working surface, shall be protected from falling by either a guardrail system, a personal fall arrest system or a safety net system.

6.2.4 Fall Protection Systems, Criteria and Use

The conventional fall protection systems used by most workers include guardrail systems, travel restraint systems, personal fall arrest systems. Guardrail systems offer a passive barrier to prevent falls and should be considered first when selecting a fall protection system. Travel restraint systems prevent an employee from falling by restricting access to a fall point. Personal fall arrest systems do not prevent falls but are designed to arrest a fall, thereby preventing an employee from striking a lower level.

In addition to the systems mentioned above, work positioning device systems are allowed for specific operations (namely vertical walking/working surfaces). Warning line systems and safety nets are allowed for some types of work but are not recommended due to the complexity of installation and maintenance required.

Each of these systems and the requirements for each are outlined in the following sections.

6.2.4.1 Guardrail Systems

Guardrails must contain a top-rail, mid-rail, post, and possibly a toeboard. Toeboards are required when employees or others are below a walking/working surface and there is a potential for material, equipment, or tools to fall below. *Under no circumstances should an employee climb onto a guardrail or use a guardrail as a fall arrest anchor point.*

Guardrails must meet the following requirements:

Strength: Guardrail systems shall be capable of withstanding, without failure, a minimum of 200 lbs. applied within 2 inches of the top edge of the top rail in any direction. Mid-rails must be capable of withstanding 150 lbs. applied in any direction along the mid-rail.

Materials: The following material specifications shall be followed when constructing guardrails:

- **Wood**: (construction grade lumber)
  - Top Rail & Post: 2x4
  - Mid-rail: 2x4
  - Toeboard: 1x4
- **Wire Rope:** Minimum ¼ inch wire rope with flags every 6 ft. Manila, plastic, or synthetic rope shall not be used for top rails or mid-rails.
- **Metal Pipe:** All rails & post schedule 40 pipe with a minimum diameter of 1 ½ inch.
- **Structural Steel:** All rails & post, 2 inch by 2 inch by 3/8 inch angles

Post Spacing All materials listed above: 8 feet on center.

Height Requirements:

- **Top Rail:** Must be 42 inches plus or minus 3 inches above the walking/working surface.
- **Mid-Rail:** Must be midway between the top rail and the walking/working surface.
- **Toe Board:** Must be at least 3 ½ inches tall, with no more than ¼ inch clearance above the walking working surface.

6.2.4.2 Travel Restraint & Work Positioning Systems

Travel Restraint Systems
A travel restraint system is not to be confused with a personal fall arrest system. A travel restraint system is designed to allow an employee to work on a walking/working surface that is flat or less than 4:12 slope while restricting access to the fall point.

A full body harness with either a lanyard or self-retracting lanyard (SRL) that is sized and/or adjusted to limit the user from reaching the fall point. *Body belts are not allowed for use as part of a travel restraint system at NCDOT.*

A personal fall arrest system shall be used if the worker is exposed to falling 6 feet or more to a lower level while traveling to the surface where a travel restraint system will be used.

Each component of a travel restraint system is vital and dependent on all elements. For this reason, the requirements for the system and each component are discussed in the following sections:

System Requirements
- The strength requirements for the travel restraint system as outlined in this section are limited to employees whose combined tool and body weight is less than 310 lbs. (ANSI) and/or the manufactures weight rating. It is important to ensure the full body harness and connecting device are equally rated.
- The travel restraint system shall be designed and installed to not allow the user to reach the fall point.

Anchorage
Anchorages selected for restraint systems shall have a strength capable of sustaining static loads applied in the directions permitted by the system.

Anchorages must be capable of supporting at least 1,000 lbs. for non-certified anchorages or at least two time the foreseeable force for certified anchorages.

Connectors
Connectors shall be drop forged, pressed, or formed with a corrosion-resistant finish and a minimum tensile strength of 5000 lbs. and a gate rated to 3,600 lbs. All surfaces should be smooth to prevent damage to interfacing parts of the system.

Snap hooks shall:
- Be self-locking and double actuated
- Never be connected together
- Not be connected to any object that is not dimensionally compatible or that does not allow the snap hook to fully lock closed.

Lanyards & SRL's

- Lanyards and SRL's shall have a minimum tensile strength of 5000 lbs.
- Lanyards and SRL's shall only be used in travel restraint systems if the total deployment length of the lanyard does not permit the user to reach and be exposed to a fall hazard.
- Should include a visual load indicator to indicate the need to remove from service.

Full Body Harness

- Each employee shall be fitted with an approved full body harness that should fit correctly without slack in the straps and an appropriate weight rating.
- The dorsal D-ring shall be used for travel restraint.
- Should include a visual load indicator to indicate the need to remove from service.
- Recommend all full body harnesses be equipped with rescue straps to reduce the effects of suspension trauma in the event of a fall.

Inspection Requirements

All parts of the travel restraint system (hardware, webbing, stitching, & labels) shall be inspected by the authorized user prior to use for signs of fraying, corrosion, burns, and overall condition. Annual documented inspection by a competent person is required for all components of a travel restraint system, unless otherwise specified by the manufacture.

All components of a travel restraint system that have been damaged, deployed, or have reached an end of service life date shall be removed from service immediately.

Work Positioning Systems

Work positioning system holds the user in place while allowing for hands free work. A typical work positioning set-up consists of full body harness with side D-rings, a "y" type connecting device consisting of two snap hooks and a short piece of webbing or chain with a larger rebar snap hook attached between them to connect to the anchorage. Although work positioning should not allow the user to fall it is required to have a backup personal fall arrest system at all times.

6.2.4.3 Personal Fall Arrest Systems

A personal fall arrest system is designed to arrest and stop a falling employee from contacting a lower level. It consists of an anchorage, body harness, and connecting device. *Body belts are **not** to be used as part of a personal fall arrest system.*

Each component of a personal fall arrest system is vital. The success of the system to arrest and then stop an employee that has fallen is dependent on all elements of the system. For this reason, the requirements for the system and each component are discussed below.

System Requirements

- The strength requirements for the personal fall arrest systems as outlined in this section is limited to employees whose combined tool and body weight is greater than 130 lbs. and less than 310 lbs. or otherwise specified by the fall protection equipment manufacture.

- The system shall be designed to limit the free fall of an employee to 6 feet, and limit the arresting force on an employee's body to at a maximum 1,800 lbs. *There are SRL's and energy absorbing lanyards that will reduce the maximum arresting force to a safer 900 lbs.*

- Self-rescue after a fall while using a personal fall arrest system is not a rescue plan. The competent person needs to establish a rescue plan specific for each job site where fall protection systems are in place. Relying on emergency services is not enough. These plans may include the use of a simple extension ladder, a MEWP, or possibly the crew has been trained in the use of controlled decent rescue devices. All employees involved in the rescue plan need to be trained on the rescue plan and rescue equipment.

All Components

- **Inspection Requirements**
  All parts of the personal fall arrest system (hardware, webbing, stitching, & labels) shall be inspected by the authorized user prior to use for signs of fraying, corrosion, burns, and overall condition. Annual documented inspection by a competent person is required for all components of a personal fall arrest system, unless otherwise specified by the manufacture. Inspection Forms for each of the following components can be found in Appendix A:
  1. Full Body Harness
  2. Lanyards
  3. SLR's
  4. Anchor Point

  All components of a personal fall arrest system that have been damaged, deployed, or have reached an end of service life date shall be removed from service immediately.

  A competent person will either send back to manufacture for replacement or destroy the components. This includes the anchor point, connecting device (SRL/Lanyard), and full body harness.

Anchorage

The selection of adequate anchorage points is critical. Anchorages must be capable of supporting at least 5,000 lbs. per employee attached or designed by a qualified person to at least two times the maximum arresting for certified anchorages.

Anchorages used for attachment of personal fall arrest systems shall be independent of any anchorage being used to support or suspend platforms.

Horizontal Lifelines

Horizontal lifelines shall be designed and certified by a qualified person with experience and training in designing and using horizontal lifeline systems. Non-certified anchorages shall not be used for horizontal lifelines. *It is recommended to only use engineered horizontal lifelines in accordance with the manufacture's instructions.*

If the lifeline is supported with stanchions or post between anchorage's, that do not allow the snap hook on a lanyard to pass freely by the stanchion or post, then two lanyards/SRL's must be used to maintain 100% tie off.

Vertical Lifelines

Vertical lifelines shall have a minimum breaking strength of 5000 lbs. and shall only support one worker per line.

Connectors

Connectors shall be drop forged, pressed, or formed with a corrosion-resistant finish and a minimum tensile strength of 5000 lbs. and a gate rated to 3,600 lbs. All surfaces should be smooth to prevent damage to interfacing parts of the system.

Snap hooks shall:

- Be self-locking and double actuated
- Never be connected together
- Not be connected to any object that is not dimensionally compatible or that does not allow the snap hook to fully lock closed.

SRL's & Lanyards

- Lanyards and SRL's shall meet minimum strength of 5,000 lbs.
- Must have an energy absorber that does not exceed 1,800 lbs. of arresting force. *There are SRL's and energy absorbing lanyards that will reduce the maximum arresting force to a safer 900 lbs.*
- Ensure the lanyard and SRL are the proper length for the application and fall clearance needed.
- Standard SRL's and lanyards are weight rated for 130 lbs. to 310 lbs. Anything outside of this standard range needs to be certified by the fall protection manufacture.
- Should include a visual load indicator to indicate the need to remove from service.

Body Harness

- Each employee shall be fitted with an approved full body harness that should fit correctly without slack in the straps and an appropriate weight rating.
- Must include a load bearing pelvic strap, strap retainers, and lanyard parking attachment with a maximum breaking strength of 120 lbs.
- Must include a visual load indicator to indicate the need to remove from service.
- Must include a dorsal D-ring that should be centered at the base of the user's neck.
- Side or chest D-rings are not to be used for fall arrest.
- Recommend all full body harnesses be equipped with rescue straps to reduce the effects of suspension trauma in the event of a fall.

6.2.4.4 Warning Line Systems

Employees performing low slope roofing work with unprotected sides and edges 6 feet or more above lower levels may use the warning line system in conjunction with the following systems:

- Guardrail system
- Personal fall arrest system
- Safety Monitoring system

A warning line system is designed to provide an isolated zone around all edges of the roof work area. The warning line system must comply with the following:

System requirement:
Only employees performing roof work shall be allowed in the area between the roof edge and the warning line system. If a safety monitoring system is used, employees must comply with the directions of the safety monitor.

Strength:
The warning line shall have a minimum tensile strength of 500 lbs.

Materials:

- Warning lines consist of ropes, wires, or chains and supporting stanchions flagged with high visibility tape every 6 feet.
- The lowest point of the line, including sag, can be no less than 34 inches from the walking/working surface.
- The highest point in the line can be no more than 39 inches from the walking/working surface.
- The stanchions shall be capable of resisting without tipping, a force of 16 pounds applied perpendicular to the line and horizontally against the stanchion 30 inches above the walking/working surface.
- Lines shall be attached to the stanchion such that pulling on one section will not result in slack being taken up in adjacent sections before the stanchion tips over.

Layout

- Warning lines shall be erected no less than 6 feet from the roof edge when no mechanical equipment is in use.
- If mechanical equipment is being used, the warning line must be erected as follows:
  - Lines perpendicular to the direction of travel must be 10 feet from the roof edge
  - Lines parallel to the direction of travel must be 6 feet from the roof edge.
- Access Points, material handling areas, storage areas and hoisting areas shall be connected to the work area by 2 warning lines and, when not in use, shall be barricaded by an equivalent material to prevent a person from walking directly into the work area.

6.2.4.5 Safety Net Systems

Safety nets are designed to catch a falling worker, tools and/or debris before they reach a lower level. Safety net systems are not used by NCDOT; however, private contractors occasionally may use them. If a contractor is using a safety net system and a NCDOT employee will be using this system as a fall protection system, contact your safety engineer for assistance.

6.2.5 Fall Protection Plans, Criteria and Use

Fall protection plans are only available to workers engaged in leading edge work or precast concrete erection work and who can demonstrate that it is not feasible or that a greater hazard is created when conventional fall protection systems are used.

A fall protection plan, must conform to the following provisions:

- A written fall protection plan shall be prepared by a qualified person and developed specifically for the site where the leading edge or precast concrete erection work will take place.
- The plan must be updated when any changes are made.
- The qualified person must approve any changes to the plan.
- A copy of the plan with any approved changes must be onsite.
- Implementation of the plan shall be under the supervision of a competent person.
- If an employee falls, or some other serious event occurs, the circumstances of the fall or event shall be investigated to determine if the fall protection plan needs to be changed. If changes are needed, they shall be implemented to prevent similar types of falls or incidents.

6.2.5.1 Documentation Requirements

The fall protection plan shall include the following documentation in detail:

- Why conventional fall protection systems are not feasible or why their use creates a greater hazard.
- The fall hazards in the work area and a discussion of other measures that will be taken to reduce or eliminate the fall hazard for workers who will work under the plan.
- The specific location where conventional fall protection methods cannot be used. These locations will immediately be classified as controlled access zones and the criteria for controlled access zones and Safety Monitor Systems will be in effect.
- The plan must contain the names of employees designated to work in the controlled access zone. No other employee may be in the controlled access zone.
- The plan must contain the name of the safety monitor.

6.2.5.2 Training

Employees working under a fall protection plan shall be trained on the following:

- The fall protection plan for the work site
- The fall hazards in the work area
- Avoidance of fall hazards
- Recognition of unsafe practices or working conditions
- The function, use and operation of the controlled access zone and the safety monitoring system
- The correct procedure for erecting, maintaining or disassembling of the system used

6.2.5.3 Controlled Access Zones

Controlled access zones may be used as part of a fall protection plan or when over-hand bricklaying work is taking place. Only employees engaged in work inside the controlled access zone are permitted in the zone.

Controlled access zones shall be defined by a control line or any other means that restricts access. The requirements for Control lines are as follows:

Strength:
Control lines shall have a minimum breaking strength of 200 lbs.

Materials:

- Control lines consist of ropes, wires, or tapes or equivalent materials and supporting stanchions flagged with high visibility tape every 6 feet.
- Each line shall be rigged and supported so that its lowest point is not less than 39 inches from the walking/working surface and its highest point in not more than 45 inches. (For overhand bricklaying the highest point should not exceed 50 inches.)

Control Line Layout

- Control lines shall extend along the entire length of the unprotected or leading edge and shall be approximately parallel to that edge, except for overhand bricklaying work.
- Each end of the control line shall be connected to a guardrail system or wall, except for overhand brick laying work.
- For leading edge work:
  The control line shall be erected no less than 6 feet but no more than 25 feet from the unprotected side or leading edge.

For precast concrete member work:
The control line shall be erected no less than 6 feet but no more than 60 feet or half the length of the member being erected whichever is less, from the unprotected side or leading edge.

For overhand bricklaying and related work:

- The control line shall be erected no less than 10 feet but no more than 15 feet from the working edge.
- The control line shall extend a sufficient distance to enclose all employees performing overhand bricklaying and related work at the working edge.
- The control line shall be approximately parallel to the working edge.
- Additional control lines shall be erected at each end of the work area, to enclose the controlled access zone.

6.2.5.4 Safety Monitoring System

A safety monitoring system is a fall protection procedure in which a competent person is responsible for recognizing and warning employees of fall hazards while working near unprotected sides or edges, classified as controlled access zones. It is used as part of a fall protection plan or can be used when overhand bricklaying is taking place. This system relies on the ability of the monitor to see all employees working in the controlled access zone, the worker to hear the safety monitor and the timely reaction of the employee to such warnings. Safety monitoring systems shall meet the following requirements:

- Only a competent person shall be designated as a Safety monitor.
- A competent person shall warn employees when it appears that the employee is unaware of a fall hazard or is acting in an unsafe manner.
- The safety monitor shall be on the same walking/working surface, within visual sight distance and close enough to communicate orally with employees in the controlled access zone.
- A safety monitor shall not have any other responsibilities, which could take their attention away from employees working in the controlled access zone.
- Each employee working in a controlled access zone shall immediately follow all directions and/or warnings from the safety monitor regarding fall hazards.
- Mechanical equipment shall not be used or stored in areas where a safety monitoring system is being used to monitor employees engaged in low slope roof activities.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure adequate funds are available and budgeted for the purchase of fall protection equipment and training in their areas. They will also identify the employees affected by this safety policy and procedure as well as ensure that qualified and competent persons are available. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will communicate appropriate needs to managers/unit heads and consult with a qualified/competent person regarding fall protection systems.

Supervisors will not allow any employee who has not received the required training to be exposed to a fall hazard greater than 6 feet and will ensure that employees are provided with the PPE necessary for their job. Supervisors will ensure that a competent person is managing fall protection.

6.3.3 Qualified Person

A qualified person shall, through education, professional certification in a related field or both, have knowledge and understanding of applicable fall protection regulations, standards, equipment and systems, physical sciences, engineering principles, and mandatory requirements for fall protection equipment and systems used by the employer. The qualified person shall meet the qualifications of a competent person.

Qualified person will be responsible for supervising the design, installation, selection, or approval of anchorage points or any horizontal lifeline systems.

6.3.4 Competent Person

The competent person shall be responsible for the immediate supervision, implementation, and monitoring of the fall protection program. Competent persons are responsible to anticipate, recognize, and evaluate workplace fall hazards and have the authority to taking prompt corrective action.

6.3.6 Employees

Employees shall attend appropriate training and comply with all applicable guidelines contained in this safety policy and procedure. Report all near misses, unsafe acts, unsafe conditions, and fall incidents to supervision.

6.3.7 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, and others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing required training. Safety and Risk Management will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased fall protection equipment and PPE complies with current safety regulations and this safety policy and procedure.

6.3.8 Safety Engineers

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.9 Central Equipment Unit

Central Equipment Unit will be responsible for ensuring that purchased equipment meets or exceeds current safety regulations.

Appendix A: Personal Fall Arrest System Component Inspection Forms

INSPECTION FORM: Full Body Harness

OHSA 1926.502(d)(21)
Personal fall arrest systems SHALL be inspected prior to each use for wear, damage, and other deterioration, and defective components SHALL be removed from service.

6.1 Inspection
6.1.1 Equipment SHALL be inspected by the user before each use and, additionally, by a competent person other than the user at intervals of no more than one year.

FREQUENCY OF INSPECTION IN THE FOLLOWING CATEGORIES:

General Industry:_____ Construction:_____

Your Organization:_____ Manufacturer: _____

MANUFACTURER OF EQUIPMENT:

Name of Manufacturer: _____

Serial #:_____ Model #: _____

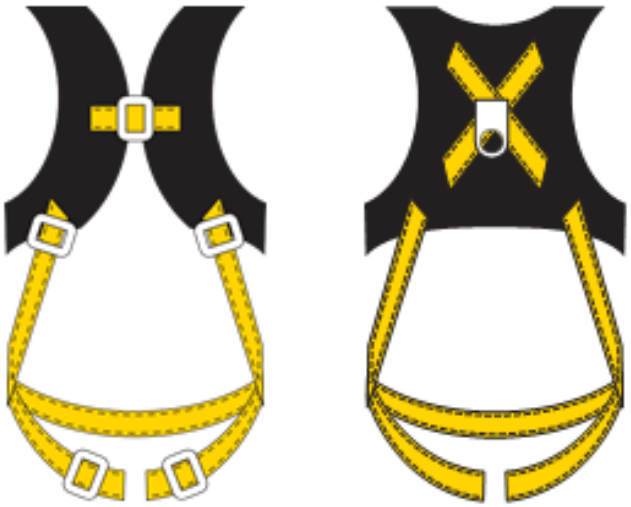
Date of Manufacture:___/___/___

INSPECTION:
Date: ___/___/___

REMOVE FROM SERVICE WHEN:
Date: ___/___/___

NAME OF COMPETENT PERSON: _____

NAME OF USER (AUTHORIZED PERSON): _____



LOOK AT:

1 Hardware 2 Webbing
3 Stitching 4 Labels/Tags

LOOK FOR:

1 HARDWARE	✓	✗
Rust/corrosion		
Deformed/bent		
Burs/cracks		
Weld spots/slag		
Missing rivets		
Springs		
Functionality		
Other		

2 WEBBING	✓	✗
Cuts/burns/holes		
Excessive wear		
Excessive UV damage		
Chemical attack		
Writing on the webbing		
Other		

3 STITCHING	✓	✗
Missing		
Loose		
Broken		
Other		

4 LABELS/TAGS	✓	✗
Missing		
Illegible		
Dates		
Other		

✓ PASS ✗ FAIL

Appendix A: Personal Fall Arrest System Component Inspection Forms (cont. 2)

INSPECTION FORM: Lanyard

OSHA

OHSA 1926.502(d)(21)
Personal fall arrest systems SHALL be inspected prior to each use for wear, damage, and other deterioration, and defective components SHALL be removed from service.

ANSI

6.1 Inspection
6.1.1 Equipment SHALL be inspected by the user before each use and, additionally, by a competent person other than the user at intervals of no more than one year.

FREQUENCY OF INSPECTION IN THE FOLLOWING CATEGORIES:

General Industry:_____ Construction:_____

Your Organization:_____ Manufacturer: _____

MANUFACTURER OF EQUIPMENT:

Name of Manufacturer: _____

Serial #:_____ Model #: _____

Date of Manufacture:___/___/___

INSPECTION:

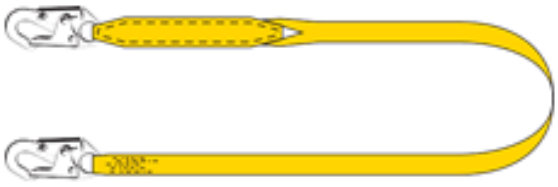
Date: ___/___/___

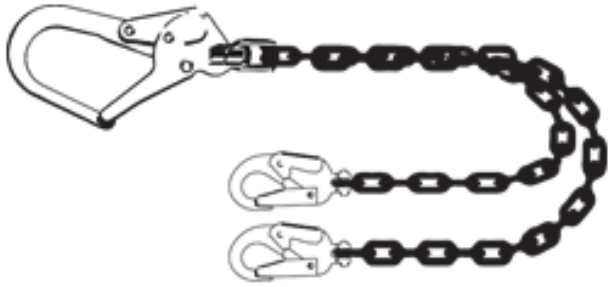
REMOVE FROM SERVICE WHEN:

Date: ___/___/___

NAME OF COMPETENT PERSON: _____

NAME OF USER (AUTHORIZED PERSON): _____





LOOK AT:

1 Hardware 2 Webbing
3 Stitching 4 Labels/Tags

LOOK FOR:

1 HARDWARE	✓	✗
Rust/corrosion		
Deformed/bent		
Burs/cracks		
Weld spots/slag		
Missing rivets		
Springs		
Functionality		
Other		

2 WEBBING	✓	✗
Cuts/burns/holes		
Excessive wear		
Excessive UV damage		
Chemical attack		
Writing on the webbing		
Other		

3 STITCHING	✓	✗
Missing		
Loose		
Broken		
Other		

4 LABELS/TAGS	✓	✗
Missing		
Illegible		
Dates		
Other		

✓ PASS ✗ FAIL

Appendix A: Personal Fall Arrest System Component Inspection Forms (cont. 3)

INSPECTION FORM: Self-Retracting Lifeline

OHSA 1926.502(d)(21)
Personal fall arrest systems SHALL be inspected prior to each use for wear, damage, and other deterioration, and defective components SHALL be removed from service.

6.1 Inspection
6.1.1 Equipment SHALL be inspected by the user before each use and, additionally, by a competent person other than the user at intervals of no more than one year.

FREQUENCY OF INSPECTION IN THE FOLLOWING CATEGORIES:

General Industry:_____ Construction:_____

Your Organization:_____ Manufacturer: _____

MANUFACTURER OF EQUIPMENT:

Name of Manufacturer: _____

Serial #:_____ Model #: _____

Date of Manufacture:___/___/___

INSPECTION:

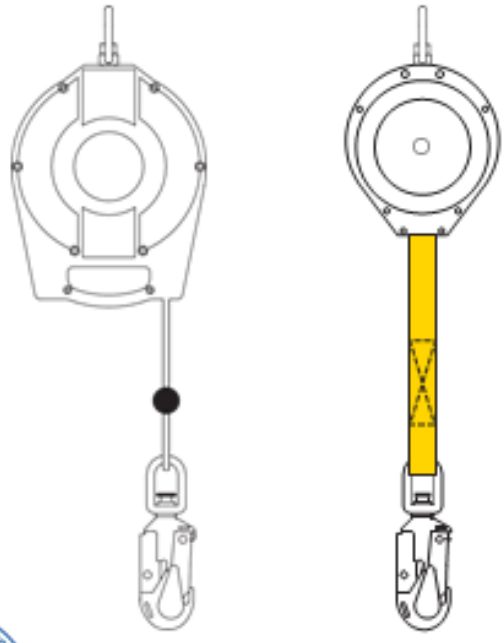
Date: ___/___/___

REMOVE FROM SERVICE WHEN:

Date: ___/___/___

NAME OF COMPETENT PERSON: _____

NAME OF USER (AUTHORIZED PERSON): _____



LOOK AT:

1 Hardware 2 Webbing
3 Stitching 4 Labels/Tags

LOOK FOR:

1 HARDWARE	✓	✗
Rust/corrosion		
Deformed/bent		
Burs/cracks		
Weld spots/slag		
Missing rivets		
Springs		
Functionality		
Other		

2 WEBBING	✓	✗
Cuts/burns/holes		
Excessive wear		
Excessive UV damage		
Chemical attack		
Writing on the webbing		
Other		

3 STITCHING	✓	✗
Missing		
Loose		
Broken		
Other		

4 LABELS/TAGS	✓	✗
Missing		
Illegible		
Dates		
Other		

✓ PASS ✗ FAIL

Appendix A: Personal Fall Arrest System Component Inspection Forms (cont. 4)

INSPECTION FORM: Anchor Point

OHSA 1926.502(d)(21)
Personal fall arrest systems SHALL be inspected prior to each use for wear, damage, and other deterioration, and defective components SHALL be removed from service.

6.1 Inspection
6.1.1 Equipment SHALL be inspected by the user before each use and, additionally, by a competent person other than the user at intervals of no more than one year.

FREQUENCY OF INSPECTION IN THE FOLLOWING CATEGORIES:

General Industry:_____ Construction:_____

Your Organization:_____ Manufacturer: _____

MANUFACTURER OF EQUIPMENT:

Name of Manufacturer: _____

Serial #:_____ Model #: _____

Date of Manufacture:___/___/___

INSPECTION:

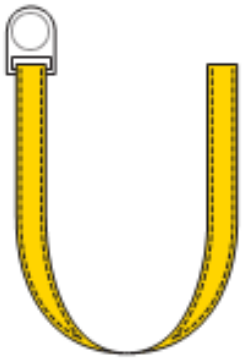
Date: ___/___/___

REMOVE FROM SERVICE WHEN:

Date: ___/___/___

NAME OF COMPETENT PERSON: _____

NAME OF USER (AUTHORIZED PERSON): _____



LOOK AT:

1 Hardware 2 Webbing 3 Stitching 4 Labels/Tags

LOOK FOR:

1 HARDWARE	✓	✗
Rust/corrosion		
Deformed/bent		
Burs/cracks		
Weld spots/slag		
Missing rivets		
Springs		
Functionality		
Other		

2 WEBBING	✓	✗
Cuts/burns/holes		
Excessive wear		
Excessive UV damage		
Chemical attack		
Writing on the webbing		
Other		

3 STITCHING	✓	✗
Missing		
Loose		
Broken		
Other		

4 LABELS/TAGS	✓	✗
Missing		
Illegible		
Dates		
Other		

✓ PASS ✗ FAIL

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Welding SPP#1910.252

Quick Reference

Select this Link to view latest Revision changes

Contents

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures through which North Carolina Department of Transportation (NCDOT) employees receive the training and proper equipment needed to safely perform welding operations..

2.0 Scope and Applicability

The welding process joins metal parts. Welding processes require heat and sometimes other substances to produce the weld. Byproducts resulting from the welding process include fumes and gases which can be serious health hazards to employees. Additionally, safety hazards can exist such as the potential for fire or explosion and injuries from arc radiation, electrical shock, or materials handling.

This safety policy and procedure provides guidelines for safely performing welding operations. It presents provisions for training, discussion on types of welding, safe work practices, and employee protection requirements. It also presents critical details on hot work permits, work in confined spaces, ventilation requirements when performing welding operations, and inspection requirements.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Risk Management, and Central Inventory unit within NCDOT.

This safety policy and procedure affects all employees who are exposed by their job duties to welding and torch cutting operations. These welding and torch cutting operations occur at but are not limited to equipment repair shops, equipment fabrication shops, ferry maintenance and construction operations such as bridge and road repair and maintenance.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.251-257) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.350-.354).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, welding operations will be performed only by authorized and trained employees. When welding hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Welding will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT'S safety policy and procedure on Welding. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT'S safety policy and procedure on Welding.

6.1 Definitions

Approved
Listed or approved by a nationally recognized testing laboratory.

Confined Space
A space that is not designed for human occupancy, has limited openings for entry and exit, may lack adequate ventilation, and may contain or produce dangerous air contamination.

Hazardous
Any act, condition, or substance which poses health and safety risks to employees.

Hot Work Permit
A permit allowing employees to perform work involving welding, cutting, or any task that would deplete oxygen, create toxic fumes and vapors, or create the potential for fire or explosion.

Pulmonary
Any body function related to the lungs.

Welder/Welding Operator
Any operator of electric or gas welding and cutting equipment.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Types of Welding
- Welding Hazards
- Safe Work Practices
- Hot Work Permits
- Employee Protection
- Work in Confined Spaces
- Inspection

6.2.1 Training

Employees who perform welding operations will be trained to:

- Recognize the hazards associated with various welding operations
- Know the safe work practices for welding operations
- Understand the importance and requirements of Hot Work Permits
- Use the appropriate personal protective equipment (PPE) for the job
- Recognize confined spaces and the requirements associated with them
- Understand the importance of regular inspections of welding equipment, attachments, and accessories

This training shall be made available upon initial employment or job re- assignment. Refresher training shall be provided upon the discretion of the supervisor.

6.2.2 Types of Welding

Several types of welding operations are used in NCDOT. The most common welding operations in NCDOT include:

- Gas welding and cutting
- Arc welding and cutting
- Resistance welding
- Plasma arc cutting and welding

The gas welding process unites metals by heating. The gases commonly used as the fuel gas are oxygen and acetylene. The gas cutting process removes metal by a chemical reaction of the base metal with oxygen at an elevated temperature.

The arc welding and cutting processes uses electric current and two welding leads. One welding lead is connected to the electric power supply while the other lead is attached to the work surface.

Resistance welding is a metal-joining process where welding heat is generated at the joint by the resistance to the flow of electric current.

Plasma arc cutting utilizes a high temperature and velocity jet of ionized gas to cut metals by the force of the plasma arc. Plasma arc welding utilizes a constricted plasma arc to heat the metals which are then joined using a filler metal.

6.2.3 Welding Hazards

The hazards associated with welding include health and safety hazards. Health hazards are primarily respiratory hazards due to the generation of fumes and gases. Safety hazards are generally physical hazards due to the work site and conditions and materials associated with the work site.

Health hazards associated with the generation of fumes and gases depend upon the welding process, the base material, the filler material, and the shielding gas if any. Health hazards include exposure to:

- Toxic gases
- Primary pulmonary gases
- Non-pulmonary gases

- Particulate matter
- Irritants and toxic inhalants

Air sampling may be required to identify the fumes and gases emitted from a specific operation.

Safety hazards associated with welding operations include:

- Fire
- Proximity to combustible materials
- Hazardous locations (rooms containing flammable or combustible vapors)
- Closed containers that have held flammable liquids or other combustibles
- Electric shock (arc welding)
- Infrared and ultraviolet eye damage

Appendix A presents precautions that should be followed to minimize, control, or eliminate these safety hazards.

6.2.4 Safe Work Practices

Safe work practices for all welding operations include:

- A Hot Work Permit is required where in confined spaces and areas where flammable or combustible materials are present. See Appendix B for the NCDOT Hot Work Permit which may be used.
- Placing work at an optimal height to avoid back strain or shoulder fatigue
- Using fall protection equipment for work on elevated surfaces more than 6 feet above the floor or ground surface
- Wearing personal protective equipment (PPE) as applicable for the work conditions
- Following special precautions when welding or cutting in a confined space
- Posting warning signs to mark just-completed welding or cutting surfaces
- Following safe housekeeping principles
- Using equipment as directed by the manufacturer instructions or practices
- Removing any butane lighters, matches, or other combustibles from pockets prior to performing work
- Not performing welding work with oily clothing (Leathers may need to be worn over clothing)
- Following fire protection and prevention practices during the welding operation.
- Using proper ventilation techniques during welding operations

(See Appendix C for further details and SPP# 1910.94, Ventilation, for related information)

6.2.5 Hot Work Permits

Hot Work Permits are a useful accountability tool to ensure that all the necessary precautions are taken prior to commencing welding. They also assure that employees are aware of and use the appropriate safeguards when performing welding operations. In confined spaces a hot work permit is required if any welding operations are performed in that space regardless of whether or not a confined space entry permit is required. Appendix B presents NCDOT's Hot Work Permit.

6.2.6 Employee Protection

Employee protection during welding operations must include:

- Safeguards and provisions for fall protection
- Tripping hazard prevention
- Eye protection
- Protection from arc welding rays
- Protective clothing
- Protection from electrical shock hazards

Additionally, to prevent injury from burns, all areas that have been just welded or cut will be marked to inform other employees that the material or area is hot.

For fall protection, employees will either use fall protection such as full body harness will lanyard, or guardrails where falls from heights of 6 feet or more are possible.

Tripping hazards will be minimized by welding lines being placed in order not to create trip and fall hazards. Cables will not block passageways, stairways, or other exits.

Eye protection will be provided by welding helmets being used during all arc welding or arc cutting operations, excluding submerged arc welding. Helpers or attendants will be provided with proper eye protection. Specifications for eye protection are detailed in Appendix E of this safety policy and procedure. Also, see SPP# 1910.132, Personal Protective Equipment, for additional details.

Arc welding ray's protection will be provided by non-combustible or flame-resistant screens, shields or suitable eye protection to workers or other persons adjacent to the welding operations. Booths and screens shall permit circulation of air at floor level.

Protective clothing will vary with the size, nature, and location of the work. Criteria for selection of protective clothing is detailed in Appendix E of this safety policy and procedure.

Electrical protective devices will be used to protect employees from the possibility of electrical shock when welding operations are performed in wet areas or areas where high humidity is present. Refer to SPP# 1910.137, Electrical Protective Devices, for additional detail.

6.2.7 Work in Confined Spaces

No work is to commence until all requirements of the Confined Space Entry Safety Policy and Procedure are met and a Hot Work Permit is submitted. Refer to SPP# 1910.146, Confined Space Entry, for additional details.

Mechanical ventilation will be provided during any confined space welding operation to prevent the accumulation of toxic materials or possible oxygen enrichment or deficiency. All heavy and portable equipment used in confined space welding or torch cutting operations will be secured before operations begin.

When a welder must enter a confined space through a manhole or other small opening, the welder will be attached to a manned lifeline. The lifeline will be attached to not interfere with the welding operation or with the removal of the welder in case of an emergency. A preplanned emergency rescue procedure will be in place prior to the welding operations.

When arc welding operations are completed or temporarily stopped, all electrodes will be removed from the holders. The holders are to be carefully positioned and stored so that accidental contact cannot occur. Additionally, all machines will be disconnected from their power source.

6.2.8 Inspections

All welding equipment including attachments and accessories will be inspected on a monthly basis by the supervisor or his or her designee. A written record including the date, type of equipment, equipment number, and equipment serial number, along with the signature of the employee performing the inspection will be maintained for a period of one year for review by regulatory agencies.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funding is available and budgeted to provide proper equipment, supplies, PPE, and training for welders. They will also be responsible for identifying the employees affected by this safety policy and procedure.

Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will be responsible for ensuring the safe handling of welding and torch cutting equipment and ensuring safety, fire prevention and protection during welding and torch cutting processes.

Supervisors are also responsible for ensuring all welding equipment, including cables, lines and any accessories, are in good working condition. If any indication of damaged equipment is present such as broken or cut insulation on cables, etc., the supervisor will have that equipment removed from service and have it repaired.

6.3.3 Employees

Employees who are involved in welding operations are responsible for ensuring that all fire prevention and fire protection measures have been taken before any torch cutting or welding begins.

Employees are responsible for ensuring that all PPE's is worn properly for the specific hazard involved and that all equipment is in good working condition. Each employee is responsible for bringing hazards to the attention of his or her supervisor for correction as soon as the hazard is recognized.

6.3.4 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training.

Safety and Risk Management will also work with Central Equipment Unit to ensure that all newly purchased compressed gas cylinders equipment and supplies comply with current safety regulations and this safety policy and procedure.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Inventory Unit

Central Equipment Unit will maintain an inventory or source through State Contract supplier for related Welding parts and supplies.

Appendix A: Safety Hazard Precautions

- Welding should be done in a permanent location that can be designed to provide maximum safety and fire protection. Otherwise, if the welding and cutting equipment is portable the site should be inspected to determine what fire protection equipment is necessary.
- Where welding is done near combustible materials, special precautions are necessary to prevent sparks or hot slag from reaching such material and starting fires. If the combustible material cannot be removed, it must be covered with a suitable flame-resistant material and a fire watch should be provided.
- Welding or cutting activities should not be allowed in or near rooms containing flammable or combustible vapors, liquids, or dusts. If welding is required in these locations, all of the surrounding premises should be thoroughly ventilated and have frequent gas testing performed.
- Closed containers that have held flammable liquids or other combustibles should be thoroughly cleaned before welding or cutting.

- Supervisors will inspect areas where welding or torch cutting is to take place and take proper measures to ensure fire hazards are eliminated or protected against. If combustibles are within 35 feet of the welding area, welders will use guards or shields to contain sparks and slag.

- Employees trained as fire watchers will be available in areas where welding is taking place. Appropriate fire extinguishers will be immediately available and accessible at the welding operation.

- No welding, torch cutting or heating shall be done where flammable paints, the presence of other flammable compounds, or heavy dust concentrations exist.

- A Hot Work Permit must be completed and followed where torch cutting and welding operations are conducted in close proximity to flammables, combustibles, hazardous materials or processes, and in confined spaces. Hot work permits assure that employees are aware of and use appropriate safeguards when conducting welding operations in these environments.

Appendix B: Hot Work Permit

NCDOT Hot Work Permit

Date: _____

From: _____ Time To: _____ Time

Bldg.: _____ Dept.: _____ Floor: _____

Work to be done: _____

_____

_____

_____

Work performed by: _____

Fire Watch assigned: Yes ☐ No ☐

Names for Fire Watch Personnel: _____

Safety Checklist

Yes ☐	No ☐	Have all flammable or combustible materials been removed from the work area (35 feet radius)?
Yes ☐	No ☐	If any flammables or combustibles cannot be removed, have they been covered by fire resistant shields or tarpaulins?
Yes ☐	No ☐	Is adequate firefighting equipment readily available?
Yes ☐	No ☐	Have vulnerable areas of combustible floors and/or roofs been wet-down or properly covered?
Yes ☐	No ☐	Have wall and/or floor openings been properly covered?
Yes ☐	No ☐	Is the hot work equipment in good working condition?
Yes ☐	No ☐	Is a Confined Space Permit required?
Yes ☐	No ☐	If pressurized lines or lines containing hazardous gases or liquids must be broken or cut, have the appropriate safety measures been taken?
Yes ☐	No ☐	Are Lock-Out Tag-Out Procedures required?
Yes ☐	No ☐	Has the atmosphere been checked with a multi-gas meter for flammable/ explosive gas levels or other atmospheric hazards?
Yes ☐	No ☐	Is ventilation adequate?
Yes ☐	No ☐	If no, has forced ventilation or supplied air been provided?
Yes ☐	No ☐	Is adequate PPE (gloves, eye and hearing protection, breathing apparatus, special clothing, boots, etc.) provided for exposed workers?
Yes ☐	No ☐	Are curtains or shields in place to protect others in the area?
Other special precautions taken:		
_____		

Signatures Required Before Beginning Work

I have been instructed and I understand the hazards as well as the precautions necessary to do this work safely.

_____
Signature of person performing the work

I verify that this work site has been inspected, that all necessary precautions have been taken to prevent fires and/or explosions to control hazard conditions, and the individual signed above is authorized to begin doing this work.

_____ _____
Signature of Supervisor Date & Time (am or pm)

Signatures Required After Completing Work

The work has been completed: _____
Date & Time (am or pm)

_____
Signature of person performing the work

I have personally inspected the worksite after completion of the work and find the area to be in safe condition.

_____
Signature of Supervisor

_____
Date & Time (am or pm)

APPENDIX C: Ventilation Guidelines for Welding Operations

- Mechanical ventilation will be provided for welders and helpers when:
  - Welding is being performed in a space less than 10,000 cubic feet per welder.
  - A room has a ceiling height less than 16 feet.
  - A confined space or welding space contains partitions, balconies, or other structural barriers to the extent that obstruct cross ventilation.

- The minimum rate for mechanical ventilation will be 2,000 cubic feet per minute per welder unless exhaust hoods or air-supplied respirators are provided.

- When using local exhaust hoods, they will be placed as close to the operation as possible. The exhaust hood will provide a rate of 100 linear feet per minute of air flow in the welding zone.

- Air-supplied respirators will be used when mechanical ventilating is not possible or when materials such as beryllium and cadmium are used. Refer to SPP # 1910.134, Respiratory Protection, for additional details.

- Local exhaust ventilation or air-supplied respirators will be used when welding or torch cutting on coated metals (e.g., zinc, mercury, cadmium, lead, etc.) indoors or in confined spaces. Outdoors operations shall be done using respiratory protective equipment.

NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

Return to the Safety Policy and Procedure Manual

Table of Contents

Fleet Safety SPP# A-6

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish a comprehensive Fleet Safety Program for North Carolina Department of Transportation (NCDOT) employees to ensure State and NCDOT owned/operated motor vehicles are driven and maintained is a safe manner.

2.0 Scope and Applicability

Vehicle driving safety is a critical component in reducing accidents caused by motor vehicles. The Fleet Safety Program is designed to reduce injuries and loss due to driver error.

This safety policy and procedure provides guidelines for training Safety Staff, Fleet Safety Instructors and employees in safe driving techniques. Additionally, it presents a discussion of the program components of NCDOT's Fleet Safety Program and confidentiality requirements.

It also details the areas of responsibility for managers/unit heads, supervisors, Fleet Safety Instructor-Trainers, Safety Staff, Fleet Safety Instructors, employees and Safety and Risk Management within NCDOT.

This safety policy and procedure covers all NCDOT drivers of NCDOT vehicles owned, leased or rented. Trucks covered by this safety policy and procedure include utility trucks (class code 0203) through tractor-trailers. Heavy equipment operation is not covered by this safety policy and procedure.

3.0 Reference

This document is established in accordance with NCDOT Safety Policy and Procedures, Best Practices and Motor Vehicle Laws of North Carolina.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, all employees who operate motorized vehicles (excluding heavy equipment) as part of their assigned duties or their position function must be trained in safe driving using NCDOT's Fleet Safety Program.

5.0 General Responsibilities

It is the responsibility of each Division Engineer, manager, unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on Fleet Safety. It is also the responsibility of each employee to immediately report any unsafe act or condition related to fleet safety to his or her supervisor.

6.0 Procedure

This section provides applicable definitions, establishes general provisions and identifies specific responsibilities required by NCDOT's safety policy and procedure on Fleet Safety.

6.1 Definitions

Commercial Driver's License (CDL). Driver's license for a specific class vehicle (by weight) and specific endorsements, when required. Please note age restrictions.

Commercial Motor Vehicle (CMV)

(1) A single vehicle with a gross vehicle weight rating (GVWR) of more than 26,001 pounds,

(2) A combination vehicle with a gross combination weight rating (GCWR) of 26,001 or more pounds, provided the GVWR of the vehicle(s) being towed is in excess of 10,000 pounds,

(3) A vehicle designed to transport 16 or more passengers (including the driver),

Division Fleet Safety Coordinator
Designated individual (within Division/Unit) who evaluates drivers, coordinates testing and schedules Fleet Safety driver training.

Fleet Safety Instructor-Trainer
Individuals who, through advanced fleet safety training and/or experience, are qualified to train Safety Officers and Fleet Safety Instructors on the fundamentals of NCDOT's Fleet Safety Program.

Fleet Safety Instructors
Individuals appointed by the Division Safety Staff to assist in administering the Fleet Safety Program.

Heavy Truck
Class Code 0203 (utility truck) and larger trucks

Psychophysical Tests
Tests that measure visual acuity, depth perception, peripheral vision, reaction time and color blindness.

State of NC/Unit Owned Vehicle/Equipment (State Owned)
For the purposes of this SPP vehicles owned/leased/rented by a state agency, division, unit, DOA Fleet Management regardless of procurement process and may/may not be assigned a state/public license plate shall be referred as state owned.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Program Components
- Confidentiality
- NCDOT Equipment Lighting Policy
- Drug and Alcohol Testing
- Cell Phone Use

6.2.1 Training

Training requirements of this safety policy and procedure include the following categories of personnel:

- Fleet Safety Instructor-Trainers
- Fleet Safety Instructors
- Employees

The Division Fleet Safety Coordinator and Fleet Safety Instructors shall receive training upon initial job assignment. Fleet Safety Instructor- Trainers will conduct this training. Appendix A details the training subjects and eligibility requirements for the Safety Officers and Fleet Safety Instructors. Periodic refresher training shall also be conducted at the discretion of Safety and Risk Management.

Employees whose job duties may include the operation of heavy trucks (class code 0203 and heavier) shall receive the Fleet Safety Training Course upon initial employment and/or job assignment. Training will be further be required for any driver who, in the performance of their duties, is involved in two or more equipment accidents within a three-year period shall receive the Fleet Safety Training Course and any other remedial training as deemed appropriate by the supervisor or Division Engineer. Driver refresher training shall be conducted every three years or earlier at the discretion of supervisors or the Division Engineer/Unit Head.

All other employees who operate automobiles and light duty trucks shall receive Defensive Driving Training upon initial assignment and, as a minimum, every three years thereafter. Appendix B highlights the major components of the Defensive Driving Training section of the Fleet Safety Program.

6.2.2 Program Components

The Fleet Safety Program includes the following components:

- Initial driver evaluation and selection (See Appendix C for driver screening and training process).
- Driver record check and evaluation.
- Psychophysical testing (See Appendix D for guidelines on conducting psychophysical testing)
- Classroom training
- In-vehicle road testing
- In-vehicle road training when deemed appropriate by supervisor or Safety Staff
- Fleet Safety files maintained at the Division headquarters (See Appendix E for Fleet Safety file requirements)
- Follow-up and remedial training
- Continuous documented preventive maintenance by drivers on their assigned vehicles (See Appendix F for a sample vehicle preventive maintenance checklist)

- Incident Review Committee's review and analysis of equipment accidents as detailed in the Workplace Safety Manual and SPP #A-2, Safety Program Policy and Procedure
- Employee recognition (e.g., incentive pins, plaques, vehicle rodeos, etc.)

6.2.3 Confidentiality

All driver Fleet Safety files will be considered confidential. These records will be locked when not in use. The contents of these files will not be divulged to anyone other than staff and supervisors who must have this information to determine the qualifications of drivers to operate state-owned equipment.

In accordance with General Statute 126-24 and as approved by the Secretary of NCDOT, Safety Engineers, Consultants, and Officers are authorized to have access to employee's personnel files to research employee safety records.

6.2.4 NCDOT Equipment Lighting Poicy

All NCDOT vehicles utilized in Work Zone or Road Construction/Maintenance operations are required to be equipped with Warning Lights per the NCDOT Equipment Lighting Policy.

See Appendix G for the NCDOT Equipment Lighting Policy.

6.2.5 Drug and Alcohol Testing

NCDOT has a Controlled Substance Abuse and Alcohol Misuse Standard Policy and Procedure administered by the Safety and Risk Management Controlled Substance and Alcohol Program Manager. NCDOT employees (CDL/Non-CDL) that operate state owned vehicles are subject to drug and/or alcohol testing.

CDL drivers are subject to the following types of testing:

1. Pre-Employment Testing
2. Random Testing
3. Follow-Up Testing
4. Reasonable Suspicion Testing
5. Post-Accident Testing

All other drivers are subject to the following types of testing:

1. Reasonable Suspicion Testing
2. Post-Accident Testing

See Appendix H for instructions on Post-Accident Drug and Alcohol Testing

6.2.5 Cell Phone Use

Hands-free is the only acceptable use of cell phones when operating a NCDOT vehicle per Federal Motor Carrier Safety Administration. Hand-held mobile devices are prohibited.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for taking an active role in the implementation and continuous support of the Fleet Safety Program. Additionally, Managers/Unit Heads are responsible for ensuring
compliance with the guidelines contained in this safety policy and procedure. They are also responsible for delegating and assigning specific responsibilities to assure that an effective Fleet Safety Program is maintained.

Manager/Unit Heads are responsible for designating an individual to act as the coordinator for the Fleet Safety Program. Additionally, they may designate two or more Fleet Safety Instructors to assist during times of peak load.

Managers/Unit Heads are responsible for ensuring that adequate funding is budgeted and available to support the Fleet Safety Program. They are also responsible for identifying the affected employees and ensuring employees are included in the program.

Manager/Unit Heads will obtain and coordinate the required training for
the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through the auditing process.

6.3.2 Supervisors

Supervisors who have drivers under their supervision are responsible for:

- Allowing drivers under their supervision to attend the required testing and training
- Informing the designate coordinator of changes in driver's status
- Assisting in the arrangements of training schedules and facilities
- Cooperating with the designated coordinator on driver information requests
- Ensuring that drivers perform Pre-Trip inspections on their assigned vehicles
- Ensuring that equipment is not abused
- Ensuring that equipment is not operated when it is unsafe and known to be defective

Supervisors who have employees under their supervision who have been appointed as Fleet Safety Instructors will cooperate with the designated coordinator in making the Fleet Safety Instructors available to assist during peak times or as requested by other Divisions.

Supervisors shall not permit any employee to operate a Commercial vehicle if they have not been adequately trained and/or tested.

Supervisors shall not permit any employee to operate a State owned or leased vehicle until a driver's record check regarding the employee has been processed and deemed satisfactory by the Division Coordinator.

Before permitting a driver to operate a State owned or leased vehicle, supervisors will ensure the driver has the appropriate North Carolina Driver's License for the assigned vehicle. Supervisors shall not permit any employee to operate a heavy truck until the employee has been road tested, evaluated and certified by the Division Coordinator or his designee.

Supervisors are responsible for promptly investigating all equipment accidents and completing all required documentation as detailed in the Workplace Safety Manual and SPP # A-2, Safety Program Policy and Procedure.

6.3.3 Fleet Safety Instructors-Trainers

Fleet Safety Instructor-Trainers are responsible for providing the Division Coordinator and Fleet Safety Instructors with NCDOT's standard Fleet Safety Instructor Course. The Fleet Safety Instructor-Trainers are also responsible for providing consultative services for Fleet Safety procedures.

To conduct a road test, the Fleet Safety Instructor-Trainers must have the appropriate CDL license.

6.3.4 Division Fleet Safety Coordinator

Division Fleet Safety Coordinators are responsible for coordinating and managing the Fleet Safety Program in their division/unit. They are also responsible for maintaining Fleet Safety files and records.

Division Coordinators will be responsible for issuing NC DOT Driver Licenses and coordinating skill and psychophysical tests as needed. They will assist supervisors in any matter related to the Fleet Safety Program.

6.3.5 Fleet Safety Instructors

Fleet Safety Instructors are responsible for assisting with Fleet Safety Training during peak times or as requested. This will include assisting with road testing and training, and classroom training. Fleet Safety Instructors shall comply with all the requirements of the Fleet Safety Program. They will assist supervisors in any matter related to the Fleet Safety Program.

6.3.6 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

All drivers of vehicles are responsible for staying current with regulations and notifying their supervisor of conditions or issues that may affect their ability to drive (i.e. medical conditions, prescriptions, accidents/mishaps/incidents, tickets, loss of license, etc...).

Any driver holding a CDL who is convicted of violating any State law or local ordinance relating to motor vehicle operations in this or any other state, other than parking violations, shall notify they supervisor in writing within 30 days of the conviction.

Any driver whose driver's license is suspended, revoked, or canceled, shall notify they supervisor upon reporting for duty. Failure to comply with this requirement is grounds for dismissal.

Employees who are designated as Fleet Safety Instructors shall comply with all the requirements of NCDOT's Fleet Safety Program.

6.3.7 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to Managers/Unit Heads, Supervisors and others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training. Additionally, Safety and Risk Management will provide training for Fleet Safety Instructor-Trainers and will provide technical guidance for the Fleet Safety Instructor-Trainers.

Division Safety Engineers, Consultants, and Officers will provide consultative assistance within their respective division to ensure the effective administration of this safety policy.

APPENDIX A: Training and Eligibility Requirements for Fleet Safety Instructors & Safety Staff

Training Subjects for Fleet Safety Instructor Course

- Safety Policy and Procedure A#6 – Fleet Safety
- Safe driving techniques
- Defensive driving
- Attitude, emotions and driving
- Training in accident avoidance techniques for specific accident types
- Processing driver record checks
- How to conduct road testing and training
- Driver evaluation
- Follow-up and remedial road training
- Conducting psychophysical tests
- Establishing and maintaining Fleet Safety driver files and records
- How to instruct

Fleet Safety Instructor Eligibility Requirements

- High school graduate (minimum)
- No more than two convictions of moving violations in the past 3 years
- No driver's license suspensions, revocations, cancellations or disqualifications in the past 5 years.
- No convictions of alcohol or drug related offenses in the past 10 years
- Experience or knowledge of driving Commercial vehicles
- Good verbal and written communication skills
- Ability to complete documentation forms accurately and neatly
- Dependable
- Safety conscious
- Ability to work with minimum supervision

APPENDIX B: Defensive Driving Training

As a minimum, the CDL defensive driving training components of the Fleet Safety Program shall include the following subject areas.

- Defensive Driving definitions
- Three basic steps of defensive driving
- The types of traffic conflicts
- Driving distractions
- Unpracticed driving skills
- Smith System Fundamentals (Space Cushion Driving Techniques)
- Space Cushion Driving Keys:
  - Key # 1- Aim High
  - Key # 2- Get the Big Picture
  - Key # 3- Keep Your Eyes Moving
  - Key # 4- Leave Yourself an Out
  - Key # 5- Make Sure They See You

Note: For all NCDOT Non-CDL drivers (All NCDOT employees who operate automobiles and light duty trucks) shall receive Non-CDL Defensive Driving Training covering the following subjects:

- Driving behaviors and conditions
- Distracted driving
- Aggressive drivers
- Becoming a defensive driver

APPENDIX C: Driver Screening and Training Process

Driver Record Check

Prospective drivers must meet the following standards to be eligible to operate NCDOT vehicles:

- No more than two convictions of moving violations within the past three years No convictions of an alcohol or drug related traffic offense within the past five years
- Valid, current North Carolina driver's license appropriate for the type of vehicle to be operated (*Note: Employees permanently residing in adjacent states may operate a DOT vehicle using a current, valid, appropriate driver's license from their state of residence.)*
- If a driver applicant has possessed an out-of-state driver's license in the past ten years, the driver's record from the state(s) involved shall be obtained. Such applicants and those who currently possess an out-of-state driver's licenses will be responsible for providing their driving records from the appropriate states.

Road Testing and Evaluation for CDL Drivers

Before a prospective employee is allowed to operate a heavy truck (class code 0203 and heavier vehicles), they must:

- Must complete Dump Truck and/or Low Boy training through NCDOT LMS or equivalent training
- Be road tested by the Division Fleet Safety Coordinator or a Fleet Safety Instructor
- Complete any needed road and/or classroom training as indicated by the Division Fleet Safety Coordinator or Fleet Safety Instructor who conducted the road test
- Be certified by the Division Fleet Safety Coordinator or Fleet Safety Instructor

Driver Applicant Screening

- All applicants complete Driver's Questionnaire and provide required driving information (CDL or other)
- Supervisor reviews driver applications and selects best applicants.
- Supervisor interviews best applicants and selects the best qualified for road testing.
- The supervisor, utilizing this information, then makes a final selection of the best- qualified applicant and forwards through normal channels.
- The Division Fleet Safety Coordinator or Fleet Safety Instructor will conduct a road test of the new hire and provide an evaluation along with training recommendations to the supervisor as soon as possible after hiring.
- The supervisor will then schedule employee for the first available Fleet Safety Course.

Annual Driver License Check

An annual driver license check will be conducted to ensure NCDOT drivers license are current and review any convictions which may warrant action.

APPENDIX D: Guidelines for Conducting Psychophysical Testing

Psychophysical testing will be included as a part of the Fleet Safety Training Course. In addition, the Division Fleet Safety Coordinator will coordinate psychophysical testing for drivers he/she deems appropriate in the following situations:

- Observation and evaluation of a driver indicates a problem may exist regarding the driver's visual acuity, depth perception, peripheral vision, reaction time or color blindness
- Following an incident in which there are indications that the driver's visual acuity, depth perception, peripheral vision, reaction time or color blindness may have been a contributing factor
- Upon request by the supervisor
- Upon request by the driver

If psychophysical testing indicates a driver's visual acuity is less than 20/40 with the use of both eyes, the Division Fleet Safety Coordinator shall immediately advise the driver's supervisor. The subject driver shall not be permitted to operate any NC DOT equipment until an eye specialist documents the subject driver's vision is at least 20/40 with the use of both eyes. If corrective lenses are needed in order for the driver to meet this requirement, the driver will be required to wear corrective lenses when operating NC DOT equipment.
If psychophysical testing indicates the driver to be deficient in-depth perception, peripheral vision, reaction time or color blindness, the Division Fleet Safety Coordinator will advise and train the driver on methods to compensate for the problem (s).

Divisions or Units whose Psychophysical testing unit is defective and which cannot be repaired or replaced, shall require employee to get Eye Exam to meet requirements of psychophysical testing. NCDOT will cover the cost of the eye exam.

APPENDIX E: Driver's Fleet Safety File Requirements

NCDOT Drivers' Fleet Safety files that are maintained at the division/unit headquarters will consist of the following:

- Driver Applicant Questionnaire
- DMV Driver's Record Check
- Road Test Documentation
- Equipment Accident and Property Damage Reports (Form 140) on the subject driver
- Incident Reports (Forms I-1, I-2 and I-3) on subject driver
- Psychophysical test score sheet (if applicable)
- Comments and evaluation by Division Fleet Safety Coordinator or Instructors

APPENDIX F: VEHICLE PREVENTATIVE MAINTENANCE

All vehicles operated by DOT personnel need to be inspected on a regular basis. Regular inspections must take place during the 5,000-mile period between scheduled preventive maintenance. Commercial Driver License Law for all vehicles in excess of twenty-six thousand pounds GVWR dictates such inspections. These inspections are required each day, prior to the vehicle being placed into service and shall be documented using NCDOT Pre-Trip Inspection books. However, there is no such policy or requirement for noncommercial vehicles. These vehicles shall be inspected once per week. **All employees shall be trained in the inspection of each item for their appropriate vehicle.**

In addition, each department head as prescribed in the following policy shall maintain the records of these inspections.

Non-Commercial Vehicles (Less than 10,000 lb. GVWR)

In order to assure the safe operating condition of the above referenced vehicles, it shall be the policy of the Department of Transportation that each vehicle shall be inspected at least once per week. To avoid confusion in this matter, it shall be required that each employee operating a vehicle for the first-time during a given week shall inspect the vehicle prior to operation. This may require the vehicle to be inspected several times during a given week. However, this will ensure that each employee operating a vehicle has checked that the vehicle is in safe working order. These inspections are to be performed in accordance with the inspection provided for non-CDL vehicles. Each item should be checked for proper condition and function.

Commercial Vehicles (10,000 lb. GVWR or More)

The state of North Carolina requires, under the Commercial Drivers License Law, that all such vehicles be inspected prior to being placed into service each day. It shall be the policy of the Department of Transportation to inspect all commercial motor vehicles in a manner to comply with this law. The following inspection sheets shall be followed in order to insure uniformity in these inspections.

Maintenance of forms

To maintain uniformity in the collection and security of all vehicle Pre-Trip inspections, the following shall be required. Each employee shall maintain daily inspections in the Pre-Trip Inspection CDL book provided for the vehicle during the calendar year. In the event that said vehicle is involved in an incident, a copy of the pages completed up to the time of the incident, shall be attached to the required incident investigation forms and submitted to the Safety Officer. The Inspection form shall be maintained with the incident investigation forms in the Division Office. This will ensure that all incident investigations will have documentation to support that the vehicle was in safe operating condition at the time of the incident. This policy shall apply to all vehicle inspection forms.

No vehicles shall be operated if it is unsafe to do so!

APPENDIX G: NCDOT Equipment Lighting Policy

NC DOT EQUIPMENT LIGHTING POLICY

Mar-18

Listed below are the different class codes of NC DOT equipment and the appropriate types of warning lights to be installed on each class code. Please cross reference the type of light with the current year's Lighting Committee's Lighting Recommendations.

Note: Clear flashing lights are generally recognized as emergency vehicles such as, (Fire, Rescue and Law Enforcement). Amber flashing lights are generally recognized as roadway maintenance or construction equipment. Therefore, the committee recommends discontinuing (clear) lights and using the color (amber) for any new installation.

Class Code	DESCRIPTION	OPTION	SPECIFIED LIGHTS
O200	Van w/ Aerial Device	Option 1	Two (2) 17" light bar, low profile LED-A, separated.
		Option 2	One (1) 48" LED-A light bar.
O200	Carryall/Van	Option 1	One (1) 17" light bar, low profile LED-A AND Four (4) corner LED-A perimeter lights AND One (1) 30" rear mount LED-A; top center inside.
		Option 2	One (1) 48" LED-A light bar. AND Four (4) corner LED-A perimeter lights AND One (1) 30" rear mount LED-A; top center inside.

APPENDIX G: NCDOT Equipment Lighting Policy (Continued)

Class Code	DESCRIPTION	OPTION	SPECIFIED LIGHTS
0201, 0202, 0221, 0220, 0222	Pick-up (Trans. Supv.) (Bridge Maint. Supv.) (VERTS) (Pre-line) ect.	Option 1	Two (2) 17" light bar, low profile LED A, separated *AND* Four (4) corner LED A perimeter lights.
		Option 2	One (1) 48" LED A light bar. *AND* Four (4) corner LED A perimeter lights.
		Option 3	One (1) 23" LED A light bar *AND* Four (4) corner LED A perimeter lights.
0201, 0202, 0221, 0220, 0222	White Supervisor Vehicles (Only 0201,0202, 0221, 0220, 0222 class codes)	Option 1	Two (2) 17" light bar, low profile LED A, separated *AND* Four (4) corner LED A perimeter lights.
		Option 2	One (1) 48" LED A light bar. *AND* Four (4) corner LED A perimeter lights.
		Option 3	One (1) 23" LED A light bar *AND* Four (4) corner LED A perimeter lights.
0203	Sign Truck, Aerial Device, Mechanics Service Truck		One (1) 48" LED A light bar. AND Twelve (12) corner LED amber perimeter lights.

APPENDIX G: NCDOT Equipment Lighting Policy (Continued)

Class Code	DESCRIPTION	OPTION	SPECIFIED LIGHTS
0203, 0233	Special Paint Marking Truck		Two (2) 17" light bar, low profile LED A, separated *AND* Four (4) corner LED A perimeter lights. *AND* Two (2) grill mounted LED lights
0203	Cone Retrieval Truck		Two (2) 17" light bar, low profile LED A, separated Two (2) LED amber strobes in grill Twelve (12) corner LED strobes on bed corners. One (1) 30"X60" LED arrow board.
0204, 0224,	Crew Cab Pickup	Option 1	Two (2) 17" light bar, low profile LED A, separated *AND* Four (4) corner LED A perimeter lights.
		Option 2	One (1) 48" LED A light bar. *AND* Four (4) corner LED A perimeter lights.
		Option 3	One (1) 23" LED A light bar *AND* Four (4) corner LED A perimeter lights.
0205, 0212 &0232 After 2018 Buy	Dump/Tandem/Tri-Axle Combination of 6 lights Placed as follows		Two (2) high intensity strobe lights mounted on each side of headboard. Two (2) 6" Oval LED mounted on the side of the headboard Two (2) 6" Oval LED mounted on the front of the headboard Two (2) 6" Oval LED mounted on the rear of the bed post
0206	Aerial Device	Option 1	Two (2) 17" light bar, low profile LED A, separated *AND* Four (4) corner LED amber perimeter lights.
		Option 2	One (1) 23" LED A light bar *AND* Four (4) corner LED amber perimeter lights.
0206 / 0209/0233 After 2018 Buy	Flat Bed Dump Combination of 6 lights Placed as follows		Two (2) high intensity strobe lights mounted on each side of headboard. Two (2) 6" Oval LED mounted on the side of the headboard Two (2) 6" Oval LED mounted on the front of the headboard Two (2) 6" Oval LED mounted on the rear of the bed post

APPENDIX G: NCDOT Equipment Lighting Policy (Continued)

Class Code	DESCRIPTION	OPTION	SPECIFIED LIGHTS
0233	Herbicide Sprayer truck		One (1) rear facing 4'x8' arrow board Two (2) LED A 17" low profile light bars separated Eight (8) corner LED A perimeter lights on the bed Two (2) corner LED A perimeter lights on front of the truck.
0206	Truck Mounted Patcher		Two (2) 17" light bar, low profile LED A, separated.
0205, 0206/3230	Truck w/Crash Attenuator		Two (2) high intensity strobes mounted on each side of headboard and amber arrow board (96" X 48").
0206, 0209, w/1305, 0219 w/1302	Truck w/800 gal. and 1500 gal. distributor bodies	Option 1	One (1) 17" light bar, low profile LED A
		Option 2	One (1) high intensity strobe light, cab mounted.
0210	IMAP ONLY		One (1) 42" light bar, low profile LED with red arrow stick. One (1) 30 X 60 led arrow board. Four (4) amber strobes mounted on front grill. Ten (10) amber strobes on 4 corners of bed. Two (2) rear facing red strobes on back of bed. (Truck must be Park for Red warning lights to activeate)
0214, 0230	Bridge Insp. Aerial Device		Two (2) 17" light bar, low profile LED A, separated. *AND* Four (4) corner LED amber perimeter lights.
0213, 0230	Truck Mounted Cane		Two (2) 17" light bar, low profile LED A, separated. *AND* Four (4) corner LED amber perimeter lights.
0217	Low boy Truck/Tractor		Two (2) 17" light bar, low profile LED A, separated.
0219	Mobile Sweeper, truck mounted		One (1) high intensity strobe light mounted on rear arrow strip.
0219	Center Paint Machine		Two (2) 17" light bar, low profile LED A, separated *AND* Front & rear facing arrow board, type 4' X 8'

APPENDIX G: NCDOT Equipment Lighting Policy (Continued)

Class Code	DESCRIPTION	OPTION	SPECIFIED LIGHTS
0219 w/1730			
0304, 0314	Backhoe/Loader		One (1) permanent mount high intensity strobe light. Two (2) LED Flush Mount to the rear.
0302, 0303, 0306, 0312	Mower Tractor Broom Tractor		One (1) 17" light bar, low profile LED A
0313	Guard Rail Mower		One (1) single LED perimeter on left rear fender facing rear. (***NOTE*** On Guard Rail mower -- Install one LED on each rear fender)
0900	Grader		One (1) or two (2) high intensity strobe lights, cab mounted.
1011	Asphalt Machine		One (1) pole mounted high intensity strobe.
1300	Tar Kettle		Pulling truck should have proper lights for its class code.
1404	Sweeper		One (1) high intensity strobe light , cab mounted.
2002	Wheel Loader		One (1) magnetic mount *OR* One (1) permanent mount High intensity strobe light.
2009	Belt Loader		One (1) high intensity strobe light, cab mounted.
2501, 2510	Patch Roller 4 6 Ton Patch Roller 5 8 Ton		One pedestal mount or ROPS mount high intensity strobe light.
2852	Ditcher		One (1) high intensity strobe light, cab mounted or one magnetic mount high intensity strobe light.
2853	Stone/Sand Spreader		Two (2) pedestal mount high intensity strobe lights.
3153	Lube Truck		Two (2) 17" light bar, low profile LED A, separated *AND* Four (4) corner LED amber perimeter lights.
3206	Low boyTrailer		No additional lights, red flags required by permit at widest point and rear of load on over width/over length. (Remember to use proper lighting on escort vehicles.)
3214	Sign Trailer		Two (2) Pole Mounted High intensity strobe light, *OR* Two (2) pedestal Mount High intensity strobe lights.
4124	Truck W/Traffic Service Package		Two (2) 17" light bar, low profile LED A, separated *And* Four (4) corner LED amber perimeter lights.

APPENDIX G: NCDOT Equipment Lighting Policy (Continued)

Class Code	DESCRIPTION	OPTION	SPECIFIED LIGHTS
4127, 4129	In-Body Salt Spreader	Option 1	Proper lighting for primary class code and one downward facing chute mounted work light. Optional: One (1) high intensity strobe light, rear center mount.
		Option 2	Proper lighting for primary class code and one downward facing chute mounted work light. Optional: One (1) high intensity strobe light, rear center mount. *AND* A 12 volt tractor light wired to come on when truck is put into reverse.
4135, 4136, 4159	Fork Lift		One (1) high intensity strobe light mounted on top of operator enclosure.
4170	Hydroseeder		Two (2) 17" light bar, low profile LED A, mounted on rails at corner of operator station.

*-Grill Mounting Kit---(Light and 90 Degree Grill Mount, LED-A)-
F150 Flange Mount Kit---(Light and Corner/Surface Mount, LED-A)
Ford Super Duty Flange Mount Kit---(Light and Corner/Surface Mount, LED-A)-
Replacement Light---(Included with kits above)

APPENDIX H: Post-Accident Drug and Alcohol Testing

DRIVER INSTRUCTIONS
POST-ACCIDENT DRUG AND ALCOHOL TESTING

A DOT drug and alcohol post-accident test SHALL be conducted following any accident an employee is involved in while on duty where:

- A life is lost or
  - If operating a motor vehicle, the NCDOT driver is cited for a moving traffic violation and any individual involved is transported for medical treatment
  - If operating a motor vehicle, the NCDOT driver is cited for a moving traffic violation and a vehicle involved is disabled and removed from the scene by other than its own power.

DRIVER INSTRUCTIONS immediately following an accident:

1. Contact your Supervisor
   a. Provide description of accident.
   b. Provide your physical location.
2. Supervisor will determine if DOT drug and alcohol testing is required (DOT testing required only if accident meets the criteria described first paragraph)
3. Supervisor or driver contacts your Personnel Technician/Division Safety Engineer, Safety Consultant, or Safety Officer.
4. Personnel Technician/Safety Officer advises Supervisor or driver which collection site will be used for testing.
5. Driver advises collection site personnel that a post-accident drug screen and a breath alcohol test are both required.
6. Driver is sent home pending results of post-accident testing. Your Personnel Technician will advise the Controlled Substances and Alcohol section at 919-814-2159.
7. Any questions or concerns during after-hours post-accident collection process, should be referred immediately to NCDOT's substance abuse testing contractor, SafetyFirst at 800-245-1150.

Author:	Paul Roberts	Revision #:	3
Approved By:	Bobby Lewis	Date Revised:	March 2020

SAFETY POLICY & PROCEDURE

Emergency Action Plan SPP# 1910.38

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures for developing and implementing Emergency Action Plans.

2.0 Scope and Applicability

This safety policy and procedure provides guidelines to be followed when Emergencies related to medical, fire, explosion, severe weather, toxic fumes, electrical, structural failure, or threat including Active Shooter occur at any NCDOT facility.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Risk Management within NCDOT.

This safety policy and procedure affects every NCDOT employee.

3.0 Reference

This safety policy and procedure is established in accordance with the Occupational Safety and Health Standard for General Industry (29CFR 1910.38) and Occupational Safety and Health Standards for Construction Industry (29 CFR1926.35) for Emergency Action Plans.

4.0 Policy

It is the policy of NCDOT to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Each NCDOT facility shall have an Emergency Evacuation and Exit Route Plan posted for fire emergency showing primary and secondary egress routes out of the facility in the event of fire. Some Units or Facilities may want to develop a formal Emergency Action Plan addressing all emergency scenarios which will be covered in this policy and procedure.

Appendix C contains an Emergency Action Plan template that may be used.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure for Emergency Action Plans at their respective facility. It is also the responsibility of each NCDOT employee to report any safety related issues to their supervisor.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure for an Emergency Action Plan.

6.1 Definitions

Area/Floor Monitors
Assigned individuals responsible for helping coordinate an orderly Evacuation Process and assisting all physically challenged employees.

Designated Responsible Officials
Individuals responsible for the personnel working at the facility.

Emergency Coordinator
Individual responsible for administering the Emergency Action Plan at the facility.

Emergency Evacuation Plan
Plan describing procedures required for employee protection from fire or other emergencies at the facility.

Exit
That portion of a means of egress from a building, structure, or worksite.

Exit Access
That portion of a means of egress which leads to an entrance to an exit.

Means of Egress
A continuous and unobstructed way of exit travel from any point in a building, structure, or worksite to a public way.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Medical Emergency
- Fire Emergency
- Bomb Threat
- Suspicious Package
- Severe Weather and Natural Disasters
  - Tornado
  - Earthquake
  - Flood
  - Hurricane
  - Blizzard
- Active Shooter
- Responding to Pandemic Exposure in the Workplace
- Training

6.2.1 Medical Emergency

Call 911 for medical emergency and provide the following information:

- Nature of medical emergency
- Location of emergency
- Your name and phone number from which you are calling
- Do not move the victim unless it is necessary.
- Have personnel trained in First Aid and CPR provide required medical assistance until arrival of EMS.

- If personnel trained in First Aid are not available, as a minimum, attempt to provide the following assistance:
    - Stop the bleeding with firm pressure on the wounds (note: avoid contact with blood or other bodily fluids).
    - Clear the air passages using back blows and abdominal thrusts in case of choking.
- In case of rendering assistance to personnel exposed to hazardous materials, consult the Safety Data Sheet (SDS) in the 3E system.
    - Wear the appropriate personal protective equipment.
    - Attempt first aid ONLY if trained and qualified.

6.2.2 Fire Emergency

When fire is discovered:

- Activate the nearest fire alarm.
- Notify the local fire department by calling 911.
- If the fire alarm is not available, notify the site personnel about the fire emergency by the following means:
    - Voice Communication
    - Phone
    - Radio
    - Any Other Means Availably at the Facility

Fight the fire ONLY if:

- The fire department has been notified.
- The fire is small and is not spreading to other areas.
- Available fire extinguishers are rated for the type of fire encountered.
- Escaping the area is possible by backing up to the nearest exit.
- Fire extinguishers are in working condition.
- Personnel are trained to use them.

Upon being notified about the fire emergency, occupants shall:

- Leave the building using the designated evacuation routes. Know your primary exit and your alternate exit. If you are away from your normal work area, go to the nearest exit.
- Assemble in the designated area for your unit
- Remain outside until the competent authority announces that it is safe to reenter.

Supervisors and/or Area/Floor Monitors shall:

- Coordinate an orderly evacuation of personnel closing all doors as you go.
- Perform an accurate head count of personnel reported to the designated area.
- Determine a rescue method to locate missing personnel.
- Provide Fire Department personnel with the necessary information about the facility.
- Ensure that all employees have evacuated the area/floor.
- Report any problems to the Fire Department at the assembly area.

- Provide assistance to all physically challenged employees in emergency evacuation.

6.2.3 Extended Power Loss

In the event of extended power loss to a facility certain precautionary measures should be taken:

Electrical equipment:

Electrical equipment and appliances should be turned off. If power restoration would surge causing damage and possibly fire to electronics and effecting sensitive equipment, equipment should be placed in the "Off" or "Standby" positions.

Facilities experiencing freezing temperatures: (Coordinate with the landlord)

- Coordinate with Facilities Maintenance personal.
- For leased facilities, contact the Landlord.

Upon Restoration of heat and power:

- Electronic equipment should be brought up to ambient temperatures before energizing to prevent condensate from forming on circuitry.
- For NCDOT facilities, fire and potable water piping should be checked for leaks from freeze damage after the heat has been restored to the facility and water turned back on.

Elevator mishap:

- If someone gets stuck in the elevator, call 911 and then the landlord, to get them free.
- Do not attempt to pry doors open and rescue occupants! A fall to a lower level could result in a fatality.

6.2.4 Telephone Bomb Threat

Person receiving call should:

- Listen – Do not interrupt caller. Keep caller on the phone if possible.
- If possible, alert Site Coordinator by a prearranged signal while the caller is on the line.
- Notify supervisor immediately after completing the call.
- **Complete bomb threat checklist, Appendix A.**

Site Supervisors:

- **Notify police department using 911.**
- **Notify:**
  - NCDOT Security
  - Building landlord if at leased facility
- Assist responding police officials.
- Coordinate a search of the premises.
- Do not turn on or off any electrical machine switch.

6.2.5 Suspicious Package

Person receiving the package shall:

- Not open the package.
- Not bend, squeeze or drop the package.
- Put the package in a safe secure place, away from other personnel.
- Call 911.
- Notify supervisor, Safety & Risk Mgmt. & Security.

Things to look for:

- Foreign mail, air mail and special delivery
- Restrictive markings such as: "Confidential" or "Personal"
- Excessive postage
- Handwritten or poorly- typed addresses
- Incorrect titles
- Titles, but no names
- Misspelling of common names
- Oily stains or discoloration
- No return address
- Excessive weight and unevenly distributed or lopsided
- Rigid envelope less flexible than normal letters
- Protruding wires or tin foil
- Excessive securing material such as masking tape, string, etc.
- Visual distractions, misleading statements as being "Official"
- Edges are normally sharp, not rounded
- **See Appendix B: Suspicious Package Handout**

6.2.6 Severe Weather and Natural Disasters

Supervisors shall perform weather assessment and coordinate office emergency closing procedures.

Tornado:

- When a warning is issued seek inside shelter. DO NOT LEAVE THE BUILDING OR GO OUTSIDE FOR A TORNADO.
- Consider the following:
  - Small interior rooms on the lowest floor and without windows,
  - Hallways on the lowest floor away from doors and windows, and
  - Rooms constructed with reinforced concrete, brick, or block with no windows.
- Stay away from outside walls and windows.
- Use arms to protect head and neck.
- Remain sheltered until the tornado threat is announced to be over.

Earthquake:

- Stay calm and await instructions from the Emergency Coordinator or the designated official. DO NOT TRY TO RUN TO ANOTHER ROOM just to get under a table. DO NOT LEAVE THE BUILDING AND GO OUTSIDE DURING AN EARTHQUAKE.
- Keep away from overhead fixtures, windows, filing cabinets, and electrical power.
- Assist people with disabilities in finding a safe place.
- Evacuate as instructed by the Emergency Coordinator and/or the designated official.
- Specifically use: Drop, Cover and Hold On under table or desk.

Flood:

If indoors:

- Be ready to evacuate as directed by the Emergency Coordinator and/or the designated official.
- Follow the recommended primary or secondary evacuation routes.

If outdoors:

- Climb to high ground and stay there.
- Avoid walking or driving through flood water.
- If car stalls, abandon it immediately and climb to a higher ground.

Hurricane:

The nature of a hurricane provides for more warning than other natural and weather disasters. A hurricane watch issued when a hurricane becomes a threat to a coastal area. A hurricane warning is issued when hurricane winds of 74 mph or higher, or a combination of dangerously high water and rough seas are expected in the area within 24 hours.

Once a hurricane watch has been issued:

- Stay calm and await instructions from the Emergency Coordinator or the Designated official.
- Continue to monitor local TV and radio stations for instructions.
- Move early out of low-lying areas or from the coast, at the request of officials.
- If you are on high ground, away from the coast and plan to stay, secure the building, moving all loose items indoors and boarding up windows and openings.
- Collect drinking water in appropriate containers.

Once a hurricane warning has been issued:

- Be ready to evacuate as directed by the Emergency Coordinator and/or the designated official.
- Leave areas that might be affected by storm tide or stream flooding.

During a hurricane:

- Remain indoors and consider the following:
  - Small interior rooms on the lowest floor and without windows,
  - Hallways on the lowest floor away from doors and windows, and
  - Rooms constructed with reinforced concrete, brick, or block with no windows.

Blizzard:

If indoors:

- Stay calm and await instructions from the Emergency Coordinator or the designated official.
- Stay indoors!
- If there is no heat:
  - Close off unneeded rooms or areas.
  - Stuff towels or rags in cracks under doors.
  - Cover windows at night.
- Eat and drink. Food provides the body with energy and heat. Fluids prevent dehydration.
- Wear layers of loose-fitting, lightweight, warm clothing, if available.

If outdoors:

- Find a dry shelter. Cover all exposed parts of the body.
- If shelter is not available:
  - Prepare a lean-to, wind break, or snow cave for protection from the wind.
  - Build a fire for heat and to attract attention. Place rocks around the fire to absorb and reflect heat.
  - Do not eat snow. It will lower your body temperature. Melt it first.

If stranded in a car or truck:

- Stay in the vehicle!
- Run the motor about ten minutes each hour. Open the windows a little for fresh air to avoid carbon monoxide poisoning. Make sure the exhaust pipe is not blocked.
- Make yourself visible to rescuers.
  - Turn on the dome light at night when running the engine.
  - Tie a colored cloth to your antenna or door.
  - Raise the hood after the snow stops falling.
- Exercise to keep blood circulating and to keep warm.

6.2.7 Active Shooter

An active shooter is a person or group of persons determined to engage in killing or attempting to kill people. Active shooter situations are unpredictable and evolve quickly.

The threat of indiscriminate violence hasn't diminished in recent times. That's why active shooter preparedness is vital to limit the casualties resulting from an individual or group who is intent on killing or harming as many as possible.

The perpetrator(s) may be familiar to you, such as a disgruntled employee or strangers, such as terrorists. Many times, they are unconcerned with their own safety and may even seek their own death to show their commitment to their cause.

Follow these simple steps to be safe:

6.2.8 Responding to Pandemic Exposure in the Workplace

Notification (Telework Appropriate)

1. Supervisor notified of potential / confirmed diagnosis
2. Supervisor notifies immediate staff. Email should contain:
    a. Instructions mandating all sick employees to work from home or use applicable leave outlined in OSHR communicable disease policy
    b. Recommendations for all healthy but potentially exposed employees to work from home
    c. Recommendations that employees seek testing if symptoms are present
3. Supervisor notifies appropriate cleaning staff / contractor of exposure so that appropriate cleaning and precautions can be taken.
4. Supervisor notifies their superior of exposure
5. Supervisor creates log to track employee availability

B. Notification (Not Telework Appropriate)

1. Supervisor notified of potential / confirmed diagnosis
2. Supervisor notifies immediate staff. Memo should contain:
    a. Instructions mandating all sick employees to work from home or use applicable leave outlined in OSHR communicable disease policy

   b. Assignment of suitable work related to single-person operations; e.g. checking roads for maintenance, checking signage, performing equipment inspections, performing repair/upkeep work at facilities, cleaning, acting as flagger for unexposed workgroup
   c. Recommendations that employees seek testing if symptoms are present
3. Supervisor notifies appropriate cleaning staff / contractor of exposure so that appropriate cleaning and precautions can be taken
4. Supervisor notifies their superior of exposure
5. Supervisor creates log to track employee availability

C. Cleaning Procedures for Facilities

The following steps should be carried out on a regular basis and emphasized during pandemic.

1. Cleaning personnel should wear disposable gloves that as recommended by the manufacturer of the detergent/disinfectant used while cleaning or handling cleaning and disinfecting solutions. The use of sterile gloves is not required. Never wash or reuse disposable gloves. Avoid activities that generate infectious aerosols. Eye protection, such as a face shields or goggles, may be required if splashing is expected.
2. Use only EPA-registered disinfectants (including detergent/disinfectants) with label claims for influenza A virus effectiveness. Clean the surface first with detergent and water, and then apply the disinfectant as instructed by the manufacturer. Ensure adequate contact time for effective disinfection. Adhere to any safety precautions or other label recommendations as directed (e.g. allowing adequate ventilation in confined areas such as lavatories and proper disposal of unused product or used containers). Avoid product application methods that cause splashing or generate aerosols. Use only EPA-registered food-contact products on areas where consumable food products are placed and stored such as in kitchens and restaurants.
3. Cleaning activities should be supervised and inspected periodically to ensure correct procedures are followed to minimize the risk of cross-contamination from “dirty” to “clean” areas.
4. Cleaning and disinfection procedures should cover all areas, including restrooms, lounges, employee-only areas, and public locations/lobbies.
5. Procedures should include cleaning and disinfection of all nonporous general hand contact surfaces, for example:
   - Door handles
   - Handrails
   - Elevator buttons
   - Telephones
   - Keyboards
   - Tabletops
   - Chair arms, handrails
   - Toilet flush handles
   - Faucet handles
   - Equipment handles

- Water Fountains
- Binoculars

6. Bodily fluids such as emesis (vomit), blood, or feces should be immediately covered with an absorbent such as vermiculite.
7. Since disinfectants are not registered for use on porous surfaces, removable porous upholstery, rugs, and carpeting should be laundered in accordance with the manufacturer's instructions or disposed of as described below. Porous upholstery and carpeting that can't be removed may be initially cleaned with water and detergent. The material should then be allowed to air dry.
8. When cleaning is completed, collect soiled material and gloves in a sturdy, leak-proof (e.g., plastic) bag that is tied shut and not reopened.
9. When cleaning is completed and gloves have been removed, immediately clean hands with soap and water or an alcohol-based hand gel. Avoid touching the face with gloved or unwashed hands.
10. Do not use compressed air and/or water under pressure for cleaning, or any other methods that can cause splashing or which might re-aerosolize infectious material. Vacuum cleaners should only be used after disinfection has taken place. Vacuum cleaners should be maintained to minimize dust dispersal in general and equipped with High Efficiency Particulate Air (HEPA) filters.

6.2.9 Training

Training will be required for designated employees and emergency/fire prevention plan coordinators. This training will include elements for both the evacuation and fire prevention plans. This training will qualify the emergency/fire prevention coordinator and the designated employees to fulfill any element of the emergency and/or fire prevention plans. This training will consist of:

- Means of reporting fires and other emergencies
- Evacuation procedures
- Familiarization with evacuation routes
- Review of employee accountability procedures
- Identification of workplace fire hazards
- Fire prevention practices
- Alarm systems
- Proper housekeeping procedures

This training will include initial training and retraining when responsibilities or conditions/surroundings change. In addition, these employees will assemble semi-annually to discuss changes in the current methods or plans.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funding is available for the purchase of proper equipment, supplies and training for the Emergency Action Plan for

their Unit. Managers/Unit Heads will appoint individuals to serve as Emergency Action Plan coordinators, alternate (backup) coordinators, and designated employees to serve as Area/Floor Monitors to assist in an orderly execution of Evacuation Plan.

They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will be responsible for ensuring that the emergency evacuation plan is posted in a conspicuous location and that employees are trained at the start of employment, upon reassignment, and yearly thereafter.

Supervisors are responsible for ensuring new and existing employees are familiar with building layouts and are instructed in the most efficient evacuation methods.

Supervisors are also responsible to ensure that all fire extinguishers and other related equipment are in good working condition. If any indication of damaged or outdated equipment is present, the equipment will be removed from service and repaired/replaced. (Fire extinguishers must be replaced if sent out for service.)

6.3.3 Emergency Coordinator

The Emergency Coordinator will serve as the primary contact and the administrator of the Emergency Action Plan. The requirements of the Emergency Action Plan can be coordinated by one individual or by two individuals as determined by the managers/unit heads.

The coordinator will keep the emergency action plan and the elements of those plans current. A backup (alternate) coordinator will also be identified and be capable of administering the requirements of these plans.

6.3.4 Employees

It is the responsibility of each employee to ensure they are familiar with the Emergency Action Plan. Each employee should also be familiar with posted exits and evacuation routes. Employees will report suspected hazards to their supervisor immediately.

6.3.5 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety Engineers will provide consultative and audit assistance on Emergency Action Plan. Additionally, Safety and Risk Management will assist in developing of or in the securing of required training.

Appendix A: Bomb Threat Checklist

Date:	Time:	Location:
Questions to ask caller:		
Exact location of bomb?		
Time set for detonation?		
What is the explosive?		
What does bomb look like?		
Why was it placed?		
Is caller bomber? □ Yes □ No	If not, who is bomber?	
Inform caller detonation could cause injury and death.		
Characteristics of caller:		
Sex:	Accent:	
Age:	Background Noises:	
Is he/she familiar with DOT: □ Yes □ No		
Message:		
Call Security at (919) 707-4854	Notify Supervisor	Call 911
Evacuate facility		

Appendix B: Suspicious Package Handout

UNITED STATES POSTAL SERVICE

SUSPICIOUS MAIL ALERT

If you receive a suspicious letter or package:

1 Handle with care. Don't shake or bump.

2 Isolate it immediately

3 Don't open, smell, touch or taste.

4 Treat it as suspect. Call local law enforcement authorities

If a parcel is open and/or a threat is identified . . .

For a Bomb:
Evacuate Immediately
Call Police
Contact Postal Inspectors
Call Local Fire Department/HAZMAT Unit

For Radiological:
Limit Exposure - Don't Handle
Evacuate Area
Shield Yourself From Object
Call Police
Contact Postal Inspectors
Call Local Fire Department/HAZMAT Unit

For Biological or Chemical:
Isolate - Don't Handle
Evacuate Immediate Area
Wash Your Hands With Soap and Warm Water
Call Police
Contact Postal Inspectors
Call Local Fire Department/HAZMAT Unit

EMERGENCY ACTION PLAN

Template

*Department*_____

Last Review Date_____

Plan Coordinator_____

Preamble

1. All personnel shall evacuate the_____Complex during an emergency such as fire, explosion, threat, flood, toxic fumes, electrical or structural failure, exceptions as noted in Numbers 3 & 4 below. All evacuations shall proceed as rapidly and safely as possible during an emergency.

2. Area/Floor Monitors shall account for all employees in their units by sight or conference with supervisors and verify all personnel have safely exited the building. They will then report this status to the incident commander. Emphasis shall be placed on ascertaining the whereabouts of "missing" employees.

3. In the event of an active shooter, all personnel shall follow the "FLEE, FREEZE and FIGHT" protocol, remaining within the building or fleeing, as appropriate.

4. In the event of a tornado or earthquake all personnel shall follow the "DROP, COVER and HOLD ON" protocol, remaining within the building.

5. Under no circumstances should elevators be used during any emergency except by firefighting personnel.

6. This plan is developed to ensure the safety and well-being of all building occupants during an evacuation from natural or man-made emergencies. Each employee is urged to become familiar with the Emergency Evacuation procedures for his/her own safety and protection.

7. ___is required to dial out on desk phones.

8. Fire extinguishers and emergency radios are checked monthly by S&RM staff.

Emergency Personnel Names and Phone Numbers

Designated Responsible Officials:

Name: Phone: _____

Name: Phone: _____

Emergency Coordinator:

Name: Phone: _____

Area/Floor Monitors and Assistants to the Physically Challenged:

Name: Phone:_____

Name: Phone: _____

Name: Phone_____

Name: Phone: _____

Evacuation Routes

- Evacuation route maps have been posted in each work area. The following information is marked on evacuation maps:
  - Emergency exits
  - Primary and secondary evacuation routes
  - Locations of fire extinguishers
  - Fire alarm pull station locations
  - Assembly points

- Site personnel should know at least two evacuation routes.

- When the alarm has been activated, leave the building and proceed to the designated assembly area outside. Evacuate to the nearest X

Place Arial MAP HERE

Emergency Phone Numbers

FIREDEPARTMENT: 911

PARAMEDICS: 911

AMBULANCE: 911

STATE CAPITOL POLICE: 911

SECURITY: (919) 707-4854

BUILDING MANAGER:

Medical Emergency

- Call medical emergency phone number (check applicable):
  - Paramedics & Ambulance
  - NCDOT Security
  - Fire Department
  - Other
- Provide the following information:
  - Nature of medical emergency,
  - Location of the emergency (address, building, room number), and
  - Your name and phone number from which you are calling.
- Do not move victim unless absolutely necessary.
- Call the following personnel trained in CPR and First Aid to provide the required assistance prior to the arrival of the professional medical help:

Name:_Phone:_____

Name:_Phone: _____

Name:_Phone_____

Name:_Phone: _____

If personnel trained in First Aid are not available, as a minimum, attempt to provide the following assistance:

  - Stop the bleeding with firm pressure on the wounds (note: avoid contact with blood or other bodily fluids).
  - Clear the air passages using back blows and abdominal thrusts in case of choking.
- In case of rendering assistance to personnel exposed to hazardous materials, consult the Safety Data Sheet (SDS) in the 3E system.
  - Wear the appropriate personal protective equipment.
  - Attempt first aid ONLY if trained and qualified.

Fire Emergency

When fire is discovered:

- Activate the nearest fire alarm.
- Notify the local fire department by calling 911.
- If the fire alarm is not available, notify the site personnel about the fire emergency by the following means (check applicable):
    - Voice Communication
    - Phone
    - Radio
    - Other (specify)

Fight the fire ONLY if:

- The fire department has been notified.
- The fire is small and is not spreading to other areas.
- Available fire extinguishers are rated for the type of fire encountered.
- Escaping the area is possible by backing up to the nearest exit.
- Fire extinguishers are in working condition.
- Personnel are trained to use them.

Upon being notified about the fire emergency, occupants shall:

- Leave the building using the designated escape routes. Know your primary exit and your alternate exit. If you are away from your normal work area, go to the nearest exit.
- Assemble in the designated area for your unit:
- Remain outside until the competent authority announces that it is safe to reenter.

Supervisors and/or Area/Floor Monitors shall:

- Coordinate an orderly evacuation of personnel closing all doors as you go.
- Perform an accurate head count of personnel reported to the designated area.
- Determine a rescue method to locate missing personnel.
- Provide Fire Department personnel with the necessary information about the facility.
- Ensure that all employees have evacuated the area/floor.
- Report any problems to the Fire Department at the assembly area.

Assistants to Physically Challenged shall:

- Assist all physically challenged employees in emergency evacuation.

Extended Power Loss

In the event of extended power loss to a facility certain precautionary measures should be taken:

Electrical equipment:

- Electrical equipment and appliances should be turned off. If power restoration would surge causing damage and possibly fire to electronics and effecting sensitive equipment, equipment should be placed in the "Off" or "Standby" positions.

Facilities experiencing freezing temperatures: (Coordinate with the landlord)

- Should turn off and drain the following lines in the event of a long-term power loss:
  - Potable water lines
  - Toilets
- Add propylene-glycol to drains to prevent traps from freezing.

Upon Restoration of heat and power:

- Electronic equipment should be brought up to ambient temperatures before energizing to prevent condensate from forming on circuitry.
- Fire and potable water piping should be checked for leaks from freeze damage after the heat has been restored to the facility and water turned back on.

Elevator mishap:

- If someone gets stuck in the elevator, call 911 and then the landlord, to get them free.
- Do not attempt to pry doors open and rescue occupants! A fall to a lower level could result in a fatality.

Telephone Bomb Threat

Person receiving call should:

- Listen – Do not interrupt caller. Keep caller on the phone if possible.
- If possible, alert Site Coordinator by a prearranged signal while the caller is on the line.
- Notify supervisor immediately after completing the call.
- Complete bomb threat checklist, Appendix A.

Site Supervisors:

- Notify police department using 911.
- Notify:
  - Security
  - Building landlord for Leased Facilities
- Assist responding police officials.
- Coordinate a search of the premises.
- Do not turn on or off any electrical machine switch.

Suspicious Package

Person receiving the package shall:

- Not open the package.
- Not bend, squeeze or drop the package.
- Put the package in a safe place, away from other personnel.
- Call 911.
- Notify supervisor, Safety & Risk Mgmt. & Security.

Things to look for:

- Foreign mail, air mail and special delivery
- Restrictive markings such as: “Confidential” or “Personal”
- Excessive postage
- Handwritten or poorly- typed addresses
- Incorrect titles
- Titles, but no names
- Misspelling of common names
- Oily stains or discoloration
- No return address
- Excessive weight and unevenly distributed or lopsided
- Rigid envelope less flexible than normal letters
- Protruding wires or tin foil
- Excessive securing material such as masking tape, string, etc.
- Visual distractions, misleading statements as being “Official”
- Edges are normally sharp, not rounded

See Appendix B: Suspicious Package Handout

Severe Weather and Natural Disasters

Supervisors shall perform weather assessment and coordinate office emergency closing procedures.

Tornado:

- When a warning is issued seek inside shelter. DO NOT LEAVE THE BUILDING OR GO OUTSIDE FOR A TORNADO.
- Consider the following:
  - Small interior rooms on the lowest floor and without windows,
  - Hallways on the lowest floor away from doors and windows, and
  - Rooms constructed with reinforced concrete, brick, or block with no windows.
  - Specifically: Workforce Solutions designated areas:
  - 1st Floor (Piedmont Room, Cardinal Conference Room, in front of elevator and restrooms)
  - 2nd Floor (Dogwood Conference Room, Break Room and restrooms)
  - Basement (Appalachian Conference Room and restrooms)
- Stay away from outside walls and windows.
- Use arms to protect head and neck.
- Remain sheltered until the tornado threat is announced to be over.

Earthquake:

- Stay calm and await instructions from the Emergency Coordinator or the designated official. DO NOT TRY TO RUN TO ANOTHER ROOM just to get under a table. DO NOT LEAVE THE BUILDING AND GO OUTSIDE DURING AN EARTHQUAKE.
- Keep away from overhead fixtures, windows, filing cabinets, and electrical power.
- Assist people with disabilities in finding a safe place.
- Evacuate as instructed by the Emergency Coordinator and/or the designated official.
- Specifically use:

Flood:

If indoors:

- Be ready to evacuate as directed by the Emergency Coordinator and/or the designated official.
- Follow the recommended primary or secondary evacuation routes.

If outdoors:

- Climb to high ground and stay there.
- Avoid walking or driving through flood water.
- If car stalls, abandon it immediately and climb to a higher ground.

Hurricane:

- The nature of a hurricane provides for more warning than other natural and weather disasters. A hurricane watch issued when a hurricane becomes a threat to a coastal area. A hurricane warning is issued when hurricane winds of 74 mph or higher, or a combination of dangerously high water and rough seas are expected in the area within 24 hours.

Once a hurricane watch has beenissued:

- Stay calm and await instructions from the Emergency Coordinator or the Designated official.
- Continue to monitor local TV and radio stations for instructions.
- Move early out of low-lying areas or from the coast, at the request of officials.
- If you are on high ground, away from the coast and plan to stay, secure the building, moving all loose items indoors and boarding up windows and openings.
- Collect drinking water in appropriate containers.

Once a hurricane warning has been issued:

- Be ready to evacuate as directed by the Emergency Coordinator and/or the designated official.
- Leave areas that might be affected by storm tide or stream flooding.

During a hurricane:

- Remain indoors and consider the following:
    - Small interior rooms on the lowest floor and without windows,
    - Hallways on the lowest floor away from doors and windows, and
    - Rooms constructed with reinforced concrete, brick, or block with no windows.

Blizzard:

If indoors:

- Stay calm and await instructions from the Emergency Coordinator or the designated official.
- Stay indoors!
- If there is no heat:
  - Close off unneeded rooms or areas.
  - Stuff towels or rags in cracks under doors.
  - Cover windows at night.
- Eat and drink. Food provides the body with energy and heat. Fluids prevent dehydration.
- Wear layers of loose-fitting, lightweight, warm clothing, if available.

If outdoors:

- Find a dry shelter. Cover all exposed parts of the body.
- If shelter is not available:
  - Prepare a lean-to, wind break, or snow cave for protection from the wind.
  - Build a fire for heat and to attract attention. Place rocks around the fire to absorb and reflect heat.
  - Do not eat snow. It will lower your body temperature. Melt it first.

If stranded in a car or truck:

- Stay in the vehicle!
- Run the motor about ten minutes each hour. Open the windows a little for fresh air to avoid carbon monoxide poisoning. Make sure the exhaust pipe is not blocked.
- Make yourself visible to rescuers.
  - Turn on the dome light at night when running the engine.
  - Tie a colored cloth to your antenna or door.
  - Raise the hood after the snow stops falling.
- Exercise to keep blood circulating and to keep warm.

Active Shooter

An active shooter is a person or group of persons determined to engage in killing or attempting to kill people. Active shooter situations are unpredictable and evolve quickly.

The threat of indiscriminate violence hasn't diminished in recent times. That's why active shooter preparedness is vital to limit the casualties resulting from an individual or group who is intent on killing or harming as many as possible.

The perpetrator(s) may be familiar to you, such as a disgruntled employee or strangers, such as terrorists. Many times, they are unconcerned with their own safety and may even seek their own death to show their commitment to their cause.

Follow these simple steps to be safe:

Continuity of Operations

During some emergency situations, it will be necessary for the_____Group to remain at work areas to perform critical operations.

Please refer to the_____Continuity of Operations Plan and the Pandemic Annex for further guidance.

Responding to Pandemic Exposure in the Workplace

A. Notification (Telework Appropriate)

6. Supervisor notified of potential / confirmed diagnosis
7. Supervisor notifies immediate staff. Email should contain:
    a. Instructions mandating all sick employees to work from home or use applicable leave outlined in OSHR communicable disease policy
    b. Recommendations for all healthy but potentially exposed employees to work from home
    c. Recommendations that employees seek testing if symptoms are present
8. Supervisor notifies appropriate cleaning staff / contractor of exposure so that appropriate cleaning and precautions can be taken.
9. Supervisor notifies their superior of exposure
10. Supervisor creates log to track employee availability

D. Notification (Not Telework Appropriate)

6. Supervisor notified of potential / confirmed diagnosis
7. Supervisor notifies immediate staff. Memo should contain:
    a. Instructions mandating all sick employees to work from home or use applicable leave outlined in OSHR communicable disease policy
    b. Assignment of suitable work related to single-person operations; e.g. checking roads for maintenance, checking signage, performing equipment inspections, performing repair/upkeep work at facilities, cleaning, acting as flagger for unexposed workgroup
    c. Recommendations that employees seek testing if symptoms are present
8. Supervisor notifies appropriate cleaning staff / contractor of exposure so that appropriate cleaning and precautions can be taken
9. Supervisor notifies their superior of exposure
10. Supervisor creates log to track employee availability

E. Cleaning Procedures for Facilities

The following steps should be carried out on a regular basis and emphasized during pandemic.

1. Cleaning personnel should wear disposable gloves that as recommended by the manufacturer of the detergent/disinfectant used while cleaning or handling cleaning and disinfecting solutions. The use of sterile gloves is not required. Never wash or reuse disposable gloves. Avoid activities that generate infectious aerosols. Eye protection, such as a face shields or goggles, may be required if splashing is expected.
2. Use only EPA-registered disinfectants (including detergent/disinfectants) with label claims for influenza A virus effectiveness. Clean the surface first with detergent and water, and then apply the disinfectant as instructed by the manufacturer. Ensure adequate contact time for effective disinfection. Adhere to any safety precautions or other label recommendations as directed (e.g. allowing adequate ventilation in confined areas such as lavatories and proper disposal of unused product or used containers). Avoid product application methods that cause splashing or generate aerosols. Use only EPA-registered food-contact products on areas where consumable food products are placed and stored such as in kitchens and restaurants.
3. Cleaning activities should be supervised and inspected periodically to ensure correct procedures are followed to minimize the risk of cross-contamination from "dirty" to "clean" areas.
4. Cleaning and disinfection procedures should cover all areas, including restrooms, lounges, employee-only areas, and public locations/lobbies.
5. Procedures should include cleaning and disinfection of all nonporous general hand contact surfaces, for example:
    - Door handles
    - Handrails
    - Elevator buttons
    - Telephones
    - Keyboards
    - Tabletops
    - Chair arms, handrails
    - Toilet flush handles
    - Faucet handles
    - Equipment handles
    - Water Fountains
    - Binoculars
6. Bodily fluids such as emesis (vomit), blood, or feces should be immediately covered with an absorbent such as vermiculite.

7. Since disinfectants are not registered for use on porous surfaces, removable porous upholstery, rugs, and carpeting should be laundered in accordance with the manufacturer's instructions or disposed of as described below. Porous upholstery and carpeting that can't be removed may be initially cleaned with water and detergent. The material should then be allowed to air dry.
8. When cleaning is completed, collect soiled material and gloves in a sturdy, leak-proof (e.g., plastic) bag that is tied shut and not reopened.
9. When cleaning is completed and gloves have been removed, immediately clean hands with soap and water or an alcohol-based hand gel. Avoid touching the face with gloved or unwashed hands.
10. Do not use compressed air and/or water under pressure for cleaning, or any other methods that can cause splashing or which might re-aerosolize infectious material. Vacuum cleaners should only be used after disinfection has taken place. Vacuum cleaners should be maintained to minimize dust dispersal in general and equipped with High Efficiency Particulate Air (HEPA) filters.

Training

The following personnel have been trained to ensure a safe and orderly emergency evacuation:

Name	Title	Responsibility	Date

Aerial Truck Operations SPP# 1910.67

Contents

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for aerial truck operations in the servicing of traffic signals or other maintenance activities within the North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

This safety policy and procedure provides guidelines for safe aerial truck operations to protect traffic control technicians and other NCDOT employees ~~and~~ to eliminate collisions between aerial buckets and large trucks or other structures. It includes provisions for training, brief discussion of general hazards of aerial truck operations, a listing of some of the common aerial truck operations, and recommended safe work practices.

This document also details the areas of responsibility for managers/unit heads, supervisors, aerial truck operators, aerial truck crew, and Safety and Risk Management within NCDOT.

This safety policy and procedure affects NCDOT employees in Traffic Services and Traffic Engineering and employees in any other operations who as a result of their job duties are exposed to aerial truck hazards.

3.0 Reference

This policy is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.67), Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.453), and NCDOT traffic control practices.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. When aerial truck hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Aerial Truck Operations will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Aerial Truck Operations. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined under Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Aerial Truck Operations.

6.1 Definitions

Aerial Truck
A truck that is designed to lift workers up in a bucket or platform by telescoping and/or articulating mechanisms.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Aerial Truck Hazards
- Aerial Truck Operations
- Aerial Truck Safe Work Practices

6.2.1 Training

Aerial truck operators and other employees as applicable shall be instructed in the recognition and avoidance of hazards associated with aerial truck hazards.

Special training is required for employees who operate the aerial truck and must set up traffic control as applicable. Those employees must be properly trained in the procedures for the safe performance of their assigned duties.

This training shall be made available upon initial employment or job re- assignment. Refresher training shall be provided upon the discretion of the supervisor.

6.2.2 Aerial Truck Hazards

The major hazards associated with aerial truck devices when performing traffic signal servicing include:

- Aerial devices coming into contact with utilities including energized power lines.
- Vehicle traffic
- Inclement weather during emergency call outs
- Fall hazards
- Aerial equipment upset

This list is not all inclusive. There are many other various hazards that arise with each situation and that must be properly anticipated, recognized, avoided, and controlled.

6.2.3 Aerial Truck Operations

The servicing of traffic signals is several distinct operations. These operations are:

- Construction or new installation of a signal system
- Planned maintenance of a signal system
- Emergency repair of a signal system
- Emergency call out

Construction or new installation of a signal system involves setting poles, stringing span wire, hanging signal heads, running cable, cutting pavement, installing loop detectors, plowing loop wire in the shoulders, and installing the cabinet hardware.

Planned maintenance of a signal system involves replacing bulbs, cleaning the signal heads, adjusting the alignment of the heads and any other items that may apply during this type of operation.

Emergency repair of a signal system involves repairs due to accidents, storm damage, or electrical malfunction of the individual signal head.

Emergency call out involves emergency operations after normal working hours either at night or on holidays and weekends.

Any other maintenance tasks requiring the use of aerial truck.

6.2.4 Aerial Truck Safe Work Practices

The following safe work practices shall be followed when aerial truck devices are used:

- The brakes shall be set and when outriggers are used, they shall be positioned on pads or a solid surface. Wheel chocks shall be installed before using an aerial lift on an incline, provided they can be safely installed.
- Two or more individuals will be on scene during the traffic servicing operation
- The second individual (individual on the ground) shall be trained in first aid
- Aerial truck is not to be touched if it comes into contact with electrical wiring
- The aerial truck operator shall not tie off to an adjacent pole, structure, or equipment while working from the aerial bucket
- The aerial truck operator shall wear a **full body harness** with a lanyard or fall restraint device attached to the aerial bucket when working in the aerial lift
- Fall restraint device (restraint or retractable lanyard) will protect the operator from fall or being ejected out of the bucket in event of aerial lift malfunction causing sudden unplanned movement of the bucket
- Sufficient signs, racks, and traffic cones shall be available for the appropriate traffic control
- The ground person shall be instructed in the operation of the aerial device Emergency phone numbers and location of cellular phones shall be readily known and accessible
- Technicians or other operators should also refer to the aerial lift manufacturer's safe operating practices for additional information.
- Traffic Service Technicians can respond to trouble calls alone if the trouble is known to be cabinet work, where all the work is off the road and not involving traffic control or aerial work. Otherwise, two or more individuals should always be on the scene of traffic signal servicing.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure that the necessary traffic servicing, traffic control and aerial lift equipment along with PPE including full body harnesses, fall restraints or fall protection lanyards and other supplies are budgeted for and acquired. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance through their auditing process.

Managers/Unit Heads will ensure that supervisors are capable of recognizing and taking steps to avoid the exposure of any employee to aerial truck hazards due to traffic signal servicing.

6.3.2 Supervisors

Supervisors will ensure that all traffic control technicians and other personnel working out of an aerial lift have received the required training prior to performing any duties.

They shall also ensure that the traffic control technicians and other personnel working out of an aerial lift have been instructed in the recognition and avoidance of hazards due to aerial truck operations.
Supervisors will ensure that the ground employees (helpers, additional technicians) have been instructed in the operation and hazards of aerial truck devices

6.3.3 Aerial Truck Operators

Aerial Truck operators shall be responsible for knowing the potential hazards associated with aerial truck operations. They will also be responsible for refraining from work if the hazards due to the operation have not been addressed. Additionally, they will be responsible for instructing the ground personnel of any hazards during the operation.

6.3.4 Aerial Truck Crew

Aerial truck crew shall be responsible for assisting the Aerial truck operator in the aerial bucket. At least one of the crew shall be trained in first aid and be familiar in flagging and directing traffic as the situation warrants.

Employees in the work crew will report suspected hazards to their immediate supervisor and are required to follow instructions by the trained responsible party in all matters of work with or near aerial truck devices.

6.3.5 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to manager/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Hearing Conservation Program SPP# 1910.95

Quick Reference

1.0 Purpose

This safety policy and procedure establishes the methods and responsibility for implementing the North Carolina Department of Transportation (NCDOT) Hearing Conservation Program (HCP) to prevent hearing impairment of NCDOT employees in accordance with OSHA regulations.

Exposure to noise levels equal to or greater than 90dBa can be permanent and may be compensable under North Carolina Workers' Compensation (WC). The risk to noise can have a personal and an economic consequence as well as permanent health consequence.

2.0 Scope and Applicability

This safety policy and procedure provides guidelines for implementing the HCP. The program includes the identification and control of noise within work areas through engineering means and administrative control of employee noise exposure along with the selection and use of hearing protectors. It also details the areas of responsibility for managers/unit heads, supervisors and employees within NCDOT. Additionally, this safety policy and procedure sets forth requirements for noise exposure surveys, audiometric testing, recordkeeping, employee training in the use of hearing protection, and an evaluation of program effectiveness. The HCP is integrated with NC WC requirements.

Specific applicability for employee enrollment in the program shall be determined based on noise exposure levels: Employees with noise exposures that equal or exceed an 8-hour Time Weighted Average (TWA) sound level of 85 dBA or experience a noise level 90 dBA or greater.

3.0 Reference

This safety policy and procedure is established in accordance with OSHA standards 29 CFR 1910.95, 29 CFR 1915.95, 29 CFR 1926 parts .21, .52 and .101.

4.0 Policy

It is the policy of the NCDOT to provide a safe working environment without exposure to excessive noise levels. NCDOT shall take measures to reduce workplace noise to acceptable levels. Where such measures fail to reduce sound levels adequately, employees will be provided hearing protection and enrolled in the HCP at no cost to the employee.

NCDOT shall implement engineering, administrative controls or provide personal protective equipment to reduce noise exposure below 85 dBA.

5.0 General Responsibilities

It is the responsibility of each individual within NCDOT who supervises the work of others to ensure implementation of NCDOT's HCP.

It is the responsibility of each employee included in NCDOT's HCP to follow the HCP guidelines to reduce the exposures to noise.

6.0 Procedure

This section provides applicable definitions, general provisions and responsibilities required by HCP.

6.1 Definitions

Action Level (OSHA)
An exposure to an 8 hour time weighted average (TWA) of 85 decibels.

Administrative Controls
Procedures that limit the daily exposure to noise by controlling an employee's work schedule in a high noise environment.

Area Monitoring
The monitoring of noise levels in any particular area, without regard to employee occupation of the area.

Audiogram
A chart, graph, or table showing an individual's hearing threshold levels as a function of frequency. Frequencies that will be tested are: 0.5k, 1k, 2k, 3k, 4k, 6k and 8k.

Audiometric Zero
This term is in the appendix and could be defined there, but it needs to be defined. Audiometric Zero is the baseline for considering a Standard Threshold Shift.

Baseline Audiogram
The audiogram used as a reference for comparing hearing acuity with future audiograms. This may also be called a reference, preplacement or entrance audiogram.

dBA
Decibels, A-weighted - A sound level reading in decibels made on an A-weighted network of a sound level meter (SLM) set to slow response.

Dose
The cumulative amount of noise exposure a person receives over a specified period of time.

Engineering Controls
A mechanical device or physical barrier that reduces exposure to sound from a noise source.

Hierarchy of Controls
Controls used to reduce noise exposure should follow the hierarchy in sequence as follows: engineering controls, administrative controls, and PPE (hearing protection)

Hearing Conservation Program (HCP)
A program that includes noise exposure evaluation, periodic audiometric testing, and development and implementation of controls to prevent permanent hearing loss.

Noise Dosimeter
An electronic instrument that integrates a function of sound pressure over a time period such that it indicates a noise dose for that time period.

Permissible Exposure Limit (PEL)
The maximum permissible noise exposure level, defined by OSHA as 90 decibels, time weighted average, on an A weighted scale.

Personal Monitoring
Monitoring noise exposure using instruments that continuously record noise levels as the employee performs routine tasks.

Sound Level Meter
An electronic instrument for the measurement of sound levels.

Standard Threshold Shift
An average hearing threshold shift of 10 dB or more in one ear or both ears at the 2k, 3k and 4k hertz octave. This shift may be temporary or permanent.

Time Weighted Average
The sound level which, if constant over an 8 hour (TWA) workday exposure, would result in the same noise dose as measured.

6.2 General Provisions

The general elements of a HCP (HCP) are identified in the OSHA standard, 29 CFR 1910.95. These elements, as they pertain, are adopted for NCDOT as follows:

6.2.1 Monitoring Employee Exposure

Unless an employee is included in the Hearing Conservation Program, Exposure Monitoring shall be conducted whenever it is suspected that an employee's exposure routinely equals or exceeds a Time Weighted Average of 85 dBA or 90 dBA for any length of time. Noise monitoring may include personal monitoring and area sampling of continuous, intermittent, and impulse sound levels.

Personnel conducting noise monitoring shall be trained to conduct noise surveys. All sound level measuring instruments will be of the appropriate type and will be calibrated before and after use to assure accuracy.

Personal monitoring should be repeated whenever a change occurs in the work that increases the exposure levels, e.g.: exposure for a longer time or exposure to higher noise levels.

Employees routinely exposed to noise levels at or above the action level shall be included in the HCP. Employees with noise exposure below the action level but have a history of exposure above the action level shall be included in the HCP for periodic monitoring.

6.2.2 Employee Rights

Employees shall be notified in writing whenever their monitored exposures are at or above the 85 dBA TWA.

Once enrolled in the HCP, employees shall receive an initial baseline audiogram and shall be retested annually for as long as they remain exposed to noise levels at or above the action level. These tests shall be conducted at no charge to the employee.

Employees may choose from a variety of styles of hearing protection and shall be instructed in how to wear and maintain the protection selected.

Employees shall have access to their monitoring and audiometric testing records.

Employees shall be allowed to observe area noise monitoring relative to their noise exposure.

6.2.3 Audiometric Testing

If it is suspected that an employee is routinely exposed at or above the action level, has any exposure at or above 90 dBA, or has a history of exposure above the action level, the employee shall be included in the HCP. and a baseline audiometric test shall be conducted as soon as is practicable, but at least within 6 months of exposure.

Audiometric testing shall be conducted by properly certified or licensed audiologists, otolaryngologists, physicians or technicians.

Audiometric tests must not be conducted until the employee has at least 14 hours without exposure to workplace noise (such as over a weekend) or has been furnished and has worn hearing protection for this period.

Annual testing shall be conducted if an employee continues to be routinely exposed to an 8 hour TWA of 85 dBA or more and/or is exposed to 90 dBA or higher at any time during the employee work shift.

Annual testing shall include a comparison of an employee's baseline audiogram with the annual audiogram to determine if a threshold shift has occurred.

If a standard threshold shift is indicated, the employee shall be notified in writing by Division/Unit management within 21 days from receipt of testing results. A retest audiogram should be taken within 30 days and the results of the retest may be accepted as the annual audiogram.

6.2.4 Standard Threshold Shift (STS)

Any STS must be considered work-related unless the case is evaluated by a physician or other licensed professional and determined to be not work-related. This evaluation shall be paid for by the Division/unit.

An employee who experiences a STS, and who is already wearing hearing protection shall be refitted and retrained on its use.

Any employee who has experienced a STS, whom the audiologist suspects has or has had a medical problem causing or affecting the STS, may be referred to a physician for additional clinical audiometric testing or ontological examination at no cost to the employee. This includes medical problems caused or aggravated by the use of hearing protection.

When a work-related STS is indicated, it must be recorded on the OSHA 300 log as a hearing loss case. The date listed for the case shall be the date that the STS is first diagnosed.

Cases that are determined, by a licensed professional to be not work related need not be recorded or can be stricken from the OSHA 300 log.

If initial testing indicates an employee has experienced a STS, a confirmatory follow-up audiometric test should be conducted. If the retest also indicates a STS, the date of the confirmation shall be the date listed on the OSHA log.

REFER TO APPENDIX A; Decision Tree for Hearing Loss OSHA Recordable

6.2.5 Hearing Protection

Employees shall be provided with and required to wear hearing protection when exposed to 85 dBA or greater averaged over an 8-hour workday. A variety of hearing protectors shall be available for employee selection.

All hearing protection devices shall be properly fitted to the employee and their use shall be supervised. Employees shall be trained on the use and care of hearing protection.

Replace hearing protection whenever it becomes too worn to effectively protect the employee.

Hearing protection must be adequate to reduce employee exposure to 90 dBA or below if no STS has occurred, or to 85 dBA or below if a STS has occurred.

All equipment and work areas identified as louder than 85 dBA or above shall be placarded or posted that hearing protection is required. Figure 1 shows examples of Hearing Protection Required signage.

Figure 1

6.2.6 Training Program

Training programs shall include information on NCDOT's HCP, the effects of noise on hearing, purpose of hearing protection, advantages, disadvantages and the characteristics of various types of hearing protection.

Training includes the proper selection, fitting, use and care of different varieties of hearing protection.

Training includes an explanation on the purpose and methods of audiometric testing. Refresher training shall be given annually for all employees included in the HCP.

Employees experiencing a STS shall be retrained on the use of hearing protection.

6.2.7 Recordkeeping

1. Records of area noise monitoring shall be accurately maintained for (5) years.

2. All employee audiometric test records shall be maintained for the duration of employment plus 5 years. Records shall then be handled according to the records retention policy.

3. Audiometric test records shall include:
   a) Name and job classification
   b) Date of the audiogram
   c) Results of audiogram
   d) Examiner's name
   e) Date of audiometer calibration
   f) Employee's most recent noise exposure assessment
4. Records shall be provided on request to employees, former employees, and OSHA compliance officers.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for supporting the costs of baseline audiometric testing and routine annual audiometric testing.

Managers/Unit Heads shall ensure that engineering or administrative control alternatives are evaluated and implemented before including employees in the HCP.

Managers/Unit Heads are responsible for budgeting for annual audiometric testing, and employee training, and hearing protection.

6.3.2 Supervisors

Supervisors are responsible for requesting and coordinating noise monitoring in their area with Safety staff.

Supervisors shall ensure employees included in the HCP have baseline and annual audiometric testing done and attend training. Supervisors should coordinate testing and training with Safety staff.

The supervisor shall ensure that employee audiometric test records are maintained in the unit personnel files.

Supervisors are responsible for enforcing the use of hearing protection.

Supervisors shall ensure that an adequate supply and variety of hearing protection is maintained in their inventory.

Supervisors shall conduct an incident investigation for any STS case to determine the causes and to identify and implement corrective action.

The supervisor is responsible for ensuring a confirmed STS is recorded as a hearing loss case on the OSHA 300 log.

The supervisor is responsible to ensure employees are notified of their audiogram results within 21 days of receiving the report on their hearing tests and the results of noise monitoring. See Section 6.2.3 for details.

6.3.3 Employees

Employees must inform their supervisor if a change occurs in the workplace that results in increased noise exposure, e.g.: noise levels are higher or exposure is longer.

Employees shall use noise control measures or shall wear and maintain hearing protection as required.

Employees shall attend training on noise exposure and the requirements of the HCP.

Employees included in the HCP shall have medical evaluations and follow-up audiograms as scheduled by NCDOT as a condition of employment.

Employees are to report any complicating medical problems to their supervisor as soon as possible.

6.3.4 Division/Unit Safety

1. Division/Unit Safety are responsible for HCP training. Training programs shall include:
    a. The effects of noise on hearing.
    b. The purpose, care, selection, fitting, and maintenance of hearing protectors.
    c. The results of any noise tests conducted in the work area.
    d. The purpose and methods of audiometric testing.

2. Division/Unit Safety are responsible for enrolling and maintaining a list of employees in the HCP, as required.

3. Division/Unit Safety are responsible for monitoring areas or jobs for high noise exposures, as identified by supervisors, and for recommending corrective action to address possible over-exposures.

4. Division/Unit Safety shall ensure employees are notified of their audiogram results within 21 days of receiving the report on their hearing tests and the results of noise monitoring.

5. Division/Unit Safety shall record on the OSHA log 300 all occurrences of STS.

6. Division/Unit safety staff shall ensure an incident investigation for any STS case is conducted to determine the causes and to identify and implement corrective action.

7. Division/Unit safety shall post all high noise areas and equipment.

8. Division/Unit safety shall maintain records of work area noise testing for 5 years.

6.3.5 Safety and Risk Management

Safety and Risk Management shall provide oversight, general administration, and monitoring of NCDOT's Hearing Conservation Program.

Safety and Risk Management shall have the responsibility of selecting and contracting with the audiometric testing provider.

Safety and Risk Management shall recommend the most effective hearing protection available.

Safety and Risk Management shall review audiometric test data for trends and develop plans for reduction in hearing loss.

Safety and Risk Management shall ensure the Audiometric testing Contractor coordinates and conduct annual audiometric tests with the Division/Unit safety staff.

Safety and Risk Management shall ensure the NCDOT Audiometric Contractor evaluates baseline and annual audiograms to establish a hearing threshold and annual retests for comparison to the baseline to determine if a STS has occurred.

Safety and Risk Management shall evaluate the NCDOT Audiometric Contractor for compliance with all requirements of the OSHA standard on hearing conservation including test location, equipment calibration, and recordkeeping requirements.

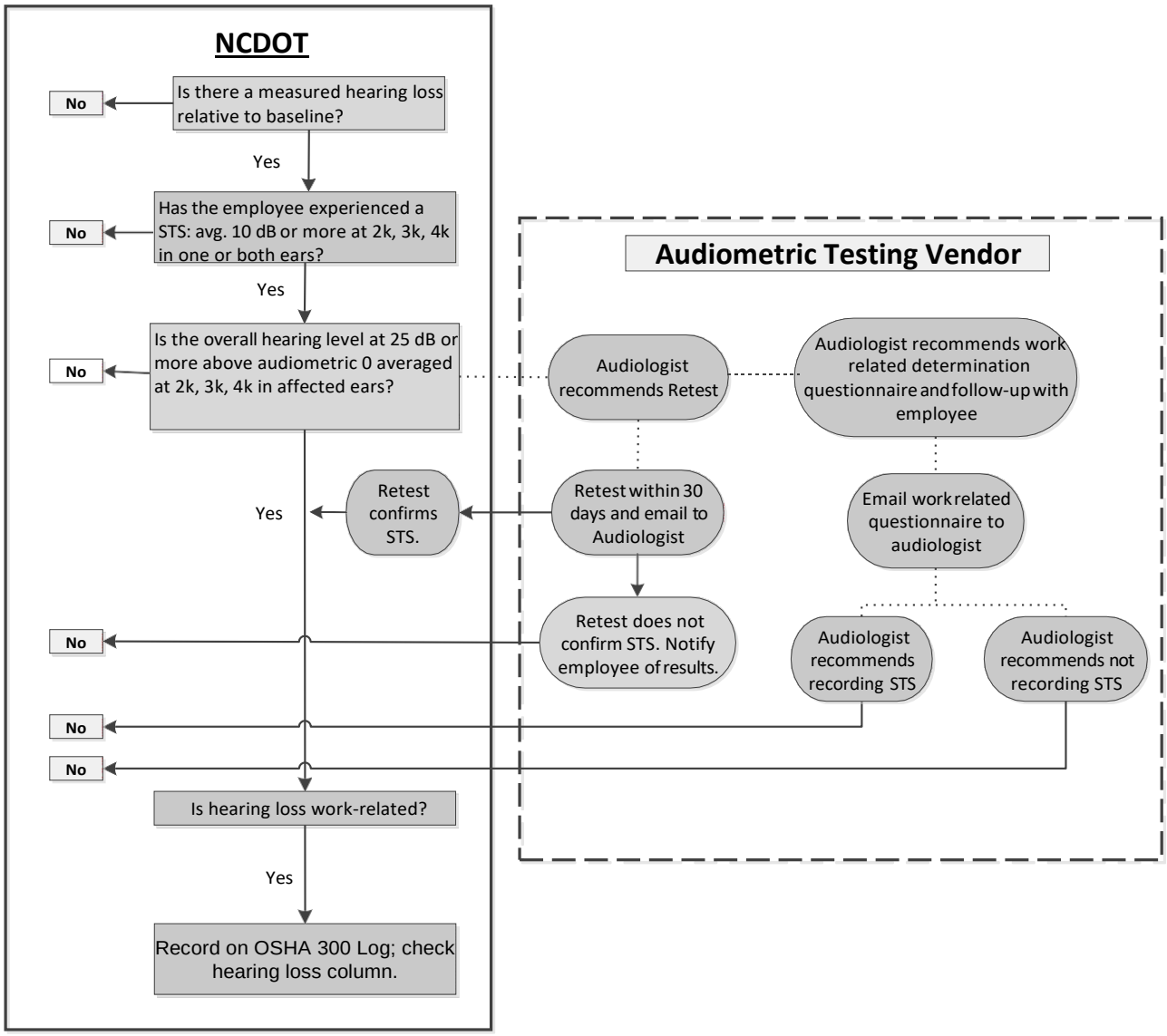
Safety and Risk Management shall ensure the NCDOT Audiometric Contractor provides a written letter to the employee with the results of the audiometric testing and any further testing that may be required. The letter template shall be approved by S&RM before it is used by the contractor.

6.3.5 Central Equipment Unit

Central Equipment Unit shall support Divisions/Units with the selection and purchase of equipment and/or modification of equipment as required to reduce employee exposure to noise. Specifications for new equipment should include maximum noise exposure of 85 dBA inside the cab of equipment if applicable.

APPENDIX A: DECISION TREE TO DETERMINE IF A HEARING LOSS IS RECORDABLE

DECISION TREE TO DETERMINE IF HEARING LOSS IS RECORDABLE



Author:	Paul Roberts	Revision #:	2
Approved By:		Date Revised:	

SAFETY POLICY & PROCEDURE

Compressed Gas Cylinders SPP# 1910.101

Quick Reference

Contents

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for the protection and safety of North Carolina Department of Transportation (NCDOT) employees who handle and use compressed gases.

2.0 Scope and Applicability

Compressed gases are typically stored under pressure in metal cylinders. These cylinders are designed and constructed to withstand high pressures. Improper handling and use of compressed gases can result in devastating consequences.

This safety policy and procedure provides guidelines for the safe handling and use of compressed gases. It includes provisions for training and presents safe handling guidelines. It also presents the types, uses, inspection, and marking requirements of compressed gas cylinders. Additionally, this safety policy and procedure presents transportation and storage requirements for compressed gas cylinders.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Risk Management and Central Equipment Unit within NCDOT.

This safety policy and procedure affects any employee who as a result of his or her job duties is exposed to or handles compressed gas cylinders.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry on Compressed Gases (29 CFR 1910.101) and Storage and Handling of LP Gas (29 CFR 1910.110).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, compressed gas cylinders will not be handled until employees have been trained concerning their use. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Compressed Gas Cylinders will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Compressed Gas Cylinders. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT's safety policy and procedure on Compressed Gas Cylinders.

6.1 Definitions

Compressed Gas (Nonliquefied)
A gas, other than a gas in solution, which under the charging pressure is entirely gaseous at a temperature of 70^{O}F.

Cylinder
A portable compressed gas container, fabricated to or authorized for use by the U.S. Department of Transportation (DOT), or fabricated to Transport Canada (TC) or the "Rules for the Construction of Unfired Pressure Vessels," Section VIII, ASME Boiler & Pressure Vessel Code.

Flammable Gas
A gas that is flammable in a mixture of 13 percent or less (by volume) with air, or the flammable range with air is wider that 12 percent regardless of the lower limit, at atmospheric temperature and pressure.

Handling
Moving, connecting, or disconnecting a compressed or liquefied gas cylinder.

Inside Diameter (I.D.)
Inside cylinder diameter.

Liquefied Gas

A gas, which under charging pressure, is partially liquid at a temperature of 20^{O}C (70^{O}F).

Liquefied Petroleum Gas (LP Gas)
Any material which is composed predominantly of any of the following hydrocarbons, or mixtures of them; propane, propylene, butanes (normal butane or iso-butane), and butylene.

Nonflammable Gas
A gas that does not meet the definition of a flammable gas.

Outside Diameter (O.D.)
Outside cylinder diameter.

Oxidizing Gas
A gas that can support and accelerate combustion of other materials.

Safety Relief Device
A device intended to prevent rupture on a cylinder under certain conditions of exposure.

Standard Cubic Foot (SCF)

One cubic foot of gas at 70^{O}F (21^{O}C) and 14.7 psia (an absolute pressure of 101 kilo pascals [kPa]).

Storage
An inventory of compressed or liquefied gases in containers that are not in the process of being examined, serviced, refilled, loaded, or unloaded.

Toxic Gas
A gas capable of causing damage to living tissue, impairment of central nervous system, severe illness, or death when ingested, inhaled or absorbed by the skin. Toxic gas has a health hazard rating of 3 or 4 defined in NFPA 704, Standard System for the Identification of Materials for Emergency Response.

Use
The consumption of a compressed or liquefied gas in a nonrecoverable manner.

User
An individual, group, or organization who utilizes the compressed or liquefied gas in a nonrecoverable manner.

Valve Protection Device
A device attached to the neck ring or body of the cylinder for the purpose of protecting the cylinder valve from being struck or damaged from impact resulting from a fall or an object striking the cylinder.

Valve Protective Cap
A rigid, removable cover provided for compressed gas container valve protection.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- General Safe Handling Guidelines
- Use
- Types
- Inspection
- Marking
- Transportation
- Storage
- Cylinder Protection
- Service

6.2.1 Training

Employees who use and handle compressed gas cylinders will be trained before initial job assignment and/or job reassignment. Employees will be trained in the safe use, inspection, handling, and storage of compressed gas cylinders. Refresher training shall be provided at the discretion of the supervisor.

6.2.2 General Safe Handling Guidelines

Serious accidents can result from the misuse, abuse, or mishandling of compressed gas cylinders. Employees assigned to the handling of cylinders under pressure should follow general safe handling guidelines. Appendix A presents these guidelines. Figure 1 presents the typical components of a compressed gas cylinder.

6.2.3 Uses

Compressed gas cylinders are used for variety of purposes in NCDOT. Compressed gas cylinders in NCDOT are commonly used in metal cutting operations. Cylinders should be handled carefully and only used for their designated purpose. See SPP# 1910.252, Welding, for additional related information.

6.2.4 Types

Compressed gas cylinders are used for a variety of gases in NCDOT. These gas cylinders fall into the following categories:

- Flammable
- Oxidizing
- Toxic and Poison

The flammable gas cylinder predominantly used in NCDOT is acetylene. Acetylene is used in torch heating, welding, and ferrous metal cutting operations.

Oxygen is primary oxidizing gas used in NCDOT usually with acetylene for welding and cutting operations.

Toxic and poison gas cylinders are used in a variety of applications within NCDOT. Methyl Bromide is the most common of these gas cylinders. These cylinders should be marked with a poison gas label.

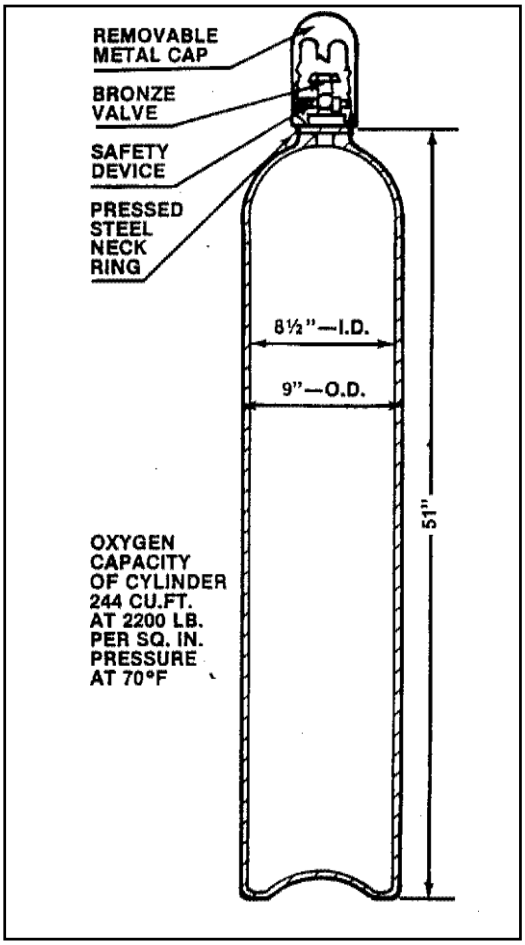


Figure 1

6.2.5 Inspection

Compressed gas cylinders should be visually inspected daily for leaks, cracks, etc. This visual inspection will include the cylinder, safety relief devices, valves, protection caps and stems. If a cylinder is thought to be defective, it should be returned to the supplier for replacement. Under no circumstances should employees attempt to repair defective cylinders. Gages should be checked to ensure that the gas under pressure is not left in hoses when operations are completed.

6.2.6 Marking

For the purpose of identifying the gas content, compressed gas cylinders shall be legibly marked with either the chemical or trade name of the gas. Such marking shall be by means of stenciling, stamping, or labeling, and shall not be readily removable. Whenever practical, the marking shall be on the shoulder of the cylinder for easy identification.

6.2.7 Transportation

Transporting gas cylinders requires careful consideration and appropriate precautions. These considerations and precautions include:

- Motor vehicle transport of cylinders
- Flammable gas and oxidizer cylinders transport
- Hand truck (dolly) transport of cylinders
- Cylinder transport precautions

Motor vehicle transport of cylinders shall only be done with vehicles equipped with racks or other means of securing the cylinders. Cylinders containing liquefied hydrogen or toxic gases shall be transported in open body vehicles.

Flammable gas and oxidizer cylinders transport must not be done together nor with poisons or corrosives. However, oxygen and acetylene cylinder joint transport is allowed if:

- The cylinders are transported in the rear truck bed below the cab level
- A roll bar is installed over the rear truck bed to prevent the cylinders from falling out of the truck bed in the event of the vehicle overturning

Red label, yellow label, white label, green label, or poison label materials are not to be transported on the same load. Poison label materials are not to be transported with food or other items intended for human consumption.

Hand truck (dolly) transport of cylinders shall be used for the transfer of compressed gas cylinders from loading area to shop or laboratory or other within-building transfers.

Cylinder transport precautions include:

- Cylinders having the valve protection cover in place while being transported (inter- and intra-building transport)
- Cylinders not being rolled or lifted by the valve or valve cap for moving
- Cylinder valves being shut off and valve caps in place during transit from location to location
- Cylinders that are dropped during transit being taken out of service and returned to the supplier for inspection
- Cylinders being securely supported at all times during transport
- Smoking being prohibited during loading, unloading, and hand transportation of flammable gas cylinders

6.2.8 Storage

The storage of compressed gas cylinders requires some basic precautions and guidelines. These include:

- General cylinder storage precautions
- Specific gas cylinder storage guidelines
- Cylinder storage room guidelines

General cylinder storage precautions include:

- Cylinders being secured in an upright position in a safe, dry, well- ventilated place prepared and reserved for the purpose
- Cylinders not being kept in unventilated enclosures such as lockers
- Cylinders not being stored in the same area as flammable substances, such as oil and volatile liquids or near sources of heat, such as radiators or furnaces
- Cylinders not being stored near elevators, gangways, stairwells, or other places where they can easily be knocked down or damaged
- Cylinders being stored on a level fireproof floor
- Cylinders stored in the open being protected from contact with the ground and against extremes of weather
- Cylinder storage being planned so that cylinders are used in the order that they are received from the supplier
- Empty and full cylinders being stored separately, with empty cylinders being plainly identified as such to avoid confusion
- Empty cylinders being grouped together that have held the same contents

Specific gas cylinder storage guidelines include additional precautions and guidelines for oxygen, hydrogen, and acetylene and liquefied fuel gas cylinders.

- **Oxygen cylinders shall not be stored within 20 feet (6 meters) of highly combustible materials, oil, grease, wood shavings, or cylinders containing flammable gases.**
- For NCDOT operations, oxygen and acetylene shall be paired and secured on a common transfer cart for use. If not to be used in the next 24 hrs., valves must be shut off, regulators removed, protective caps put in place and cylinders put back in storage.

- For applications where oxygen and acetylene will be stored on the welding cart for more than 24 hrs., the cart must have a ½ hour fire rated barrier (**triple baffle firewall partition design**) at least 5 ft. tall. See Figures 2 and 3.

Figure 2

Figure 3

- For oxygen and acetylene storage closer than 20 feet, cylinders shall be separated by a wall or barrier with a fire-resistance rating of at least ½ hour.
- Hydrogen cylinders storage locations shall be permanently placarded as follows: "HYDROGEN-FLAMMABLE GAS-NO SMOKING-NO OPEN
- FLAMES," or equivalent.
- Acetylene and liquefied fuel gas cylinders should be stored with the valve end up. If storage is within 100 feet (30.5 meters) of each other and not protected by automatic sprinklers, the total capacity of acetylene cylinders stored and used inside the building should be limited to 2,500 cubic feet. Acetylene storage areas must be well ventilated and open flames must be prohibited.
- Acetylene storage rooms should have no other compressed gases.

Cylinder storage room guidelines include:

- Storage rooms for cylinders containing flammable gases being well ventilated to prevent the accumulation of explosive concentrations of gas
- No ignition sources being permitted
- Smoking being prohibited
- All permanent wiring being in conduit
- Electric lights (portable and fixed) being equipped with guards to prevent breakage
- Electric switches being located outside the room

6.2.9 Cylinder Protection

All gas cylinders with a water capacity of over 30 pounds shall be equipped with a valve protection cap or with a collar or recess to protect the valve. Protective cap must remain in place unless in use.

6.2.10 Service

Cylinder service, modifications or repairs will be performed by an authorized individual other than a NCDOT employee. will be repaired or replaced by the

service representative. Any damaged or faulty equipment Cylinder valves that cannot be opened by hand will not be forced open with tools and will be returned to the supplier for service.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of compressed gas cylinder equipment and related supplies. They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to handle any compressed gas cylinders.

Supervisors will also note defective cylinders and tag them for repair.

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure. They shall report any defective or damaged cylinders to their supervisor.

6.3.4 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training.

Safety and Risk Management will also work with Central Equipment Unit to ensure that all newly purchased compressed gas cylinders equipment and supplies comply with current safety regulations and this safety policy and procedure.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Inventory Unit

Central Equipment Unit will maintain an inventory or source through State Contract supplier related parts and supplies for compressed cylinders.

Appendix A: Compressed Gas Cylinders Safety Handling Guidelines

- Accept only cylinders approved for use in interstate commerce for transportation of compressed gases.
- Do not remove or change the marks and numbers stamped on the cylinders.
- Follow manufactures instructions.
- Cylinders must never be dragged, pushed, or pulled across the floor.
- Transport cylinders weighing more than a total of 40 pounds (18.2 kg) using hand truck or motorized truck, securing them from falling.
- Keep the cylinders clean and protect them from cuts or abrasions.
- Do not lift compressed gas cylinders with an electromagnet. Where cylinders must be handled by a crane or derrick, as on construction jobs, carry them in a cradle or suitable platform and take extreme care that they are not dropped or bumped. Do not use slings.
- Do not drop cylinders or allow them to strike each other violently.
- Do not use cylinders for rollers, supports, or any purpose other than to contain gas.
- Do not tamper with safety devices in valves or on cylinders.
- Consult the supplier of the gas when in doubt about the proper handling of a compressed gas cylinder or its contents.
- Clearly indicate “EMPTY” with marking or tags on empty cylinders that are to be returned to the vendor.
- Close cylinder valves and replace valve protection caps, if the cylinder is designed to accept a cap.
- Load cylinders to be transported to allow as little movement as possible. Secure them to prevent violent contact or upsetting.
- Always consider cylinders to be full and handle them with corresponding care.
- Secure compressed gas cylinders at all times. Cylinders must not be left “free- standing”, e.g., cylinders unloaded from truck to loading dock must be secured until placed on a hand truck for delivery within the building.
- Compressed gas cylinders should never be subjected to a temperature above 125^{0}F.
- Never place cylinders where they might become part of an electrical circuit.
- Do not re-paint cylinders.
- Never use a flame to detect flammable gas leaks. Always use soapy water.

PROPANE CYLINDERS

NCDOT regularly uses propane for heating of asphalt, portable torches, crack sealing, LP forklift and other equipment fuel and operations. Compressed Gases such as propane that are stored in cylinders create a significant hazard. Propane stored in tanks expands at 270 it’s stored pressure when changing from liquid to a vapor state. As the temperature rises, the liquid becomes less dense and expands.

Cylinders may not be stored near highly flammable substances such as oil, gasoline or waste. They also cannot be stored next to highly flammable solvents, combustible waste material or

similar substances. You may not store them in flammable storage cabinets due to the rise in temperature and expanding vapors. Doing so increases the chance for an explosion and increase the risk of fire and shrapnel. Small propane gas cylinders should be stored in cages.

Storage

Storage of LPG containers within NCDOT buildings not frequented by the public shall not exceed 300 lbs. All outside storage for LPG/Propane tanks awaiting use, shall be located from the nearest building or group of buildings in accordance with the following. All storage will be in a suitable ventilated area where safety relief valves on tanks can vent without the danger of vapors or fumes getting near.

Quantity of LP Gas stored	Distance
500 lbs. or less	0
501 to 6,000 lbs.	10
6,001 to 10,000 lbs.	20
Over 10,000 lbs.	25

Cylinders will be stored on a concrete surface so that moisture will dissipate from the foot ring and prevent rusting to the cylinders and the tank. Cylinders shall be stored upright when possible. All cylinders will be securely chained to a wall or within a rack to prevent tipping.

Any cylinder stored in a horizontal position must be done so with the relief valve up. This allows the over pressure of the container to be in constant contact with the relief valve to blow off the excess pressure of the tank.

Fire protection for Containers

Storage locations shall be provided with at least one approved Portable fire extinguisher having a rating of not less than 20-BC.

All containers weather portable or permanent tanks shall be located in an area protected by or free from damage by vehicular traffic.

Inspections

All propane cylinders have a date of Mfg. stamped on the top collar of the cylinder. After the date of Mfg., the cylinders must be requalified every 12 years. From that point forward, they must be inspected every 5 years thereafter.

Items to be inspected include:

- Relief Valves,
- Service Valves
- Bleeder valves
- Stamped markings or nameplates,
- Protective collars (Neck rings)

- Tanks that have not been inspected or are out of date are to be removed from service and sent to an authorized service center/dealer for inspection. The date of the inspection can be found on the collar of the tank.
- Foot rings.
- Tank condition. Minor rusting can be cleaned up and repainted.
- Any defects found such as major rusting, pitting of the surface, damage to welds, dents or damage to collars or foot rings will require removing the cylinders from service.

Markings

All tanks, large or small shall be appropriately marked to show the dangers of the contents.

All tanks regardless of size should be marked so that labels denoting the contents can be read from the directions of travel.

Tanks 500 lbs. and over should be marked on at least two sides with:

- NFPA Diamond
- No Smoking
- Propane
- Flammable.

Respiratory Protection SPP# 1910.134

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure (SPP) is to establish guidelines for using respiratory protection to protect the health of North Carolina Department of Transportation (NCDOT) employees from inhalation hazards.

2.0 Scope and Applicability

The human respiratory system is typically the quickest avenue of material entry into the human body. Toxic materials that enter the body through the lungs may present serious health risks.

This safety policy and procedure presents guidelines for the use of respiratory protection by NCDOT employees. Details are presented on the administration requirements of a respiratory protection program, the need for exposure assessments, provisions for training, and respirator selection guidelines. Additionally, details are presented on recordkeeping, purchasing, and medical requirements associated with respiratory protection. This document also describes the areas of responsibility for unit heads, supervisors, employees, Safety and Risk Management (SRM), Division Safety Engineers (SE), and central equipment units within NCDOT.

This SPP affects any employee who, as a result of his or her job duties, is exposed to air contaminants or hazardous environments where contaminants exceed the Occupational Safety and Health Act (OSHA) Permissible Exposure Limit (PEL) or are immediately dangerous to life and health (IDLH). It also applies to employees performing an occupational activity that, per management, requires respiratory protection – even if the actual airborne hazard concentration is below the PEL or is otherwise unknown.

3.0 Reference

This SPP is established in accordance with OSHA standards for general industry which also includes shipyards (29 CFR 1910.134) and construction (29 CFR 1926.103)

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Engineering and administrative controls will always be explored prior to reliance on respiratory protection. NCDOT employees will use respirators when engineering and administrative controls are in the process of being explored/implemented or are unable to reduce air contaminants below their respective PEL. Safe work practices and employee training shall supplement the use of respiratory protection.

5.0 General Responsibilities

It is the responsibility of each unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on respiratory protection.

It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on Respiratory Protection.

6.1 Acronyms/Definitions

ACRONYMS

AIHA	**American Industrial Hygiene Association**
APF	**Assigned Protection Factor**
APR	**Air-Purifying Respirator**
CFR	**Code of Federal Regulations**
ESLI	**End of Service Life Indicator**
HEPA	**High Efficiency Particulate Air**
IDLH	**Immediately Dangerous to Life and Health**
IH	**Industrial Hygiene/Hygienist**
MSHA	**Mine Safety and Health Administration**
NCDOT	**North Carolina Department of Transportation**
NIOSH	**National Institute for Occupational Safety and Health**
OSHA	**Occupational Safety and Health Administration**
OV	**Organic Vapor**
PEL	**Permissible Exposure Limit**
PLHCP	**Professionally Licensed Healthcare Provider**
QLFT	**Qualitative Fit Test**
SE	**Safety Engineer**
SPP	**Safety Policy and Procedure**
SRM	**Safety and Risk Management**
STEL	**Short Term Exposure Limit**
TWA	**Time Weighted Average**

DEFINITIONS

Aerosol
Particles, solid or liquid, suspended in air.

Airline Respirator
An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

Air-Purifying Respirator (APR)
Respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

American Industrial Hygiene Association (AIHA)
Professional organization of industrial hygiene.

Approved
Evaluated and listed as permissible by NIOSH/MSHA, for the respirator's intended use.

Assigned Protection Factor (APF)
The workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program.

Contaminant
A harmful, irritating, or nuisance airborne material.

Disposable Respirator
A respirator for which maintenance is not intended and that is designed to be discarded after excessive resistance, sorbent exhaustion, physical damage, or end-of- use-service-life renders it unsuitable for its intended use. (See: Dust mask)

Dust
An aerosol consisting of mechanically produced solid particles derived from the breaking up of larger particles.

Dust Mask
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. NOTE: the elastic, fabric face covers typically used in medical settings are separate from dust masks. They are not respirators and are not considered by NCDOT to provide any respiratory protection.

End-of-Service-Life Indicator (ESLI)
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.

Exposure Limit
The maximum allowable concentration of a contaminant in the air to which an individual may be exposed. These may be time-weighted averages, excursion limits, ceiling limits and short-term limits.

Filter
A component used in respirators to remove solid or liquid aerosols from the inspired air.

Fit Check
A test conducted by the wearer to determine if the respirator is properly sealed to the face.

Fit Test
The use of challenge agent to evaluate the fit of a respirator on an individual.

Fume
Solid aerosols formed by the condensation of metal.

Hazardous Atmosphere
An atmosphere that contains a contaminant(s) in excess of the exposure limit or is oxygen deficient.

High-Efficiency Particulate Air (HEPA) Filter
A filter that removes from the air 99.97 percent or more of the aerosols having a diameter of 0.3 micrometers.

Immediately Dangerous to Life or Health (IDLH)
Any atmosphere that poses an immediate hazard to life or poses immediate irreversible debilitating effects on health.

Negative Pressure Respirator (tight fitting)
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.

Permissible Exposure Limit (PEL)
Regulatory limits for contaminants that include:

- Eight-hour time weighted average (TWA)
- Short Term Exposure Limit (STEL)
- Ceiling (c)
- Excursion Limits

Powered Air-Purifying Respirator (PAPR)
An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering. Loose-fitting (hooded) PAPRs do not require fit testing. PAPRs with a tight face seal will still require fit testing.

Qualitative Fit Test (QLFT)
A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

Workplace Exposure Assessment
Evaluation of respiratory hazards by activity observation, material data sheets, historical data review, and/or air monitoring by a Safety Engineer or Industrial Hygienist.

6.2 General Provisions

This section details the provisions of this SPP with each provision discussed in a separate subsection. These provisions are:

- Training
- Written Respiratory Program
- Administration
- Exposure Assessment
- Respirator Selection
- Respirator Fit Test
- Recordkeeping
- Purchasing
- Medical Surveillance

6.2.1 Training

Employees who use or who are assigned respirators shall be trained in:

- Respirator limitations under various conditions
- Protection factors of the various types of respirators
- Proper use, maintenance, cleaning, disinfection, and storage of respirators
- Testing of the respirator face seal

This training shall be provided upon initial job assignments requiring the use of respirators and shall occur annually and when job conditions change. The training (and retraining) will include a fit test if employees are assigned tight-fitting respirators. Upon initial training employees shall be provided the information in Appendix D: Voluntary Respirator Use Information. A signed copy of Appendix D shall be retained by the employer.

6.2.2 Written Respiratory Program

This safety policy and procedure provides an overview of the key components of respiratory protection. Each unit shall have a written respiratory program if respirators are provided to employees. The key elements of this written respiratory program are:

- Using standard operating procedures for respirator training, selection, use, maintenance, storage, procurement, and medical examinations
- Selecting respirators based upon employee exposure hazards
- Training respirator users on the proper use and limitations of respirators
- Respirator fit testing
- Assigning respirators to individual workers for their exclusive use
- Cleaning and disinfecting respirators on a regular basis
- Storing respirators in convenient, clean and sanitary locations
- Inspecting respirators during routine cleaning for worn or damaged parts
- Conducting surveillance of work area conditions and degrees of employee exposure or stress
- Conducting regular inspections and evaluations to determine the continued effectiveness of the program

- Not assigning respirators until it has been determined that the employee is physically able to perform the work and use the equipment

A comprehensive Written Respiratory Program can be found in Appendix B. Units may adopt the Written Respiratory Program provided in Appendix B or produce their own with more specific guidelines to their operations.

6.2.3 Administration

Each Division Safety Engineer shall administer the written respiratory protection program. SRM will assist in the implementation of the program, selection of approved respirators, training, and recordkeeping.

6.2.4 Exposure Assessment

A safety professional or industrial hygienist shall assess employee exposures to airborne contaminants prior to the employee using a respirator. Based on the assessment, the proper respirator shall be selected. Exposure assessments shall be based on such data as air monitoring results, process information, work environment, historical data, and/or work practices relative to the type of contaminant.

The OSHA Permissible Exposure Limit (PEL) of an air contaminant does not have to be exceeded for an employee to be required to use a respirator. The supervisor or safety professional may also require respirator use because of nuisance exposure or due to doubts in the exposure assessment findings.

6.2.5 Respirator Selection

6.2.5.1 Air Purifying Respirators (APR)

The majority of respirators used at NCDOT are air purifying respirators (APR). They rely on cartridge or material filtration of atmospheric air to lower contaminant exposure. The four most common types are:

- **Disposable filtering facepiece APR**
- **Half face negative pressure APR**
- **Full face negative pressure APR**
- **Powered air purifying respirator (PAPR)**

APRs are appropriate for low-level exposures to such contaminants as

- Silica
- Lead
- Asbestos
- Welding fumes
- Asphalt fumes
- Respirable dust
- Pesticides
- Hexavalent Chromium

Which could be expected from such activities as

- Sawing
- Hot work (welding, torching, metal grinding)
- Grinding
- Paving
- Painting

NOTE: these lists are not exhaustive, and an exposure assessment must be performed on any activity to dictate proper respirator assignment.

6.2.5.2 Assigned Protection Factor (APF)

- **APF [10]: Disposable filtering facepiece, half face negative pressure APR**
- **APF [50]: Full face negative pressure APR**
- **APF [25]: Powered air purifying respirator (PAPR)**

The number that appears in brackets ([ ]) after each APR above is the assigned protection factor (APF). A respirator's APF corresponds to its level of contaminant reduction. For example, a respirator with an APF of 25 will reduce actual user exposure of atmospheric contaminants by a factor of 25. To further illustrate, if an employee is exposed to 200 µg/m^3 of lead, if he/she is using a respirator with an APF of 25 (e.g. PAPR), the actual exposure would be 8 µg/m^3 (200 / 25 = 8). Higher APF respirators, therefore, may be required in atmospheres of higher contaminant concentration. The proper APF respirator should always be used to lower employee exposure below the PEL.

6.2.5.3 APR Cartridge Selection

The types of filtering cartridges/materials used on APRs vary between particulate filters and chemical filters.

Particulate filters are rated both on an oil resistance scale:

- N – not resistant to oil
- R – partially resistant to oil
- P – resistant to oil

And on an efficiency scale:

- 95 – when properly used this filter removes 95% of 0.3 µm-sized particles
- 99 – when properly used this filter removes 99% of 0.3 µm-sized particles
- 100 – when properly used this filter removes 99.97% of 0.3 µm-sized particles

Chemical cartridge filters are more substance specific. They include:

- OV – organic vapor filter
- Acid gas – hydrogen sulfide, chlorine, sulfur dioxide
- Hg – mercury filter

The proper respirators and filters shall be selected to provide the protection factor to achieve compliance with a PEL for the particular airborne contaminant(s). Filter cartridges are color coded for clarification. Some cartridges protect against multiple contaminants (e.g. OV/P100). Other filters are built-in to the respirator (i.e. N95 filtering facepieces).

6.2.5.4 Supplied Air Respirators (SAR)

Unlike APRs, supplied air respirators (SARs), do not rely on filtration of atmospheric air. Instead, they provide breathing air either from a self-contained tank or from an airline source. SARs can be used for either high-exposure situations (e.g. abrasive blasting operations) or for emergency escape. SARs use grade-D breathing air which must be regularly tested. The APF for supplied air depends on the specific type of facepiece and pressure mode, the manufacturer's manual should be referenced to find the specific model's APF. Escape SARs are only to be used in emergency situations.

6.2.6 Recordkeeping

Medical evaluation records are to be kept by the employer and made available to the employee. Although they do not contain HIPA information, they will be treated as confidential medical records and kept securely and separately from the employee's personnel file. If the PLHCP maintains the records instead of NCDOT that is acceptable and preferred.

Records shall be kept on each employee who receives training and fit testing. This record will include the name, location, type of contaminant(s), respirator type, fit tester, medical evaluation and results of fit testing. Fit test records are to be kept until the next fit test is administered, or for 5 years, whichever occurs first. See Appendix A for the form.

6.2.7 Fit Testing

Fit testing shall be conducted annually for all employees required to wear a tight-fitting respirator (e.g. half-face APR or filtering facepiece). Tested employees shall be clean shaven. Mustaches and goatees are not allowed to interfere with the sealing area of the respirator. At least two different brand/models of respirator shall be made available for employees to choose from. The fit test should be performed by a safety professional.

Annual fit tests may be quantitative (e.g. TSI Porta Count) or qualitative. Qualitative fit tests (QLFT) shall utilize one of the following irritants: isoamyl acetate (banana oil – recommended for organic vapor respirators), saccharin, bitrex, or irritant smoke. proceed as follows:

- If using banana oil, saccharin, or bitrex, perform a sensitivity test using the dilute irritant while the employee is not wearing the respirator.
- After determining the sensitivity threshold of the irritant, allow the employee 5 minutes for their senses to return to normal.

- Don the respirator and adjust the straps to provide a comfortable but snug fit.
- Perform a positive pressure seal check by covering the exhalation valve and exhaling. The APR should have some resistance during the check, as air should not pass freely around the respirator seal edges.
- Perform a negative pressure seal check by covering the cartridges and inhaling. The APR should collapse inward somewhat (depending on what type it is). Air should not pass easily around the respirator seal edges.

While wearing the respirator, the user shall perform the following exercises for at least 30 seconds each while being properly tested with the respective irritant or odorizer:

- Normal breathing
- Deep breathing
- Turning head side to side
- Moving head up and down (nodding)
- Talking (reciting a poem or song or counting backwards from 100)
- Grimacing
- Bending over (touching toes)
- Normal breathing

If the user does not taste/smell the irritant at any point during the exercises, the fit test should be considered passed.

Loose-fitting PAPRs do not require annual fit testing, nor do they require users to be clean-shaven. *The use of PAPRs does not exempt employees from the medical clearance and annual training requirements of this policy.*

6.2.8 Purchasing

Only NIOSH-approved respirators shall be purchased and kept in stock along with an adequate supply of cartridges and replacement parts. Respirators shall be provided by the employer at no cost to the employee.

6.2.9 Medical Surveillance

All employees who are required to use a respirator for any work activity shall complete the medical evaluation questionnaire or receive an initial medical examination that obtains the same information as the medical questionnaire.

- The questionnaire evaluation or initial medical examination must be performed by a professionally licensed healthcare professional (PLHCP).
- The PLHCP will provide a written recommendation to the employer regarding the employee's ability to use the specified respirator(s).
- If the recommendation demonstrates the need for one, or if an employee gives a positive response to any question among questions 1 through 8 in Section 2, Part A of the questionnaire, the employee will be sent to a PLHCP for a follow-up, in person medical examination.

***VOLUNTARY** use of filtering facepiece respirators (e.g. N95s) by employees does not require medical clearance.*

No employees will wear a respirator until medical clearance has been completed. Any medical event or substantial physical change which would affect an employee's breathing or their ability to wear a respirator shall warrant a follow-up medical examination. If employee annually documents that no significant changes to his/her job activity nor physical appearance has occurred that would change the effectiveness of the existing medical clearance, then the initial clearance remains valid. A copy of the required (Part A) medical questionnaire is attached in Appendix C. An additional (Part B) may optionally be included in the questionnaire submitted. For a copy of part B please reference the OSHA publication or reach out to SRM.

6.3 Specific Responsibilities

6.3.1 Industrial Hygienist

The NCDOT industrial hygienist (IH), or manager of the NCDOT IH program, will act as the program administrator for the department's respiratory protection program. As the program administrator, the IH shall have specific training and be knowledgeable about respirator use to supervise the program properly. All other responsible parties should administer the program in liaison with the IH.

6.3.2 Unit Heads

Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of respiratory protection equipment and related supplies. They will also be responsible for identifying the employees affected by this safety policy and procedure and assure those employees are provided a medical examination before being issued a respirator.

Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.3 Supervisors

Supervisors will not allow any employee who has not received the required training or medical evaluation to perform any of the tasks or activities requiring respiratory protection. They will also ensure that respirators are properly worn and maintained.

Supervisors will request and coordinate the required training for the affected employees. Supervisors will be responsible for ensuring that an adequate supply of respirators, cartridges, and replacement parts are available.

6.3.4 Employees

Employees shall comply with all applicable guidelines contained in this SPP. They will maintain and clean the respirator assigned to them and properly store the respirator when not in use. Employees will be clean shaven if required to wear a tight-fitting respirator.

6.3.5 Safety Engineer

Safety Engineer will act as manager of the written respiratory program specific for the unit and provide assistance to unit heads and supervisors on respirator use and training.

Safety Engineer shall conduct respiratory training and fit testing on an annual basis.

Safety Engineer shall consult with an Industrial Hygienist as needed to perform exposure assessments and for proper respirator selection.

6.3.6 Safety and Risk Management

Safety and Risk Management (SRM) will provide prompt assistance to unit heads, supervisors, or others as applicable on any matter concerning this SPP.

SRM will provide consultative audit and exposure assessment assistance to ensure effective implementation of this safety policy and procedure.

6.3.7 Central Equipment Unit

Central Equipment Unit will maintain an inventory of approved respirators for NCDOT.

APPENDIX A: Respirator Fit Test Form

NCDOT
RESPIRATOR FIT TEST FORM
QUALITATIVE FIT TEST

Date: _____

Employee Name:_____Unit: _____

Division: _____

Job Description:

_____

Respirator:_____half-face_____full face_____Positive Pressure Check: **Yes No**

Negative Pressure Check: **Yes No** Facial Hair: **Yes No**

Prescription Glasses: **Yes No** Familiarity With Respirator: **Yes No**

Test Agent: Saccharin Irritant Smoke Isoamyl acetate Bitrex

Pre-test: Taste: Pass Fail Odor: Pass Fail Irritant: Pass Fail

FIT TEST RESULTS

Respirator Brand & Model	Normal	Deep Breathing	Head side to side	Head up and down	Speaking Passage	Jogging	Normal

P = Pass **F** = Fail Must have all **P**'s to have a satisfactory fit test.

Reason for failure to fit test:_____

By passing all the above fit tests, the employee is qualified to use the above respirator for the following contaminants:_____

I certify that I have trained the above individual on the use, care, limitations and maintenance of the respirator and performed the fit test in accordance with the respirator manufacturer's procedures and OSHA requirements.

Fit Tester Signature _____

I have been fit tested and trained on the above listed respirator. I will follow the NCDOT policies and procedures for the use, maintenance and care of the respirator. No changes to my health, appearance, or work activities has occurred that would negate my existing medical clearance.

Employee Signature _____

APPENDIX B: Comprehensive NCDOT Respiratory Program

NCDOT
DIVISION RESPIRATORY PROTECTION

I. Introduction

In the control of those occupational diseases caused by breathing air contaminants, the primary objective is to prevent harmful exposures. This is accomplished as far as feasible by accepted administrative, engineering control measures and work practice controls. When effective controls are not feasible, or while they are being put in place, appropriate respirators may be required.

II. Purpose and Scope

The purpose of this program is to comply with 29 CFR 1910.134, the OSHA respiratory protection standards, ANSI Respiratory Protection Z88.2-1992, and to assure respirator users are protected against air contaminants in the workplace. The program applies when respirators are:

- Used to comply with OSHA requirements
- Required by the employer without explicit OSHA requirement
- Worn voluntarily

III. Responsibility

A. The Division Safety Engineer is responsible for:

1. Respirator selection
2. Training and instruction
3. Fit testing users for tight-fitting respirators
4. Medical evaluation
5. Respirator availability and use
6. Respirator maintenance and inspection
7. Quality and quantity of breathing air
8. Routine audit of the program
9. Records retention

B. The employee is responsible for:

1. Using the respirator provided according to instructions and training
2. Completing the medical evaluation
3. Performing seal checks each time he puts on his respirators.
4. Undergoing fit tests
5. Cleaning, disinfecting, inspecting, and storing his/her respirator
6. Making the most of the annual training provided

C. The supervisor is responsible for:

1. Supplying respirators
2. Assurance that respirators are worn safely

IV. Respirator Selection

The manager of the divisional respiratory program selects respirators based on the concentration of hazardous contaminants likely to be encountered and the nature of the work being done. Breathing zone air samples are the best measurement of employee exposure, however a reasonable estimate of expose can be used.

A. Lead
   PAPR with P100 filters
   Half face tight fitting respirator with P100 filters (Contract Inspectors only)

B. Respirable Crystalline Silica
   Half or full-face APR with P100 cartridges
   Disposable filtering facepiece respirator N95 under some circumstances

C. Herbicides and Pesticides
   Half-face APR with organic vapor cartridge with P100 filter

D. Nuisance Dust
   Disposable filtering facepiece respirator N95

E. Abrasive Blasting Dust
   Bullard or Clemco Abrasive Blast Helmet Type CE

V. Use of Respirators

Each employee shall use the respirator correctly. Failure to use or wear the respirator correctly will reduce the provided protection and may cause breathing difficulty for the user. Employees shall adhere to the following:

A. Put the respirator on as instructed during training.
B. For tight fitting respirators, the wearer must be clean shaven so no hair interferes with the face to respirator sealing area.
C. For tight fitting respirators, the wearer must perform the fit seal check prior to entering the work area.
D. Loose fitting respirators shall only be worn after the wearer assures that the respirator is being supplied with the required airflow. Wears do not have to be clean shaven. (see manufacturer's instructions)
E. Filters and cartridges shall be replaced as follows:
    1. P100 filters (purple/pink) when breathing resistance increases, when it becomes wet, or after a scheduled period of time. Replacement times are dependent on work activity, SE should provide consulting on when to replace cartridges.
    2. Organic vapor cartridges after each use and/or at the end of the shift.
    3. Disposable dust mask N-95 after each use and/or at the end of the shift.
    4. PAPR cartridges are to be flow tested periodically. See the manufacturer's instructions for how to perform test and for replacement procedure based on test results.
F. Employee shall be allowed to take periodic breaks to maintain respirator and to relief discomfort.

VI. Medical Evaluation

Each employee shall be medically evaluated prior to using any respirator. The program manager shall have the medical provider conduct the evaluation to include the required OSHA questionnaire and additional necessary tests, and written clearance for use. The medical evaluation shall be repeated anytime the employee has a medical event which would affect the ability to wear a respirator. During annual respiratory training employees shall document that no significant job activity nor health changes have occurred that would negate the received medical clearance.

VII. Maintenance and Care of Respirators

Employees shall maintain their respirator to retain their original effectiveness by periodic inspection, repair, cleaning, and proper storage. Manufactures instructions shall be followed to inspect, repair, and cleaning.

A. Inspection
   Employees shall inspect their respirators before each use and while cleaning to check the condition of the face piece, head straps, connecting tube, and canisters and elastomeric parts for signs of deterioration.

B. Repair
   Employee's respirators, which do not pass inspection, shall be replaced or repaired immediately. Employees can change canisters and head with OEM parts designed for the respirator. All other replacement or repairs are handled by person trained to repair respirators. (NOTE: Only the manufacturer or technician trained by the manufacturer can attempt to adjust or repair reducing and admission valves regulators, and alarms.)

C. Cleaning
   Employees shall clean and disinfect their respirators as frequently as necessary to make sure they are sanitary. All reusable respirators shall be cleaned following use by the following methods:
   1. Disassemble respirator
   2. Wash with warm dilute dish soap solution or wipe with respirator cleaning wipes
   3. Inspect all parts
   4. Air dry or pat dry
   5. Re-assemble respirator

D. Storage
   Employees shall store respirators after inspection, cleaning, and necessary repairs, so the respirators are protected against damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. The preferred method is in a plastic bag inside a crush proof box.

VIII. Training

A. Training is required when respirators are used. The program manager provides training for workers required by OSHA to wear a respirator and for their supervisors. The training includes:
   1. Why respirators are needed
   2. How improper fit, usage, or maintenance can compromise the protection provided.
   3. Capabilities and limitations

4. How to use during emergencies and what to do if the respirator malfunctions
5. How to inspect, put on and remove, use and check the seals
6. Maintenance and storage
7. How to recognize medical signs and symptoms that affect use
8. General requirements of 29 CFR 1910.134 Training must be provided initially, annually, and anytime a significant job activity or health condition of an employee changes that may change aspects of their respiratory protection.

B. Training is required when respirators are worn even though they are not required by OSHA. Employees who wear respirators even though they are not required to by OSHA need to be provided with the information in Appendix D of 1910.134, either orally or in writing.

C. Fit Test will be conducted as prescribed in 1910.134 Appendix A. Any employee required to wear a tight-fitting respirator must be fit tested annually. Employees using only loose-fitting PAPRs or abrasive blast helmets are not required to be fit tested. Voluntary use of filtering facepieces do not require fit testing.

IX. Records

The respiratory program manager maintains the following records:

A. An up-to-date copy of the written respiratory program.

B. List of employees enrolled in the written respiratory program.

C. Fit test reports. These are to be kept until the time of the next annual fit test, or for 5 years from the latest occurrence.

D. Training records. These are to be kept until the time of the next annual training, or for 5 years from the latest occurrence.

E. Medical evaluation records for the duration of employment plus 30 years. These are to be treated appropriately as medical records and thus be kept confidential and separate from the employee's personnel file.

F. Employee exposure records for duration of employment plus 30 years.

X. References

- **American National Standard for Respiratory Protection. ANSI Z88.2.**
- **American National Standard for Respirator Fit Test Methods. ANSI Z88.10**
- **NIOSH Respirator Decision Logic. October 2004. DHHS (NIOSH) Publication No. 2005-100.**
- **OSHA Respiratory Standard. 29 CFR 1910.134. Revised 2011.**
- **NCDOT SPP #1910.134 (latest revision)**

Division Safety Engineer:

_____

Date:

_____

APPENDIX C: Respirator Medical Evaluation Questionnaire

Part A Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

1. Today's date:

2. Your name:

3. Your age (to nearest year):

4. Sex (circle one): Male/Female

5. Your height: ft. in.

6. Your weight: lbs.

7. Your job title:

8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code):

9. The best time to phone you at this number:

10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): Yes/No

11. Check the type of respirator you will use (you can check more than one category):

    a. ☐ N, R, or P disposable respirator (filter-mask, non-cartridge type only).

    b. ☐ Other type (for example, half- or full-facepiece type, powered-air purifying, supplied-air, self-contained breathing apparatus).

12. Have you worn a respirator (circle one): Yes/No If "yes," what type(s):

Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").

		YES	NO
1.	Do you currently smoke tobacco, or have you smoked tobacco in the last month?	☐	☐
2.	Have you ever had any of the following conditions?		
a.	Seizures	☐	☐
b.	Diabetes (sugar disease)	☐	☐
c.	Allergic reactions that interfere with your breathing	☐	☐
d.	Claustrophobia (fear of closed-in places)	☐	☐
e.	Trouble smelling odors	☐	☐
3.	Have you ever had any of the following pulmonary or lung problems?	YES	NO
a.	Asbestosis	☐	☐
b.	Asthma	☐	☐
c.	Chronic bronchitis	☐	☐
d.	Emphysema	☐	☐
e.	Pneumonia	☐	☐
f.	Tuberculosis	☐	☐
g.	Silicosis	☐	☐
h.	Pneumothorax (collapsed lung)	☐	☐
i.	Lung cancer	☐	☐
j.	Broken ribs	☐	☐
k.	Any chest injuries or surgeries	☐	☐
l.	Any other lung problem that you've been told about	☐	☐
4.	Do you *currently* have any of the following symptoms of pulmonary or lung illness?	YES	NO
a.	Shortness of breath	☐	☐
b.	Shortness of breath when walking fast on level ground or walking up a slight hill or incline	☐	☐
c.	Shortness of breath when walking with other people at an ordinary pace on level ground	☐	☐
d.	Have to stop for breath when walking at your own pace on level ground	☐	☐
e.	Shortness of breath when washing or dressing yourself	☐	☐
f.	Shortness of breath that interferes with your job	☐	☐
g.	Coughing that produces phlegm (thick sputum)	☐	☐
h.	Coughing that wakes you early in the morning	☐	☐
i.	Coughing that occurs mostly when you are lying down	☐	☐

j. Coughing up blood in the last month	☐	☐
k. Wheezing	☐	☐
l. Wheezing that interferes with your job	☐	☐
m. Chest pain when you breathe deeply	☐	☐
n. Any other symptoms that you think may be related to lung problems	☐	☐
5. Have you ever had any of the following cardiovascular or heart problems?	YES	NO
a. Heart attack	☐	☐
b. Stroke	☐	☐
c. Angina	☐	☐
d. Heart failure	☐	☐
e. Swelling in your legs or feet (not caused by walking)	☐	☐
f. Heart arrhythmia (heart beating irregularly)	☐	☐
g. High blood pressure	☐	☐
h. Any other heart problem that you've been told about?	☐	☐
6. Have you ever had any of the following cardiovascular or heart symptoms?	YES	NO
a. Frequent pain or tightness in your chest	☐	☐
b. Pain or tightness in your chest during physical activity	☐	☐
c. Pain or tightness in your chest that interferes with your job	☐	☐
d. In the past two years, have you noticed your heart skipping or missing a beat	☐	☐
e. Heartburn or indigestion that is not related to eating	☐	☐
f. Any other symptoms that you think may be related to heart or circulation problems	☐	☐
7. Do you currently take medication for any of the following problems?	YES	NO
a. Breathing or lung problems	☐	☐
b. Heart trouble	☐	☐
c. Blood pressure	☐	☐
d. Seizures	☐	☐
8. If you've used a respirator, have you ever had any of the following problems?	☐	☐
(If you've never used a respirator, check NO and go to question 9.)		
a. Eye irritation	☐	☐
b. Skin allergies or rashes	☐	☐
c. Anxiety	☐	☐
d. General weakness or fatigue	☐	☐
e. Any other problem that interferes with your use of a respirator	☐	☐

	YES	NO
9. Would you like to talk to the PLHCP about your answers to this questionnaire?	☐	☐

Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-facepiece respirator or a self-contained breathing apparatus (SCBA). For employees who have been selected to use other types of respirators, answering these questions is voluntary.

	YES	NO
10. Have you ever lost vision in either eye (temporarily or permanently)?	☐	☐
11. Do you currently have any of the following vision problems?	☐	☐
a. Wear contact lenses	☐	☐
b. Wear glasses	☐	☐
c. Color blind	☐	☐
d. Any other eye or vision problem	☐	☐
12. Have you ever had an injury to your ears, including a broken eardrum?	☐	☐
13. Do you currently have any of the following hearing problems?	☐	☐
a. Difficulty hearing	☐	☐
b. Wear a hearing aid	☐	☐
c. Any other hearing or ear problem	☐	☐
14. Have you ever had a back injury?	☐	☐
15. Do you currently have any of the following musculoskeletal problems?	☐	☐
a. Weakness in any of your arms, hands, legs, or feet	☐	☐
b. Back pain	☐	☐
c. Difficulty fully moving your arms and legs	☐	☐
d. Pain and stiffness when you lean forward or backward at the waist	☐	☐
e. Difficulty fully moving your head up or down	☐	☐
f. Difficulty fully moving your head side to side	☐	☐
g. Difficulty bending at your knees	☐	☐
h. Difficulty squatting to the ground	☐	☐
i. Climbing a flight of stairs or a ladder carrying more than 25 lbs.	☐	☐
j. Any other muscle or skeletal problem that interferes with using a respirator	☐	☐

APPENDIX D: Voluntary Respiratory Use Information

Respirators are an effective method 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.

I have read and understand the requirements laid out in this appendix and will follow them if I choose to voluntarily wear an air purifying respirator under working conditions where it is not required.

Name: _____ Date: _____

Confined Space Entry SPP# 1910.146

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to protect North Carolina Department of Transportation (NCDOT) employees who enter confined spaces.

2.0 Scope and Applicability

A confined area or space is one which by design has limited openings for entry and exit, which has unfavorable natural ventilation which could contain or produce dangerous air contaminants, and which is not intended for continuous employee occupancy. Confined spaces are located throughout NCDOT with different types of hazards associated with them. Confined spaces can present dangerous hazards to NCDOT employees who perform work activities in them.

This safety policy and procedure provides guidelines for entry into confined spaces to protect NCDOT employees who work in them. It includes provisions for training and discussion on what defines a confined space. This safety policy and procedure presents details on the hazards of confined spaces and on identifying confined spaces. Additionally, it presents discussion on evaluating confined spaces and the requirements for permit-required confined space entry. This document also provides recordkeeping requirements.

This safety policy and procedure details the areas of responsibility for managers/unit heads, supervisors, employees, entrants, attendants, entry supervisors, qualified persons, Safety and Risk Management, and Central Equipment Unit within NCDOT.

This document applies to any operation that requires NCDOT employees or contractors to enter or work inside any existing tank, tank car, tower, sewer, manhole, sump, vault, vat, process vessel, pit, tunnel, or similar confined spaces. This safety policy and procedure applies to but is not limited to the following NCDOT employees and operations:

- Employees who enter weigh station pits
- Employees who enter trenches
- Ferry Maintenance employees who enter areas below the weather deck excluding the engineering room below deck
- Maintenance and Bridge employees who work in pipes and culverts
- Inspectors and Maintenance employees who work in specified bridge beam areas
- Employees who work on sewage and water treatment facilities located at rest stops or welcome centers
- Maintenance employees who work in catch basin areas
- Maintenance employees who enter weigh scale pits for operational service
- Traffic Service employees who enter paint tanks
- Any employee who enters boilers
- Employees who use and/or maintain grease pits at equipment shops
- Bridge employees who enter caissons

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standard for General Industry (29 CFR 1910.146) and Occupational Safety and Health Standards for the Maritime Industry (29 CFR 1915.11-16) and Occupational Safety and Health Standards for Construction (29CFR 1926.1200-1213.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, at each NCDOT facility and/or jobsite, confined spaces will be identified and, as applicable, permitted and posted with warning signs. When confined space hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Confined Space Entry will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Confined Space Entry It is also the responsibility of each NCDOT employee to report immediately unsafe conditions to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT's safety policy and procedure on Confined Space Entry.

.6.1 Definitions

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

Confined Space
A confined space by design large enough and so configured that an employee can bodily enter and perform assigned work, has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.), and is not designed for continuous employee occupancy.

Controlling Contractor is the employer that has overall responsibility for construction at the worksite.

Entrant
An employee who is authorized and trained by the employer to enter a permit required confined space.

Entry Permit
A written document that is provided by the employer to allow and control entry into a permit required space.

Entry Supervisor
The person 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.

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

1. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent
2. Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL)
3. Airborne combustible dust at a concentration that meets or exceeds its LFL
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
5. Any other atmospheric condition that is immediately dangerous to life or health.

Host Employer
The employer that owns or manages the property where the construction work is taking place.

Hot Work Permits
A permit allowing employees to perform work involving welding, cutting, or any task that would deplete oxygen, create toxic fumes and vapors, or create the potential for fire or explosion.

IDLHL (Immediately Dangerous to Life or Health)
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/flammable gas or vapor in air which will ignite if an ignition source is present.

Oxygen Deficient Atmosphere
An atmosphere containing oxygen at a concentration of less than 19.5% by volume as measured by an oxygen measuring device.

Oxygen Enriched Atmosphere
An atmosphere containing oxygen at a concentration of more than 23.5% by volume as measured by an oxygen measuring device.

Permit-Required Confined Space
A 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.

Qualified Person
A person who has been trained and authorized to perform atmospheric testing.

Upper Explosive Limit (UEL)
The maximum concentration of a combustible/flammable gas or vapor in air before its saturation point which will ignite if an ignition source is present.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Confined Spaces
- Hazards of Confined Spaces
- Identifying Confined Spaces
- Evaluating Confined Spaces
- Permit-Required Confined Space Entry Requirements
- Recordkeeping
- Rescue
- Coordination w/ Contractors

6.2.1 Training

Confined space entry training is to provide employees with the necessary understanding, skills, and knowledge to safely perform their jobs. Components for confined space entry training include:

- Types of confined spaces
- Confined space hazards
- Atmospheric testing of confined spaces
- Cleaning and ventilation
- Lockout of confined spaces
- Personal Protective Equipment (PPE)
- Respirator use and care
- Buddy systems and emergency procedures
- Communication procedures
- Emergency rescue and procedures
- Hot work

Initial and refresher training are to be provided to employees. Refresher training must be conducted whenever an employee's duties change, whenever hazards in the confined space change, or whenever an evaluation of the confined space entry program identifies inadequacies in the employee's knowledge.

Employees designated to enter confined space work areas will be trained in the following areas (this includes entrant, attendant, and rescue team):

- Emergency entry and exit procedures
- Applicable respirators
- First Aid and CPR
- Lockout barriers at worksites
- Safety equipment use
- Rescue equipment
- Permit system
- Work practices

Appendix A presents a training certification form to document the affected employees' training on confined spaces.

Qualified persons shall be trained in:

- Atmospheric testing methods
- Meter calibration
- Atmospheric behaviors of oxygen, combustible, and toxic gases

Qualified persons shall receive initial and refresher training

6.2.2 Confine Spaces

In NCDOT, a confined space is one by design that:

- Is large enough for a person to enter and perform assigned work
- Has entry and exit openings that may be limited in size and/or number
- Is not intended for continuous human occupancy

Confined spaces in NCDOT can include any existing tank, tank car, tower, sewer, manhole, sump, vault, vat, grease pit, tunnel, or other similar confined spaces as shown in Figure 1.

6.2.3 Hazards if Confine Spaces

Confined spaces present many hazards to employees due to the nature of the space's shape, size, lack of ventilation, proximity to toxic gases, and other contributing substances. Potential confined space hazards include hazardous atmospheres, and general safety hazards.

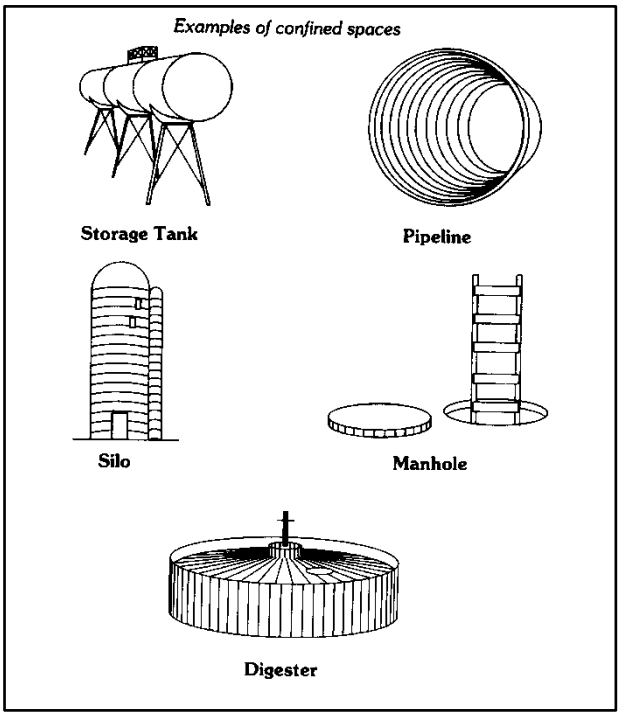


Figure 1

Hazardous atmospheres expose employees to risks of death, incapacitation, injury, or acute illness. These hazardous atmospheres include:

- A flammable gas, vapor, or mist in excess of ten percent of its lower flammable limit (LFL)
- An airborne combustible dust at a concentration that obscures vision at a distance of five feet or less
- An atmospheric oxygen concentration below 19.5 percent or above 23.5 percent
- An atmospheric concentration of any substance for which a permissible exposure limit is published in Subpart Z of 29 CFR Part 1910 and could result in employee exposure in excess of its permissible limit(s)
- Any atmospheric condition recognized as immediately dangerous to life or health (IDLH)

General safety hazards include but are not limited to:

- Physical hazards include non-chemical, physiologic stressors and include noise, vibration, slick/wet surfaces, falling objects, temperature extremes, employee fatigue, and engulfment
- Structural hazards include confined space areas that may contain converging or sloping/tapered walls
- Electrical hazards include shock, burns, and/or electrocution due to exposed or ungrounded electrical energy sources.

- Mechanical hazards include any inadvertent mechanical movement of or within a confined space that threatens the safety of the employee working in the confined space.
- Biological hazards include bacterial action that can consume oxygen to produce carbon monoxide or emit hydrogen sulfide or methane.
- Radiation hazards include those sources that can inadvertently expose employees to dangerous levels of radiation.

6.2.4 Identifying Confined Spaces at Your Facility

All confined spaces at your worksite/facility must be identified and located so the permit-required confined space permit program can be established. Visually survey your worksite/facility to identify confined spaces that are present and that will be included in the confined space inventory. List all suspected confined spaces.

If a work space meets the confined space criteria, note it for inclusion into your worksite/facility's confined space inventory. Appendix B provides a convenient format for inventorying your confined spaces.

6.2.5 Evaluating Confined Spaces

Once all the confined spaces have been identified, then those confined spaces must be evaluated to determine the hazards that may be present. Hazardous atmospheres and general safety hazards must be evaluated for all the confined spaces.

A hazardous atmospheric evaluation must be performed by conducting atmospheric testing to assess the conditions in the confined space. Appendix C presents atmospheric testing procedures that should be followed by a qualified person. Results of the atmospheric testing should be documented for later use.

General safety hazards should be assessed by physical observation. This physical observation should include a visual assessment of:

- The engulfment potential
- The internal configuration of the confined space
- Other safety hazards such as exposed live electrical components , mechanical moving parts, pressurized lines. thermal, etc.)

Additionally, assessment should be based on knowing the existing conditions and use of the confined space along with the actual and potential hazards posed by materials and substances in the confined space. Appendix D presents a Confined Space Evaluation Form.

If any of these hazards are present, then the confined space is a permit- required confined space. If none of these hazards is present, then it is not a permit-required confined space.

If a change in use or configuration of a non-permit-required confined space increases hazards to entrant, then the space must be reevaluated for possible reclassification to a permit-required confined space.

A permit-required confined space may be reclassified to a non-permit- required confined space if:

- The permit-required confined space poses no atmospheric hazards and all non-atmospheric hazards are eliminated without entry
- Entry is necessary to eliminate hazards and such entry is performed
- in accordance with the confined space entry program, and testing and inspection during entry indicate that hazards have been eliminated
- The basis for determining that all hazards are eliminated is documented and certified

Reclassification is effective as long as the hazards remain eliminated.

6.2.6 Permit Required Confined Space Entry Requirements

Once all permit-required confined spaces have been identified, no employee can enter that space until several requirements are met. These requirements include:

- Establishing a permit system
- Conducting pre-entry atmospheric testing
- Isolating energy sources (lockout/tagout)
- Ventilating and cleaning the confined space
- Posting permit-required confined spaces with warning signs
- Having appropriate PPE
- Having appropriate tools in place
- Having attendants in place
- Having rescue teams in place
- Having provisions for contractor compliance with these requirements

The permit system for each worksite/facility shall include a listing of all permit-required confined spaces, a warning sign/label at each permit-required confined space, and permit issuance by a qualified supervisor or safety professional.

Once all permit-required confined spaces are identified, they will be marked with a sign (examples shown in Figure 2) advising personnel and the general public as to the dangers involved. Where practical, all permit-required confined spaces will be locked or blocked to prevent entry

A qualified supervisor must authorize entry, prepare and sign written permits, order corrective measures if necessary, and cancel permits when work is completed.

Figure 2

The entry permit is completed and posted in a conspicuous location near the entrance.

Permits must be available to all permit space entrants at the time of entry and should extend only for the duration of the task. They must be retained for a year to facilitate review of the confined space program.

Appendix E presents a Confined Space Entry Permit. This permit must be completed prior to a permit-required confined space entrance. Appendix F presents a Confined Space Entry Program Element Contact List. These forms shall be maintained at each facility or operation by the individual charged with administering the Confined Space Permit Program.

If welding, cutting, burning, riveting, heating, or any other tasks where a source of ignition is present are to be performed in the confined space (permit-required or non-permit-required), a hot work permit must also be obtained. See Welding, SPP # 1910.252 for additional information.

Pre-entry atmospheric testing for the confined space shall be performed prior to employee entrance. See Appendix C for atmospheric testing procedures.

Energy sources will be completely isolated by physical disconnection, double blocking, bleeding, or by lockout/tagout procedures. Figure 3 presents some typical lock/tagout devices. Also, see SPP# 1910.147, Lockout/Tagout, for additional details.

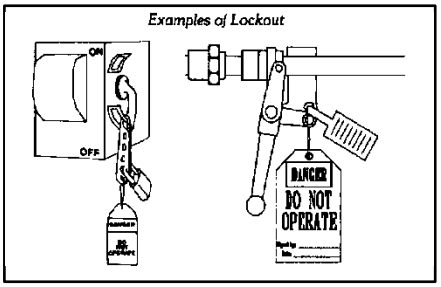


Figure 3

Ventilation and cleaning shall be performed to empty, flush, or purge spaces from the outside if feasible. Figure 4 presents a typical ventilation configuration to empty, flush, or purge a confined space.

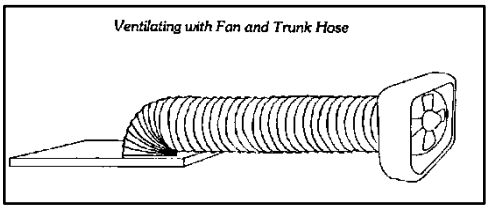


Figure 4

During pre-entry ventilation, the blowing duct outlet should be positioned for uniform dilution and elimination of any hazardous atmospheres pockets as shown in Figure 5.

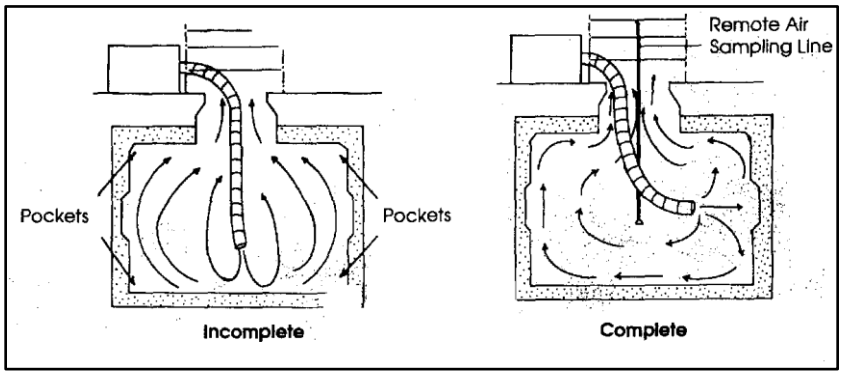


Figure 5

When a hazardous atmosphere is detected, ventilation will continue until:

- The space has no harmful concentration of toxic gases or vapors and acceptable oxygen concentrations
- The space shall be tested 3 times until safe levels are maintained.
- Upon entry, the atmosphere will be continually monitored by the entrant to ensure safe levels are maintained. The gas monitor will have audible alarms to signal when unsafe conditions are detected signaling that space should be immediately evacuated.

The appropriate PPE should be worn based on the hazard(s) and include:

- Eye and face protection
- Head protection
- Foot and leg protection
- Body protection
- Hearing protection
- Respiratory protection
- Hand and arm protection
- Harness, safety belts, and lifelines

See SPP# 1910.331, Personal Protective Equipment, for details on matching PPE to the hazard.

Appropriate equipment and tools must be in place and in good condition. See SPP# 1910.241, Hand and Portable Power Tools, for additional details.

The attendant shall be stationed immediately outside permit-required confined spaces and shall:

- Be trained in non-entry rescue
- Not enter the permit-required confined space
- Be within sight or call of the entrant
- Have means to summon assistance
- Have tripod set-u p w/ life line attached to entrant for non-entry rescue

The attendant shall be physically capable of assisting any employee inside the confined space in the event of an emergency. This individual will be responsible for alerting others that a rescue is in progress and for taking appropriate measures to ensure the safety of all co-workers in the area. No employee is to enter a confined space if another employee goes down! The attendant shall always seek assistance.

Appropriate communications shall be established such as radios or walkie- talkies if the employee gets out of sight or earshot.

Rescue teams must be available and on-call for permit-required confined space entry. The Rescue team must be able to respond in a timely matter, be properly trained, and equipped with rescue equipment including SCBAs.

Contractors who perform permit-required confined space entry must comply with all the OSHA requirements.

- If NCDOT owns the property on which the construction activity occurs and has contracted with an entity for the general management of that property, and has transferred to that entity the information specified in § 1926.1203(h)(1), OSHA will treat the contracted management entity as the host employer for as long as that entity manages the property. Otherwise, OSHA will treat NCDOT as the host employer. In no case will there be more than one host employer.

- Permit space entry communication and coordination with Contractors before entry operations begin, NCDOT must provide the following information, if it has it, to the controlling contractor:
    1) The location of each known permit space;
    2) The hazards or potential hazards in each space or the reason it is a permit space; and
    3) Any precautions that the host employer or any previous controlling contractor or entry employer implemented for the protection of employees in the permit space.

6.2.7 Recordkeeping

Recordkeeping requirements include:

- Retaining each cancelled permit for at least one year to facilitate review of Permit-Required Confined Spaces program
- Noting problems encountered during entry on permit to facilitate revisions to program
- Certification of training with name, identity of trainers and training dates
- Reclassification from permit to non-permit space certification with date, location, and signature of person making determination.

6.3 Specific Responsibilities

6.3.1 Managers & Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of confined space equipment in their areas. They will also be responsible for identifying the employees affected by this safety policy and procedure

Managers/Unit Heads shall be responsible for having Safety Engineers or Safety Officers identifying confined spaces at their worksite/facility. Additionally, they will be responsible for ensuring all confined spaces are evaluated to determine if a permit is required prior to entry.

Managers/Unit Heads shall also designate entry supervisors and qualified persons. Managers/Unit Heads will obtain and coordinate the required training for affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will not allow any employee who has not received the required training to perform any of the tasks or activities associated with this safety policy and procedure.

Supervisors will be responsible for communicating appropriate needs to managers/unit heads and/or supervisors.

Supervisors will be responsible for knowing where confined and permit- required confined spaces are located at their worksite/facility. They will also be responsible for ensuring permit-required confined spaces are posted with warning signs.

Supervisors will ensure employees are provided with PPE as necessary for their job. Supervisors are responsible for ensuring that only employees trained and qualified will operate material handling equipment

6.3.3 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

It is the responsibility of the employee to follow all instructions pertaining to confined spaces. Employees are never to enter confined spaces unless authorized by training and job duties.

6.3.4 Entrant

The attendant is responsible for maintaining communication with the entrant at all times. Appendix G presents additional details on the attendant's responsibilities.

6.3.5 Attendant

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing required training. Safety and Risk Management will work with Purchasing and Central Equipment Unit to ensure that all newly purchased Locks and Tags comply with this safety policy and procedure.

Safety and Risk Management shall be responsible for monitoring the Lockout/Tagout Program and any changes in the machinery and equipment that may require modification of the Program.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.6 Entry Supervisor

Entry supervisor is responsible for ensuring that only employees who are trained are allowed to enter confined spaces. The entry supervisor is responsible for ensuring proper permits and safety procedures are followed closely at the jobsite.

The entry supervisor must also be familiar with all hazards associated with the entry operation. He is responsible for all safety precautions, rescue procedures, and safety

equipment needed for the operation. Appendix G presents additional details on the entry supervisor's responsibilities.

6.3.7 Qualified Person

Qualified person is responsible for checking the atmosphere of a confined space and correctly reading and using the gas detection instruments. Qualified Person is also responsible for documenting all confined space measurements

6.3.8 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training. Safety and Risk Management will provide guidelines for using air monitoring and gas detection equipment.

Safety and Risk Management will provide guidance to the qualified person on atmospheric testing. As applicable, the air monitoring data will be evaluated for completeness, accuracy, and precision.

Additionally, the Safety & Risk Management and the Safety Engineer will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Certification Training Form for Authorized Employees

Location: _____

Instructor: _____

Employee Name: ***Employee #*** _____

Has the OSHA required training been completed in the following categories?

Topic	Completion Date	Instructor's Initial	Employee's Initial
Types of Confined Spaces			
Confined Space Hazards			
Atmospheric Testing of Confined Spaces			
Evaluating Confined Spaces			
Cleaning and Ventilation			
Lockout of Confined Spaces			
PPE			
Respirator Use and Care			
Buddy Systems and Emergency Procedures			
Communication Procedures			
Emergency Rescue			
Employees designated to enter confined spaces (includes entrant, attendant, and rescue team) shall also be trained in the following topics	Completion Date	Instructor's Signature	Employee's Initial
Emergency Entry and Exit Procedures			
Applicable Respirators			
First Aid and CPR			
Lockout Barriers at Worksites			
Safety Equipment at Worksites			
Rescue Equipment			
Permit System			
Work Practices			

Attach Course Roster to this Form
(See SPP# 1926.21 for Course Roster Form)

APPENDIX B: Confined Spaces Inventory

Facility:
Location:
Inventory Date:

All permit-required confined spaces shall be posted with signs stating "Confine Space-Do Not Enter" or "Unauthorized Entry Prohibited

Confine Space	Purpose	Hazards	Work Done	Permit Required

This inventory must be kept up to date. All operational changes should always be evaluated for its impact on this facility's confined spaces.

APPENDIX C: Atmospheric Testing Procedure

A qualified person shall test spaces a minimum of 3 times at all stratified levels prior to permit required confined space entry. Figure 5 illustrates the common gases found at each of these (3) stratified levels. Using a direct reading instrument with remote sampling capacity, the qualified person shall test the atmosphere for in the following order:

1. Oxygen level (19.5 percent minimum/maximum 23.5 percent)
2. Potential flammable hazard, not to exceed (10 percent LEL Max.) or Lower Flammable Limit (LFL)
3. Toxic materials which potentially could be present: Carbon Monoxide – 35 ppm Max., Hydrogen Sulfide 10ppm Max. & other gases must be less than the known TLV for that gas.

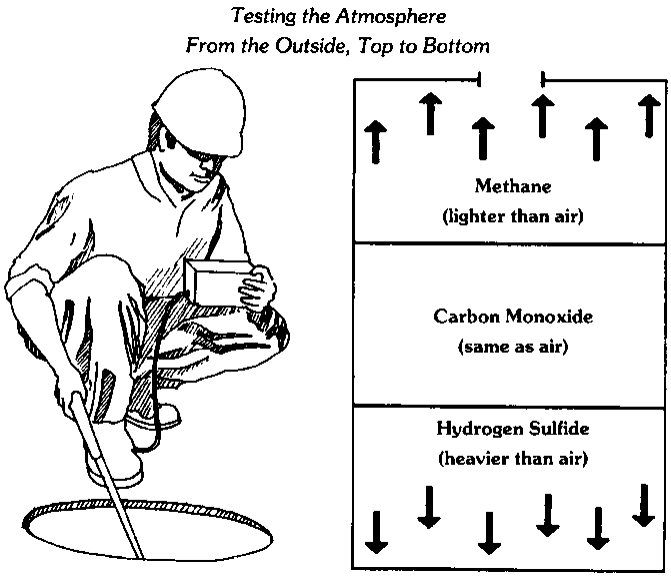


Figure 5

The qualified person shall record all atmospheric test results on the permit prior to entry. A qualified person shall perform atmospheric testing during occupancy; if the entrant wears the four gas monitor with audible alarms for continuous monitoring, this will fulfill the requirement for periodic testing and will not need

Each testing instrument shall be:

- Calibrated per manufacturer's instructions (instruments out of calibration or that fail field checks cannot be used until calibrated).
- At least annually calibrated by the manufacturer.
- Field checked immediately prior to use. This field check shall include checking with a test gas at least monthly.

APPENDIX D: Confined Space Evaluation Form

Confined Space Evaluation

Confined Space Identification number: _____
Confined Space Description: _____
Location of space: _____
Is a Permit Required? _____
List the typical tasks performed: _____

Potential Hazards:	Required Work Procedures
☐ Flammable or Explosive atmosphere	☐ Atmospheric Testing Prior to Entry (see acceptable limits below)
☐ Oxygen deficient atmosphere	☐ Continuous Atmospheric Testing (see acceptable limits below)
☐ Toxic atmosphere / Specify:_____	☐ Standby attendant required
☐ Eye contact	☐ Lock/Tag equipment*
☐ Skin contact	☐ Blank or Disconnect lines*
☐ Electrocution	☐ Double block and bleed*
☐ Moving mechanical equipment	☐ Ventilation/Purge (continuous forced air)
☐ Slip or fall	☐ Inert/Purge space prior to Ventilation
☐ Heat stress or thermal contact	☐ Decon/Clean space prior to work
☐ Engulfment	☐ Barricade area
☐ Entrapment	☐ Communications equipment
☐ Drowning	☐ Attach MSDS to permit
☐ Other / Specify:___	☐* Attach Job specific hazardous work permit
☐ Other / Specify:_____	

Atmospheric testing acceptable limits: Oxygen 19.5% - 23.5%, Combustibles <10% LFL / LEL, Toxics See MSDS

Elimination of Hazards §(c)(7) applicable? ___ (note: if §(c)(7) used, this hazard assessment may not apply)
Alternate Procedures §(c)(5) applicable? ___ (note: if §(c)(5) used, this hazard assessment may not apply)

Required Equipment for entry

☐ Survey atmosphere monitor	☐ Tripod with hoist (gantry hoist)
☐ Personal monitor, continuous	☐ Harness with retrieval line
☐ Respirator:_____	☐ Ladder
☐ Gloves:_____	☐ Spark/Explosion proof or Intrinsically safe equipment required
☐ Boots:_____	☐ GFCI Protected equipment
☐ Eye/Face protection	☐ Additional illumination
☐ Chemical protective clothing (CPC):_____	☐ Personal fall arrest system (PFAS)
☐ Hearing protection	☐ Fire extinguisher _____
☐ Other equipment / Specify:_____	

Emergency Plan

☐ Non-entry retrieval rescue attempted after notification
☐ Non-entry notification rescue only

Rescue team must be on On Call Standby:

Initial assessment reviewed by: _____ Date:_____
Annual review by: _____ Date:_____
Annual review by: _____ Date:_____

APPENDIX E: Confined Space Entry Permit

(Valid for one 8-hour shift only)
All copies of permit will remain at jobsite until job is completed

Entry Supervisor Approval Signature:_____

Location and Description of Confined Space:	**Date:**		
Scheduled Work to be Done:	**Time Started:**		
Division / Unit:	**Time Completed:**		
Persons Authorized to Enter:	**Continuous Monitoring By Entrant w/ 4 Gas Monitor**	**Yes**	**No**
Entry Supervisor:	**Attendant:**		

Check Yes or No for Each Potential Hazard Present

Potential Physical Hazards Present	**Yes**	**No**	**Potential Hazard Atmosphere Present**	**Yes**	**No**
Engulfment			Low Oxygen (<19.5%)		
Moving Machinery			High Oxygen Enriched (>23.5%)		
Hazardous Materials			Flammable (>10% LEL)		
Converging Walls			Carbon Monoxide (>35 ppm)		
Exposed Electricity			Sulfur Dioxide (>10 ppm)		
Slips/Falls			Other (list):		
Other (list):					

Check Yes / No or Enter N/A for Each Special Requirement

SPECIAL REQUIREMENTS	**Yes**	**No**		**Yes**	**No**
Lockout/Tagout - Denergize			Tripod for Non-entry Rescue		
Lines Broken - Capped or Blanked			Body Harness		
Ventilation			Life Line		
Purge - Flush and Vent			Fire Extinguisher		
Secure Area			Alternate Procedure		
Hot Work Permit			Respirator		
Communication Equipment			Rescue Procedure		

Record Gas Monitor Readings & Enter Time for Initial Check. If the entrant is wearing a four gas meter w/ audible alarms, periodic checks do not have to be entered. If continuous monitoring is not feasible, Periodic Checks must be completed w/ readings and time documented.

Atmospheric Checks	**Permissible Entry Level**	**Initial Check (Enter Time)**	**Periodic Checks (Enter Time)**		
% Oxygen	19.5% to 23.5%				
%of Lower Explosive Limit	Less than 10%				
Carbon Monoxide	35 ppm				
Hydrogen Sulfide	10 ppm				
Other					

Continuous Monitoring shall be performed during the job unless not feasible.
State Reason for not feasible: _____

Name of Qualified Person - Gas Tester(s):					
Monitor Name & Model		S/N		Date Calibrated	

Never Enter a Confined Space to Attempt Rescue; Tripod for Non-Entry Rescue Must Be Set-up Prior to Entry w/ Entrant Wearing Body Harness &Life Line Attached to Tripod.
Arrangements Must Be Made for Nearest Entry Rescue Team to be On Call Stand-By:
List: _____
Rescue team must be on On Call Standby. If not available reschedule confined space entry.

APPENDIX F: Confined Space Entry Program Elements

Facility:_____

Program Element	Contact Person
Hazard Identification	
Hazard Control	
Written Permit System	
Posting Confined Spaces	
Confined Space Training	
Special Safety Equipment (i.e. Four Gas Direct Reading Monitor w/ Audible Alarms & Remote Sampling Capabilities, Tripod, Life Line)	
Written Rescue Plan & Procedures	
External Hazard Protection	
Communication Equipment	
Contractor Notification	

Notes: _____

_____

_____

_____

_____

_____

_____

APPENDIX G: Confined Space Entry Team Responsibilities

A permit-required confined space team performs four functions:

- The attendant (observer) who remains outside while the work is being done
- The entry supervisor who authorizes permits
- The rescue team who performs rescue

The entrant:

- Does the assigned task
- Reviews the permit before entry
- Wears appropriate personal protective clothing, as required
- Uses appropriate PPE, as required
- Uses and attends to area and personal monitoring equipment
- Pays attention to own physical reactions that could signal an unsafe condition
- Maintains contact with the attendant and responds to evacuation orders
- If the entrant senses any reaction to the environment, he or she should signal the attendant for help, if necessary, and leave the confined space immediately

The attendant:

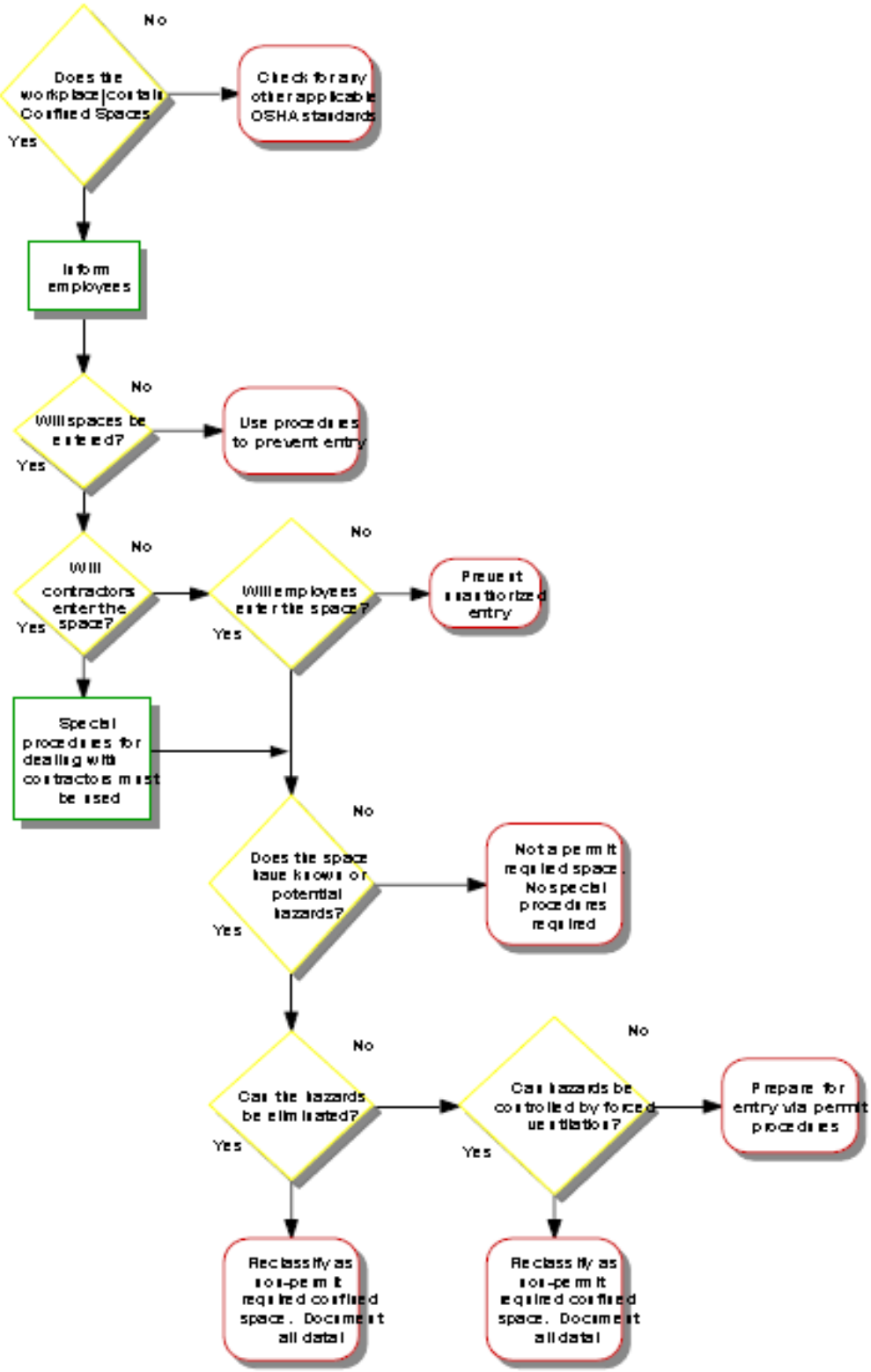
- Reviews the permit before entry
- Keeps track of who is in the space at all times
- Keeps unauthorized people out of the area
- Maintains continuous communication, visual or voice, with the entrant during the entry
- Makes sure the ventilation equipment, if used, is working
- Monitors the atmospheric testing equipment
- Attends to the lifeline, if worn by the entrant
- Attends to the airline, if used, to prevent tangles and kinks
- Remains alert for early symptoms of danger within the space
- Watches for hazards outside and inside the space
- Maintains clear access to and from the space
- Notifies the entrant and orders evacuation if conditions warrant or if the permit limits expire
- Is prepared to call for emergency help, if needed

APPENDIX G: Confined Space Entry Team Responsibilities (Continued) 2

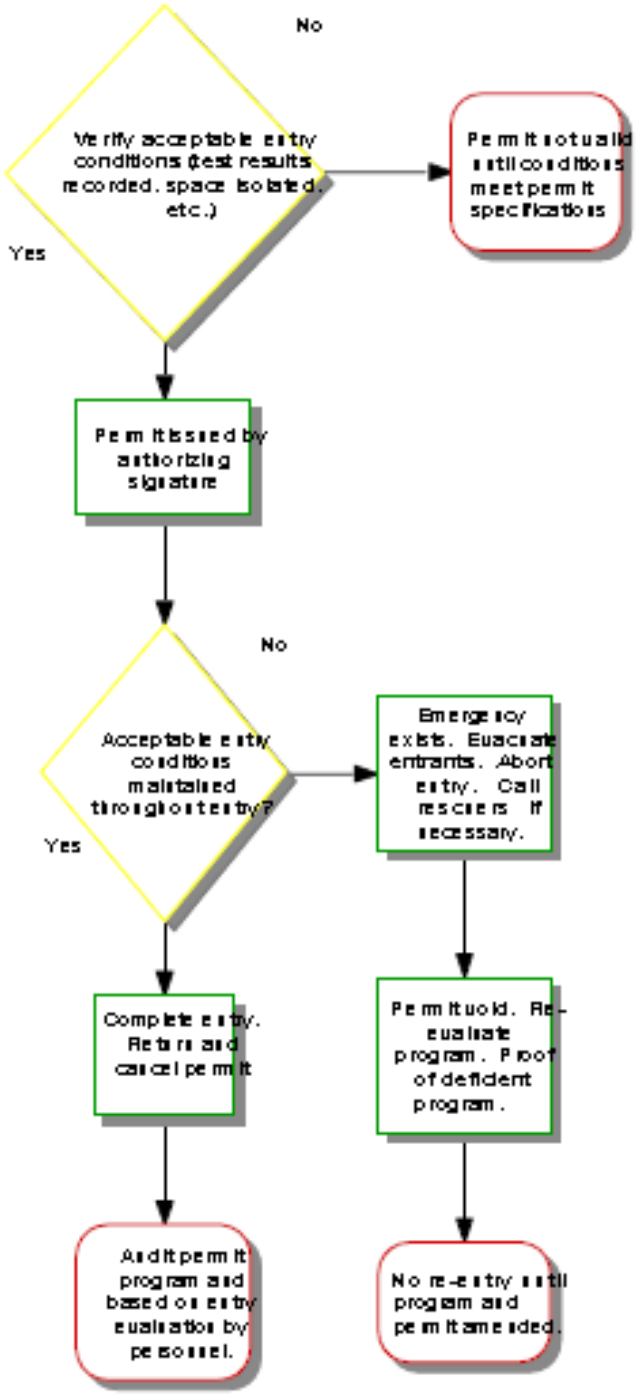
The Entry Supervisor (person authorizing permits) :

- Plans each entry. Planning means to:
  - Describe the work to be done
  - Identify the workers involved
  - Evaluate the hazards of the space
  - Perform (or arrange for) atmospheric testing and monitoring
  - Develop rescue plans
- Ensures that the permit is complete, dated, and signed
- Determines the need for certain equipment
- Ensures atmospheric testing
- Ensures that all necessary procedures, and equipment for safe entry are in effect
- Determines, at "appropriate" intervals, that operations remain acceptable
- Cancels the permit and terminates the work if the conditions are not acceptable
- Trains (or provides training for) all workers on the Confined Space Entry Team
- Keeps records on training, safety drills, test results, equipment inspections, and equipment maintenance.
- Cancels the permit and secures the space when the work is done
- Determines if a written rescue plan is necessary for a particular confined space entry
- Verifies that emergency help is available and that the method of summoning help is operable

APPENDIX H: Confined Space Decision Tree Flowchart



APPENDIX I Confined Space Entry Decision Tree Flowchart



Author:	Paul Roberts	Revision #:	2
Approved By:	Ricky Greene	Date Revised:	April 2015

SAFETY POLICY & PROCEDURE

Lockout/Tagout SPP# 1910.147

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish methods for isolating machines or equipment from hazardous energy sources before routine maintenance and servicing of those machines and equipment by North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Uncontrolled energy is a hazard to operators and other employees in the area of the machinery, equipment, or processes. Those who service and maintain machinery or equipment are especially vulnerable because the machinery or equipment might become energized while being serviced or stored energy might be unexpectedly released. A lockout/tagout device is used to keep equipment from being set in motion and endangering employees.

This safety policy and procedure provides guidelines for isolating machines or equipment from energy sources. It emphasizes two major components of the lockout/tagout requirements in the form of training and the procedure to be followed. The training component is organized into:

- General training requirements
- Authorized employee training
- Affected employee training
- Supervisor training

The training component addresses all the procedural details of an effective lockout/tagout program. The equipment survey component addresses the identifications of energy sources and the assignment of lockout/tagout devices for those energy sources. This document also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Risk Management. This safety policy and procedure affects employees who service, maintain, and operate stationery equipment and machines.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.147).

4.0 Policy

It is the policy of the North Carolina Department of Transportation (NCDOT) to provide a place of employment free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, all energized machines and equipment must be locked out and/or tagged out before any maintenance or servicing is performed. When hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Lockout/Tagout will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on Lockout/Tagout. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's Lockout/Tagout Program. NCDOT requires that Lockout/Tagout be used. If the equipment does not have provisions for accepting a lock, a Tagout system may be used.

1. The purpose of the tagout device is to indicate that the energy source isolating device and the equipment being controlled may not be operated until the tagout device is removed.
2. Tags must achieve a level of safety that is equivalent to that which would be achieved through a lockout system. In other words, the employer must implement additional safety measures that "bridge the gap" between the degree of safety achieved through lockout and the degree of safety achieved through tagout. An example would be to lockout the energy source that feeds the equipment you cannot apply a lock, but can only implement tagout.

6.1 Definitions

Affected Employee
An employee whose job duties require operation or use of a machine or piece of equipment in a location in which servicing or maintenance is being performed under Lockout/Tagout Procedures.

Authorized Employee
An employee who lockouts or tagouts a machine or piece of equipment in order to perform servicing or maintenance on that machine or piece of equipment. An affected employee becomes the authorized employee when that employee's duties require him or her to perform the service or maintenance covered under this policy.

Capable of Being Locked Out
An energy isolating device capable of being locked out if it has a hasp or other means of attachment through which a lock can be affixed to the equipment or machine.

Energy Isolating Device
A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and additionally by which no pole can be operated independently; a line valve; a blind; or any similar device used to block or isolate energy. Push buttons, selector switches, and other control circuit-type devices are not energy isolating devices.

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

Figure 1

Hasp
Lockout tagout device which can accept multiple locks and tags. (See Figure 1.)

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

Lockout Device
A lock and/or device capable of accepting a lock that utilizes a positive means to hold an energy isolating device in a safe position to prevent the energizing of a machine or piece of equipment. (See Figure 2)
Included are blank flanges and bolted slip blinds.

Figure 2

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

Setting Up
Any work performed to prepare a machine or equipment to perform its normal production operation.

Tagout
The placement of a tagout device or 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.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- General Training Requirements
- Authorized Employee Training
- Affected Employee Training
- Supervisor Training
- Equipment Survey

6.2.1 General Training Requirements

General training requirements for the Lockout/Tagout program shall consist of:

- Basic lockout/tagout training
- Training on the limitations of tags
- Authorized and affected employee retraining
- Certification of lockout/tagout training

Basic lockout/tagout training shall communicate a basic awareness of the procedures and skills that employees are required to possess. This training shall ensure that:

- Each authorized employee receives training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control
- Each affected employee be instructed in the purpose and use of the energy control procedure
- All other employees be instructed when work operations are in an area where energy control procedures are used

Training on the limitations of tags must be provided to the identified employees. Tagout systems are not completely foolproof. Instructions should include, among others, the following examples of tag limitations:

- Tags are essentially warning devices affixed to energy isolating devices and do not provide the physical restraint on those devices that is provided by a lock
- When a tag is attached to an energy isolating means, it is not to be removed without authorization and it is never to be bypassed, ignored, or otherwise defeated
- In order to be effective, tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area
- Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace
- Tags may evoke a false sense of security and their meaning needs to be understood as parts of the overall energy control program

- Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use

Authorized and affected employee retraining is required when:

- There is a change in their job assignments, a change in machines, equipment, or processes that presents a new hazard, or when there is a change in the energy control procedure.
- A NCDOT supervisor has reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

This retraining shall establish employee proficiency and introduce new or revised control, methods and procedures, as necessary.

Certification of lockout/tagout training must be accomplished and updated when such training has taken place. The certification shall contain each employee's name, job title, division/unit, and dates of training. Appendices A and B contain Lockout/Tagout training certification forms for authorized and affected employees respectively.

6.2.2 Authorized Employee Training

Authorized employees are those who use lockout/tagout devices. This training will be the responsibility of the supervisor.

Training requirements for authorized employees will include the following:

- Purpose of the standard and hazards controlled
- When the standard applies
- Definitions of terms used
- Equipment used for lockout/tagout:
    - standardized appearance
    - personal identification procedures
- Procedures, including:
    - preparation for shutdown
    - shutdown, isolation, blocking, and securing
    - placement, removal, and transfer of devices
    - release of stored energy
    - testing to verify effectiveness of energy control
    - release from lockout/tagout:
    - procedural requirements
    - release if employee who applied device is no longer at facility
- Special procedures and rules for tagout systems
- Special procedures for changes of shifts and personnel changes
- Special procedures and practices for group lockout/tagout:
    - procedure
    - authority for lockout/tagout in group situations
- Inspection program
- Communication and reporting of problems

Appendix C presents NCDOT's lockout/tagout procedure for authorized employees.

6.2.3 Affected Employee Training

Affected employees are those who operate equipment locked or tagged, or employees who work in the area where the devices are in use. Affected employee training may cover:

- Introduction to procedures outlined above for authorized employees
- Prohibition against energizing any machine or piece of equipment that is locked or tagged out

6.2.4 Supervisor Training

In addition to the employee training mentioned above, supervisors will receive additional training which includes the following elements:

- Determination of machinery and equipment to be included in the Lockout/Tagout Program
- Energy isolation points of each piece or class of machinery and equipment
- Training requirements, scheduling, responsibility
- Annual retraining circumstances and requirements for employees
- Inspection requirements and responsibilities
- Outside contractor personnel requirements

6.2.5 Equipment Survey

A survey is required to identify all isolating devices prior to a lockout/tagout event. The purpose of the survey is to determine which switch(s), valve(s), or other energy isolating devices applies to the equipment in order to establish lockout/tagout procedures for each type of equipment. Appendix D contains forms for performing an equipment survey for a facility.

6.3 Specific Responsibilities

6.3.1 Managers & Unit Heads

Managers/Unit Heads shall be responsible for the completion of a survey of machinery and equipment within their area to determine which machinery and equipment should be included in the Lockout/Tagout Program.

Managers/Unit Heads shall be responsible for identifying all affected and authorized employees.

Manager/Unit Heads shall ensure that the necessary funding is available for purchase of the required lockout/tagout safety equipment. Managers/Unit Heads will also ensure annual compliance with this safety policy and procedure through their inspection and auditing processes.

Managers/Unit Heads are responsible for coordinating required training with Safety and Risk Management.

6.3.2 Supervisors

Supervisors shall be responsible for ensuring that this safety policy and procedure is implemented in their areas.

Supervisors shall be responsible for ensuring that an adequate supply of locks, tags, and other safety equipment is available and is utilized in accordance with this safety policy and procedure.

Supervisors shall be responsible for the training of the employees and for ensuring that the training meets the requirements of this safety policy and procedure.

Supervisors shall be responsible for conducting a periodic inspection of LOTO procedures at least annually to ensure this safety policy and procedure is being followed. The inspection shall be conducted by observing each authorized employee performing LOTO to determine if the procedure is adequately being followed and to correct any deviations and inadequacies identified to ensure it is effective in protecting the authorized employee. This inspection shall be documented. Appendix E contains a form that may be used to document the inspection.

6.3.3 Authorized Employees

Authorized employees shall be responsible for following NCDOT's lockout/tagout procedures before any maintenance or servicing activities are begun.

Authorized employees will be responsible for notifying affected employees before beginning a lockout/tagout procedure on a piece of equipment or machinery.

Authorized employees shall report to their supervisors any changes in the machinery or equipment that would require a change in the lockout/tagout procedure.

6.3.4 Affected Employees

Affected employees shall attend the required training. This training will be given at least annually or when new employees or equipment are introduced into the work environment. Records for training will be maintained by the office in which the equipment and employees are located. This training will include electrical, hydraulic, chemical, thermal, and any other energy sources that have the ability to release without warning.

Affected employees shall ensure that all precautions required by this safety policy and procedure be observed.

Affected employees shall report to their supervisors any changes in the machinery or equipment that would require a change in the lockout/tagout procedure.

6.3.5 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing required training. Safety and Risk Management will work with Purchasing and Central Equipment Unit to ensure that all newly purchased Locks and Tags comply with this safety policy and procedure.

Safety and Risk Management shall be responsible for monitoring the Lockout/Tagout Program and any changes in the machinery and equipment that may require modification of the Program.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.6 Central Equipment Unit

Central Equipment Unit shall maintain an inventory of lockout tags and hasps that comply with this safety policy and procedure.

APPENDIX A: Certification Training Form for Authorized Employees

Facility:	**Location:**

AUTHORIZED EMPLOYEE TRAINING

Lockout/tagout for AUTHORIZED employees includes special instructions concerning scope, purpose, rules, and techniques for lockout/tagout of hazard energy sources including, but not limited to:

- Intended use of the procedure
- Steps for shutting down, isolating, holding, and securing
- Steps for placement, removal, and transfer of lockout/tagout devices
- Requirements for testing to determine and verify effectiveness of lockout/tagout devices
- Other measures_____

Employee's Name	**Job Title**	**Division/ Unit**	**Comments**	**AUTHORIZED**	
				Date	**Supervisor**
Training Conducted by:		**Date:**	**Reviewed by:**		**Date:**

APPENDIX B: Certification Training Form for Affected Employees

Facility:	**Location:**

AFFECTED EMPLOYEE TRAINING

Lockout/tagout for AUTHORIZED employees includes special instructions concerning scope, purpose, rules, and techniques for lockout/tagout of hazard energy sources including, but not limited to:

- Intended use of the procedure
- Steps for shutting down, isolating, holding, and securing
- Steps for placement, removal, and transfer of lockout/tagout devices
- Requirements for testing to determine and verify effectiveness of lockout/tagout devices
- Other measures_____

Employee's Name	**Job Title**	**Division/ Unit**	**Comments**	**AUTHORIZED**	
				Date	**Supervisor**
Training Conducted by:		**Date:**	**Reviewed by:**		**Date:**

APPENDIX C: Lockout/Tagout Procedure

Sequence of Lockout or Tagout

- Prepare for shutdown by locating all energy sources that power the equipment. Each energy source will be identified on the Lockout/Tagout Procedure. More than one energy source (electrical, mechanical, hydraulic, pneumatic, thermal, or others) may be involved.
- Notify all affected employees that a lockout or tagout system is being implemented and provide the reason why.
- Refer to the LOTO procedure for the specific type of equipment to determine type and magnitude of energy present.
- Shut down machine or equipment by normal stopping procedure.
- Shut off the electrical power supply disconnect switch, valve(s), or other energy isolating devices(s) so that the equipment is isolated from all its energy source(s). Stored energy (such as that in springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as repositioning, blocking, bleeding down, etc.
- Lockout and tagout the energy isolating devices with assigned individual lock(s) and tag(s).
- Verify the energy isolating sources are disconnected by operating the ON switch or normal operating controls. Ensure that no personnel are exposed before operating the controls. (Return operating control to neutral or off position after test.)
- The equipment is now locked out and can safely be worked on.
- After servicing is complete and the equipment is ready for normal operations, check the area around the equipment to ensure that all tools, parts, etc. have been removed and guards have been reinstalled.
- Ensure that all employees are in the clear and remove all lockout/tagout devices. Operate the energy isolating devices to restore energy to the machine or equipment.
- Notify affected employees that servicing is complete, and the equipment is ready for use.

Procedure Involving More Than One Person

In the preceding steps, if more than one individual is required to lockout/tagout equipment, each person shall place his or her own personal lockout/tagout device on the energy isolating device(s). When an energy isolating device cannot accept multiple locks or tags, a multiple lockout/tagout hasp shall be used.

Equipment Specific LOTO Procedures

For the authorized employee to identify the type and magnitude of the energy available, equipment specific LOTO procedures should be available. Appendix D: Lockout/Tagout Equipment and Energy Source Survey Form may be used to establish those equipment specific LOTO procedures.

APPENDIX D: LOTO Equipment and Energy Source Survey Form

TYPES OF HAZARDOUS ENERGY AT THIS FACILITY

Facility Name _____

	General Description	Location
Electrical		
Pneumatic		
Hydraulic		
Other (Steam, Hot Water, Water Pressure, etc.)		

APPENDIX D: LOTO Equipment and Energy Source Survey Form (cont.) 2

ELECTRICAL EQUIPMENT				
Equipment Name	**Primary Isolating Device (Type)**	**ID Number**	**Location**	**Magnitude (Volts)**

APPENDIX D: LOTO Equipment and Energy Source Survey Form (cont.) 3

HYDRAULIC EQUIPMENT				
Equipment Name	**Primary Isolating Device (Type)**	**ID Number**	**Location**	**Magnitude (psi)**

APPENDIX D: LOTO Equipment and Energy Source Survey Form (cont.) 4

PNEUMATIC EQUIPMENT				
Equipment Name	**Primary Isolating Device (Type)**	**ID Number**	**Location**	**Magnitude (psi)**

APPENDIX D: LOTO Equipment and Energy Source Survey Form (cont.) 5

OTHER EQUIPMENT				
Equipment Name	**Primary Isolating Device (Type)**	**ID Number**	**Location**	**Magnitude (psi, temp.)**

APPENDIX E: LOTO Periodic Inspection Form

Facility:	**Location:**

Periodic Inspection of LOTO Procedures & Program

Inspection of LOTO Procedures shall consist of observing all Authorized Employees performing a LOTO procedure on a piece of equipment to determine if procedures are being followed and to correct any deviations or inadequacies identified to ensure it is effective in protecting the authorized employee. Results shall be documented including any deficiencies found. Inspection shall include these items.

- Proper lockout devices and tags are being used.
- Procedure being followed.
- Deviations and inadequacies in procedure to effectively protect the Authorized Employee.

Inspection of LOTO Program shall consist of verifying and documenting the following items:

- All employees performing LOTO have been trained as authorized employee and this training is documented.
- Lockout devices and tags are readily available for performing LOTO.

Authorized Employee Audited	Equipment/Procedure Audited	Comments	Inspection Conducted By	
			Date	Supervisor

First Aid / CPR / AED SPP# 1910.151

Contents

1.0 Purpose

The purpose of this safety policy and procedure is to establish first aid, CPR (cardiopulmonary resuscitation), and AED (automated external defibrillator) requirements for North Carolina Department of Transportation (NCDOT).

2.0 Scope and Applicability

Prompt medical attention in case of injury on the job is critical to ensure the health and well-being of NCDOT employees. Having provisions for timely access to first aid, CPR, and AED if available helps to minimize the extent of injury to affected employees and fosters a caring attitude among the NCDOT organization.

This safety policy and procedure provides guidelines to determine what first aid, CPR, and AED requirements are applicable for the various operations in NCDOT. It includes provisions for training, discussion on posting requirements for first aid kit and AED locations.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, first aid/CPR/AED trained employees, employees, and Safety and Risk Management within NCDOT.

This document affects all NCDOT Units.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.151) and (29CFR 1910.266) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.50).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Because hazards may exist, NCDOT will train adequate numbers of employees in First Aid and provide first aid equipment to ensure that employees receive prompt assistance in case of injury.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure for First Aid, CPR and AED. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on First Aid.

6.1 Definitions

AED
An **AED (Automated External Defibrillator)** is a portable electronic medical device that automatically analyzes and administers an electric shock through the chest wall to the heart for sudden cardiac arrest victims. Built-in computers assess the patient's heart rhythm and determine if defibrillation is needed; the AED then advises if administering of shock is necessary.

CPR
Cardiopulmonary Resuscitation (CPR) is an emergency procedure in which the heart and lungs are made to work by compressing the chest overlying the heart and forcing air into the lungs. CPR is used to maintain circulation when the heart has stopped pumping on its own.

First Aid
The immediate, temporary care given to the injured or suddenly ill until proper medical attention can be given.

Sudden Cardiac Arrest
Sudden cardiac arrest occurs when ventricular fibrillation takes place or when the heart stops beating altogether.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Posting Requirements
- First Aid Access for Buildings
- First Aid Access for Field Personnel
- First Aid Kits
- AED
- Eyewash & Flushing Station

6.2.1 Training

The employees designated to be trained in first aid, CPR and AED will be trained upon their initial designation. This training must certify those in the American Red Cross First Aid, American Heart Association, and/or equivalent first aid, CPR and AED training. Red Cross-approved refresher training must be done every two years to retain their first aid, CPR and AED certification.

6.2.2 Posting Requirements

Information will be posted throughout buildings and on jobsites advising employees where the first aid kits are located and AED's if available on site are located.

6.2.3 First Aid Access for Buildings

All buildings shall have access to first aid supplies and/or 25-unit first aid kits.

- 25-unit wall-mounted first aid kits should be located on all floors or locations throughout the facility so they can be accessed within 3 – 4 minutes. Common areas such as break rooms or bulletin boards would be good locations. Security office or reception area may be another alternative.
- Lavatory with hot and cold water should be available.
- Automated external defibrillators (AEDs) should be considered for large office buildings or facilities especially those that provide services for the Public.
- In addition to first aid supplies, NCDOT will ensure that an adequate number of office employees are trained in first aid/CPR and AED if available in the building. It is recommended that at least one person trained in First Aid/CPR/AED for every (50) employees at each location.

6.2.4 First Aid Access for Field Personnel

All field employees will have access to first aid supplies. This will be achieved by ensuring each location/operation is equipped with a first aid kit. This kit will be adequate to service the number of employees normally found on a job site.

In addition to first aid supplies, NCDOT will ensure that an adequate number of field employees are trained in first aid/CPR/AED. Each work crew in the field should have at least one person trained in First Aid/CPR.

6.2.5 First Aid Kits

The 25-unit first aid kit will consist of the following items:

- 1-4"x4" Bandage Compress
- 1-Box 3"x3" Sterile Gauze Pads (4 per box)
- 1-Triangular Bandage (40"x40"x40")
- 1-2"x 4 yards Gauze Bandage
- ½" x 2.5 yards Adhesive Tape (2 per box)
- 1-Boxes of 1"x3" Adhesive Bandages (16 per box)
- 1-Sterile Buffered Isotonic Eyewash Kit (1 oz.) with 2 eye pads, 2 adhesive strips
- 1-Instant Cold Pack
- Hand Sanitizer (1/32 oz. pks 6 per box)
- Antiseptic Wipes (10 per box)
- Triple Antibiotic Ointment (1/57 oz. pks 10 per box)
- Sting Relief Swabs (10 per box)

- 1-Eye/Skin Wash 1oz.
- 1-CPR Breather Barrier
- Disposable Nitrile Gloves (2 per box)
- Burn Treatment (10 per box)
- 1-Burn Dressing (4”x4”) gel soaked
- 2–Trauma Pads (5”x9”)
- 1-Scissors
- First Aid Guide

Due to the potential severity of injury and excessive bleeding to a body part from a chainsaw cut, Loggers First Aid Kit should be available which includes additional and larger (8”x10” Gauze Pads) meeting OSHA 1910.266 requirements for logging operations.

First aid kits should be periodically inspected and replenished with any depleted items or at a minimum once per year.

6.2.6 AED (Automated External Defibrillator)

Automated external defibrillators (AEDs) are an important lifesaving technology and play a role in treating workplace cardiac arrest. Most sudden cardiac deaths occur outside of the hospital. It is estimated that 5 percent or less of victims of sudden cardiac arrest are successfully resuscitated and discharged alive from the hospital. Chances of survival from sudden cardiac death diminish by 7 – 10 percent for each minute without immediate CPR or defibrillation. After 10 minutes, resuscitation rarely succeeds.

AED’s should be considered facilities with more than (50) employees or if you serve the General Public. If your location has one or more AED’s, ensure that your personnel trained in First Aid and CPR are also trained in AED use. The placement of the AED is critical for adequate response time to reach a victim of sudden cardiac arrest.

The following procedure should be followed:

1. Have someone call 911 immediately to request emergency medical services.
2. Immediately begin CPR.
3. Have someone retrieve the AED stored at your facility.
4. If CPR has not revived the victim, attach the AED pads to the victim and follow prompts.

6.2.7 Emergency Eyewash, Shower, and Flushing Station

Where the eyes or body of any person may be exposed to injurious corrosive chemicals, suitable facilities for flushing of the eyes and body shall be provided within the work area for immediate emergency use. Stations should be located within 10 second access (approximately 50’ from possible exposure to corrosive chemicals). Corrosive chemicals cause damage to living tissues such as eyes and skin. Some other material used for NCDOT operations may involve chemicals which may be an irritant to eye or skin exposure, but not classified as corrosive. Review SDS (Safety Data Sheet) for chemicals being used to determine if corrosive or an irritant.

NCDOT Operations which may require eyewash, shower, or flushing stations based on Hazard Assessments for each activity include the following:

1. Fork lift battery charging stations are primarily where NCDOT employees have a potential exposure hazard to corrosive electrolyte (acid) in batteries and would require eyewash, shower, or flushing stations. If a plumbed eyewash station or gravity fed eyewash station capable of providing flushing fluid for 15 minutes is not practical, a portable eyewash station may be used to initially flush skin exposure until access to plumbed sink, shower, or other water source for further flushing.
2. Calcium chloride mixing / storage stations for snow/ ice operations has been determined to be an eye and skin irritant based on SDS where eyewash, shower, or flushing station should be considered. .
3. Pesticide/herbicide storage or dispensing locations have been determined to be an eye and skin irritant based on SDS's for chemicals used where eyewash, shower, or flushing station should be considered.
4. Any other activities where chemicals used may be an eye or skin irritant based on SDS's where eyewash, shower, or flushing station should be considered.

6.2.7.1 Plumbed Eyewash or Shower Station

The following are requirements for Plumbed Eyewash Stations:

- Mounted with water flow pattern between 33" – 53" from floor
- Located 6" from closest wall or obstruction
- Plumbed w/ tepid water
- Hands free after activating push handle
- Located within 55' of corrosive exposure hazard
- Eyewash station must be maintained in sanitary condition

The following are requirements for Plumbed Shower Stations:

- Height of water column between 82" – 96" from floor
- Center of water pattern at least 16" from any obstruction
- Plumbed w/ tepid water
- Hands free after activating lever at maximum height of 69" from floor
- Located within 55' of corrosive exposure hazard
- Safety shower must be maintained in sanitary condition

6.2.7.2 Portable Eyewash Station

Gravity fed eyewash stations for splashes or spills where only the eyes are likely affected require flushing of 0.4 gallons per minute at 30 PSI for 15 minutes.

Eyewash bottle stations may be used for immediate use if a lavatory or other eyewash station is readily available to continue flushing eyes or other affected body parts.

- Saline solutions used for portable eyewash stations have a shelf-life and should be replaced accordingly. These stations shall be kept in sanitary conditions. Follow manufactures instructions for inspection and replacement of saline solution.

6.2.7.3 Inspection

Follow manufactures instructions for periodic inspection and replacement of saline solution to ensure proper operation, sanitary condition, and accessibility Weekly inspection of Emergency Eyewash/Shower/Flushing Stations is recommended per manufacturer ANSI Z358.1-2014 provides recommended guidelines.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of first aid equipment and related supplies. They will designate which employees receive first aid, CPR and AED training. They will also obtain and coordinate the required training for the affected employees.

6.3.2 Supervisors

Supervisors will assist managers/unit heads as needed. Additionally, they will assist first aid-trained employees as needed.

6.3.3 First Aid Trained Employees

First aid trained employees will administer first aid, CPR and AED if available as conditions and circumstances dictate. They will also be responsible for ensuring that first aid supplies are replenished when used

6.3.4 Employees

Employees shall comply with all applicable guidelines contained in this safety policy and procedure.

6.3.5 Safety and Risk Management

Safety and Risk Management shall provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or providing First Aid and CPR/AED training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure

6.3.6 Central Inventory Unit

The Central Inventory Unit or MRO contract supplier will be responsible for maintaining an inventory of first aid kits and supplies.

Appendix A: Inspection of Emergency Eyewash/Shower/Flushing Stations

NCDOT Eyewash/Safety Shower/Drenching Hose Inspection Checklist					
Date:	**Location:**				**ID:**
Inspection Conducted By:	**Rating**			**Observations/Corrective Actions**	**Abatement Date**
Inspection Items (If Applicable)	**S**	**U**	**N/A**	**S=Satisfactory, U=Unsatisfactory, N/A=Not Applicable**	**If corrective action required**
Eyewash Station(15 Minutes Minimum Flow)					
Sanitary, Free of Accumulated Dirt and Debris					
Located Within 20' of Hazard					
Visible Eyewash Sign Present					
Eyewash Station Readily Accessible; Not Blocked					
For Plumbed Eyewash; Activate for Proper Operation					
For Plumbed Eyewash; Tepid Water Used (60-100 Degrees F) Recommended					
For Portable Eyewash Station; Check for Proper Level of Sterile Eyewash Solution					
For Portable Eyewash Station; Check Expiration Date of Sterile Eyewash Solution					
Eyewash Bottles (Emergency Immediate Use)					
For Portable Eyewash Bottle Station; Check Expiration Date of Sterile Eyewash Solution					
Eyewash Bottle Station Readily Accessible; Not Blocked					
Visible Eyewash Sign Present					
Located Within 20' of Hazard					
Eyewash, Safety Shower, Combination, Drenching Hose					
Sanitary, Free of Accumulated Dirt and Debris					
Located Within 20' of Hazard					
Visible Eyewash & Shower Sign Present					
Eyewash Shower or Drenching Hose Station					
For Plumbed Station; Activate for Proper Operation					
For Plumbed Eyewash; Tepid Water Used (60-100 Degrees F) Recommended					

Appendix A: Inspection of Emergency Eyewash/Shower/Flushing Stations (Continued) 2

The above checklist sections should be followed when conducting inspection of Emergency Eyewash/Shower/Flushing Stations for appropriate item being inspected. For items found unsatisfactory, corrective action should be taken with an abatement date indicated. Initiate or implement corrective action which should be performed prior to next scheduled inspection.

Inspection Tags should be used to verify periodic inspections have been conducted. Shown below are examples of Inspection Tags that could be utilized for appropriate emergency stations.

Use this type of tag for plumbed emergency stations.

Use this type of tag for portable eyewash stations. Saline solution used will have shelf life expiration date which should be used when to replace the solution.

Author:	P. Roberts	Revision #:	2
Approved By:		Date Revised:	December 29, 2015

SAFETY POLICY & PROCEDURE

Fire Protection SPP# 1910.157

Quick Reference

1.0 PURPOSE

The purpose of this safety policy and procedure is to establish the methods and accountability for fire protection and safety at North Carolina Department of Transportation (NCDOT) facilities.

2.0 SCOPE AND APPLICABILITY

This safety policy and procedure provides guidelines for implementing fire protection in the workplace. It includes training requirements, discussion on fire hazards, portable fire extinguisher, automatic systems such as water sprinklers, and system alarms.

This document also details the areas of responsibility for managers/unit heads, supervisors, and employees within NCDOT.

This safety policy and procedure applies to all employees.

3.0 REFERENCE

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.157).

4.0 POLICY

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. . When fire hazards cannot be eliminated, fire protection equipment, engineering practices, administrative practices, safe work practices, and proper training regarding fire protection will be used or implemented.

5.0 General Responsibilities

It is the responsibility of each employee to ensure this policy is implemented. Each NCDOT employee shall report immediately any unsafe act or condition to his or her supervisor and to become familiar with required fire prevention and protection measure including, as applicable, the use and location of fire-fighting equipment. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's policy on Fire Protection.

6.1 Definitions

Class A Fires

Fires involving ordinary combustible materials such as paper, wood, cloth, and some rubber and plastic materials.

Class B Fires
Fires involving flammable or combustible liquids, flammable gases, greases and similar materials, and some rubber and plastic materials.

Class C Fires
Fires involving energized electrical equipment where safety to the employee requires the use of electrically nonconductive extinguishing media

Class D Fires
Fires involving combustible metals such as magnesium, titanium, zirconium, sodium, lithium and potassium.

Class K Fires
Fires involving cooking oils, fats. and grease. Class K fires are typically a subclass of Class B fires and can be controlled by interrupting the fire's chemical reaction.

Fixed Extinguishing System
A permanently installed system that extinguishes or controls a fire by discharging a fire suppression agent, typically through a nozzle or spray head at or near the ceiling.

Halon
A colorless, odorless, or faintly sweet smelling, electrically nonconductive liquefied gas which inhibits a fire's chemical chain reaction. Halon extinguishers may be portable or may be part of a fixed extinguishing system

Hydrostatic Testing
Pressurized test performed on fire extinguisher cylinders to check the integrity of the cylinders.

Incipient Fires
Fires that are in the initial or beginning stage and which, typically, can be controlled or extinguished by portable fire extinguishers, or standpipe or small hose systems without the need for protective clothing or breathing apparatus.

Inspection
A visual check of fire protection systems and equipment to ensure that they are in place, charged, and ready for use in the event of fire.

Portable Fire Extinguisher
A hand-held cylindrical pressure vessel containing an agent which can be discharged to extinguish a fire. Portable fire extinguishers have a limited discharge distance and are only suitable against specific types of small incipient stage fires.

Sprinkler System
A system of piping designed in accordance with fire protection engineering standards and installed to control or extinguish fires. The system includes an adequate and reliable water supply, and a network of specially sized interconnected piping and sprinklers. The system also includes control valves and devices for actuating alarms when the system is in operation

6.2 General Provisions

This section details the provisions of this safety policy and procedure. The provisions adopted by NCDOT are: Training Requirements, Fire Hazards, Portable Fire Extinguishers, Fire Suppression Systems, and Fire Alarms and Alarm Systems

6.2.1 General Training Requirements

Employees will be trained on the general principles of fire protection upon initial employment and annually thereafter.

Training will consist of:

- The facility's Emergency Action Plan. Refer to SPP# 1910.38, Emergency Evacuation and Fire Prevention Plans.
- Types of Fire Hazards, recognition and control measures
- Classification and Performance of Portable Fire Extinguishers
- Requirements for the use of Fire Extinguishers
- Fire suppression systems
- Purpose and Typical Operations of Alarm Systems

In NCDOT facilities without portable fire extinguishers, employees will be trained on the facility's "Emergency Action Plan," and will evacuate without attempting to extinguish a fire.

In NCDOT facilities with portable fire extinguishers, employees may be trained on the use of portable fire extinguishers as specified by the Manager or Unit Head. Training is required for any employee authorized to use portable fire extinguishers.

6.2.2 Fire Hazards

Fire hazards include the five classes of fires defined above. Fire classifications are generally based on the types of fuel available. The exception is a Class C fire which is classified based on the ignition source. Once the power to live equipment is shut off a Class C fire becomes a Class A or B fire. Figure 1 depicts pictograms used to identify fire classes on fire extinguishers.

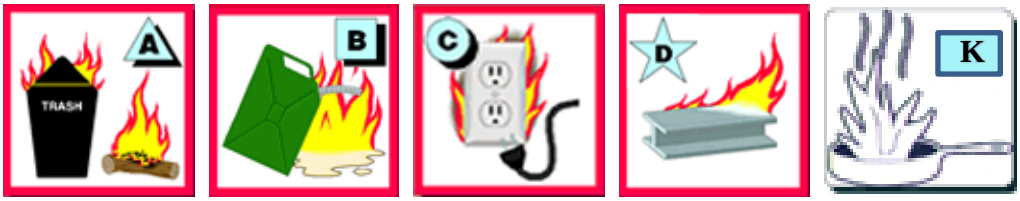


Figure 1 – pictograms used for identifying fire classes on fire extinguishers

Fuel sources: ordinary combustibles, combustible and flammable liquids, and combustible metals should be kept away from heat or ignition sources. Use good housekeeping to minimize the amount of combustible fuels and store them away from heat sources. Also, to prevent fire spread; do not store anything within 20 inches of the ceiling, or within 24 inches if the room doesn't have sprinklers.

Open flames from lighters, matches, welding, or soldering and hot metal filings from drilling or grinding are common ignition sources. Electrical appliances, particularly space heaters, heating pads, coffee makers, & toaster ovens, are common ignition sources in offices. Another common ignition source is the Daisy-Chaining or interconnecting power strips to each other because it can cause overheating of wiring.

To reduce heat loads, make sure electrical appliances do not overload cords and circuits. Never run electrical cords under doors, across hallways or thresholds, or through windows. If a power cord is hot to the touch, remove it from service. Keep electrical appliances in good repair and replace those with damaged or frayed cords or broken parts.

6.2.3 Portable Fire Extinguishers

NCDOT shall provide portable fire extinguishers that are:

- Appropriate for the hazard
- Properly mounted and located
- Inspected, maintained, and tested

Additionally, supervisors or designated employees will be trained in the selection, distribution, inspection, and maintenance of portable fire extinguishers.

Portable fire extinguishers will be selected and distributed based on the type and size of fire hazard. Below is a description of the different types of fire extinguishers.

- Water - pressurized canister with water and wetting agents. For use only on class A fires.
- Dry Chemical (various chemicals) for use on class A, B, or C fires. Note some Dry Chemical fire extinguishers are not effective against class A fires.
- Halogenated Agent halons and halocarbon agents sometimes called “clean agents” because they leave no residue. Decomposition products may be harmful. Effective against class A, B, & C fires
- CO2 (Carbon dioxide) for use on class B or C fires. CO2 is an asphyxiant
- AFFF or FFFP (Aqueous Film-Forming Foam or Film-Forming Fluoroprotein Foam). As the name suggests, these agents form an oxygen barrier on top of the liquid fuel. These are effective only against some Class B fires.
- Dry Powder (sodium chloride, granular graphite, “Met-L-X”) for combustible and reactive metals. Dry powder extinguishing agents are often distributed with a scoop from bulk containers. Dry powder is for use on Class D fires. Dry powder agents are only useful for specific metal fuels.
- Class K for use on oil and grease fires (Special liquid chemicals) which are effective on heated fuels in Class B fires.

Portable fire extinguishers will be mounted conspicuously, located and identified so they are readily accessible.

- Employees will be informed of the location of fire extinguishers. Extinguishers or wall markings indicating extinguisher locations will be visible from a distance of at least 25 feet and from all office travel aisles. Travel distance from any work location to a fire extinguisher may not exceed 75 ft. for class B fire hazards and 50 ft. for class A fire hazards.
- A clear unobstructed path to all fire extinguishers shall be maintained at all times. No materials shall be placed in front of or under any fire extinguisher. No storage of flammable or combustible materials is permitted within 3 ft. of a fire extinguisher.
- Fire extinguishers may not be used for any purpose other than firefighting and must be maintained in their mounted location.
- Portable fire extinguishers shall be visually inspected monthly to ensure they are present, charged, and operable. They are to be recharged after use or pressure leakage. Fire extinguishers will be equipped with an inspection tag, and the inspector must initial and date the tag each month to document the inspection. Tags will be replaced when all lines are used or when tags are lost or removed.
- Any extinguisher that shows excessive wear, damage or unserviceable condition, or loss of pressure will be removed from service and replaced.
- Fire extinguisher maintenance will be performed at least annually by an approved contractor or trained NCDOT personnel.
- During any period when an extinguisher is removed for testing or service, a similar extinguisher must replace the out of service extinguisher.
- Annual inspection records will be maintained for review by regulatory agencies and for internal audit purposes. Appendix A presents the portable fire extinguisher hydrostatic testing schedule for NCDOT. In lieu of hydrostatic testing of existing fire extinguishers, new replacement fire extinguishers may be acquired prior to the portable fire extinguisher hydrostatic testing schedule in Appendix A.

6.2.3 Fire Suppression Systems

Water Sprinkler Systems:
Water sprinkler systems are used in areas requiring a higher degree of fire protection than is provided by portable fire extinguishers. Sprinkler heads are heat-activated and discharge water over the fire area. Water extinguishing systems will be inspected annually by an approved outside contractor to ensure their operation is sufficient.

Halogenated and Inerting Agent Systems:
Halogenated agent extinguishing systems are used in areas with equipment sensitive to water damage. CO2 and other inerting agent systems have similar applications. All of these types of systems produce hazardous atmospheres that can be harmful to

employees. Halogenated and inerting agent systems will be inspected annually by an approved outside contractor to ensure their operation is sufficient.

6.2.4 Fire Alarms and Alarms for Sprinkler Systems

Fixed extinguishing systems such as water sprinklers, when activated, will trigger an audible alarm designed to alert employees to evacuate.

Halogenated agent systems may also have a pre-discharge alarm allowing employees to evacuate prior to discharge of the system.

Alarms can be activated by heat or smoke detectors. "Pre-action" sprinkler systems may sound an evacuation alarm before the water is released to the sprinkler heads. NCDOT Facilities in areas where municipal fire departments are available may have a fire alarm system that notifies the fire department. Managers should address fire department notification in the Emergency Action Plan.

Alarms can be activated by heat or smoke detectors. "Pre-action" sprinkler systems may sound an evacuation alarm before the water is released to the sprinkler heads.

6.3 Specific Responsibilities

6.3.1 Managers & Unit Heads

Managers/Unit Heads are responsible for budgeting and ensuring that adequate funds are available for the purchase of portable fire extinguishers for their facilities. For NCDOT facilities with water and/or halon discharge systems, managers/unit heads will ensure service contracts are in place for the annual servicing of all fire protection systems, including fire suppression systems, alarm and alert systems, audible evacuation alarms, and fire department notification systems.

They will also be responsible for identifying the employees affected by this safety policy and procedure. Managers/Unit Heads will obtain and coordinate the required training for the affected employees.

Managers/Unit Heads will audit their fire protection program for compliance with this safety policy and procedure. Managers/Unit Heads should refer to SPP # 1910.38, Emergency Evacuation and Fire Prevention Plans, for related information on fire prevention.

6.3.2 Supervisors

Supervisors will ensure that employees are trained in the general principles of fire protection the function of, and if necessary, the use of various fire protection equipment. Additionally, they shall ensure that there are an adequate number of portable fire extinguishers for each work area. Supervisors should refer to SPP #1910.38, Emergency Evacuation and Fire Prevention Plans, for related information on fire prevention.

Supervisors will ensure that fire extinguishers are recharged or replaced after each use. They will also ensure that damaged or defective fire extinguishers are removed from service and replaced. Supervisors will ensure that monthly and annual testing and maintenance is performed on portable fire extinguishers. Records of inspections and testing shall be maintained by the supervisor.

6.3.2 Employees

Employees are responsible for reporting fire hazards to their supervisors.

Employees are responsible for activating emergency evacuation alarm systems in the event of a fire.

Employees are responsible to use fire extinguishers only if authorized and only according to the level of their training.

6.3.4 Safety & Risk Management

Safety and Risk Management will assist managers/unit heads, supervisors or others as necessary on any matter concerning this safety policy and procedure, including

- developing or securing required training
- selecting proper types, placement, and signage for portable fire extinguishers
- auditing the implementation of the policy and procedure

Safety and Risk Management will assist Purchasing and Central Material Management Unit in the selection of appropriate fire protection equipment.

6.3.4 Central Material Management Unit

Central Material Management Unit will maintain a supply of replacement portable fire extinguishers including those rated for types A, B, and C hazards. Class D extinguishers will be made available only after consultation with Safety and Risk Management.

Appendix A:

NCDOT Portable Fire Extinguisher Hydrostatic Testing Schedule

Types of extinguishers	Test interval (years)
Soda acid (stainless steel shell)	5
Cartridge operated water and/or antifreeze	5
Stored pressure water and/or antifreeze	5
Wetting agent	5
Foam (stainless steel shell)	5
Aqueous Film Forming Foam (AFFF)	5
Loaded stream	5
Dry chemical with stainless steel	5
Carbon Dioxide	5
Dry chemical, stored pressure, with mild steel, brazed brass or aluminum shells	12
Dry chemical, cartridge or cylinder operated; with mild steel shells	12
Halon 1211	12
Halon 1301	12
Dry powder, cartridge or cylinder operated with mild steel shells	12

Welding SPP#1910.252

Quick Reference

Contents

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures through which North Carolina Department of Transportation (NCDOT) employees receive the training and proper equipment needed to safely perform welding operations..

2.0 Scope and Applicability

The welding process joins metal parts. Welding processes require heat and sometimes other substances to produce the weld. Byproducts resulting from the welding process include fumes and gases which can be serious health hazards to employees. Additionally, safety hazards can exist such as the potential for fire or explosion and injuries from arc radiation, electrical shock, or materials handling.

This safety policy and procedure provides guidelines for safely performing welding operations. It presents provisions for training, discussion on types of welding, safe work practices, and employee protection requirements. It also presents critical details on hot work permits, work in confined spaces, ventilation requirements when performing welding operations, and inspection requirements.

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Risk Management, and Central Inventory unit within NCDOT.

This safety policy and procedure affects all employees who are exposed by their job duties to welding and torch cutting operations. These welding and torch cutting operations occur at but are not limited to equipment repair shops, equipment fabrication shops, ferry maintenance and construction operations such as bridge and road repair and maintenance.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.251-257) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.350-.354).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, welding operations will be performed only by authorized and trained employees. When welding hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Welding will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT'S safety policy and procedure on Welding. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies responsibilities required by NCDOT'S safety policy and procedure on Welding.

6.1 Definitions

Approved
Listed or approved by a nationally recognized testing laboratory.

Confined Space
A space that is not designed for human occupancy, has limited openings for entry and exit, may lack adequate ventilation, and may contain or produce dangerous air contamination.

Hazardous
Any act, condition, or substance which poses health and safety risks to employees.

Hot Work Permit
A permit allowing employees to perform work involving welding, cutting, or any task that would deplete oxygen, create toxic fumes and vapors, or create the potential for fire or explosion.

Pulmonary
Any body function related to the lungs.

Welder/Welding Operator
Any operator of electric or gas welding and cutting equipment.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Types of Welding
- Welding Hazards
- Safe Work Practices
- Hot Work Permits
- Employee Protection
- Work in Confined Spaces
- Inspection

6.2.1 Training

Employees who perform welding operations will be trained to:

- Recognize the hazards associated with various welding operations
- Know the safe work practices for welding operations
- Understand the importance and requirements of Hot Work Permits
- Use the appropriate personal protective equipment (PPE) for the job
- Recognize confined spaces and the requirements associated with them
- Understand the importance of regular inspections of welding equipment, attachments, and accessories

This training shall be made available upon initial employment or job re- assignment. Refresher training shall be provided upon the discretion of the supervisor.

6.2.2 TypesofWelding

Several types of welding operations are used in NCDOT. The most common welding operations in NCDOT include:

- Gas welding and cutting
- Arc welding and cutting
- Resistance welding
- Plasma arc cutting and welding

The gas welding process unites metals by heating. The gases commonly used as the fuel gas are oxygen and acetylene. The gas cutting process removes metal by a chemical reaction of the base metal with oxygen at an elevated temperature.

The arc welding and cutting processes uses electric current and two welding leads. One welding lead is connected to the electric power supply while the other lead is attached to the work surface.

Resistance welding is a metal-joining process where welding heat is generated at the joint by the resistance to the flow of electric current.

Plasma arc cutting utilizes a high temperature and velocity jet of ionized gas to cut metals by the force of the plasma arc. Plasma arc welding utilizes a constricted plasma arc to heat the metals which are then joined using a filler metal.

6.2.3 Welding Hazards

The hazards associated with welding include health and safety hazards. Health hazards are primarily respiratory hazards due to the generation of fumes and gases. Safety hazards are generally physical hazards due to the work site and conditions and materials associated with the work site.

Health hazards associated with the generation of fumes and gases depend upon the welding process, the base material, the filler material, and the shielding gas if any. Health hazards include exposure to:

- Toxic gases
- Primary pulmonary gases
- Non-pulmonary gases

- Particulate matter
- Irritants and toxic inhalants

Air sampling may be required to identify the fumes and gases emitted from a specific operation.

Safety hazards associated with welding operations include:

- Fire
- Proximity to combustible materials
- Hazardous locations (rooms containing flammable or combustible vapors)
- Closed containers that have held flammable liquids or other combustibles
- Electric shock (arc welding)
- Infrared and ultraviolet eye damage

Appendix A presents precautions that should be followed to minimize, control, or eliminate these safety hazards.

6.2.4 Safe Work Practices

Safe work practices for all welding operations include:

- A Hot Work Permit is required where in confined spaces and areas where flammable or combustible materials are present. See Appendix B for the NCDOT Hot Work Permit which may be used.
- Placing work at an optimal height to avoid back strain or shoulder fatigue
- Using fall protection equipment for work on elevated surfaces more than 6 feet above the floor or ground surface
- Wearing personal protective equipment (PPE) as applicable for the work conditions
- Following special precautions when welding or cutting in a confined space
- Posting warning signs to mark just-completed welding or cutting surfaces
- Following safe housekeeping principles
- Using equipment as directed by the manufacturer instructions or practices
- Removing any butane lighters, matches, or other combustibles from pockets prior to performing work
- Not performing welding work with oily clothing (Leathers may need to be worn over clothing)
- Following fire protection and prevention practices during the welding operation.
- Using proper ventilation techniques during welding operations

(See Appendix C for further details and SPP# 1910.94, Ventilation, for related information)

6.2.5 Hot Work Permits

Hot Work Permits are a useful accountability tool to ensure that all the necessary precautions are taken prior to commencing welding. They also assure that employees are aware of and use the appropriate safeguards when performing welding operations. In confined spaces a hot work permit is required if any welding operations are performed in that space regardless of whether or not a confined space entry permit is required. Appendix B presents NCDOT's Hot Work Permit.

6.2.6 Employee Protection

Employee protection during welding operations must include:

- Safeguards and provisions for fall protection
- Tripping hazard prevention
- Eye protection
- Protection from arc welding rays
- Protective clothing
- Protection from electrical shock hazards

Additionally, to prevent injury from burns, all areas that have been just welded or cut will be marked to inform other employees that the material or area is hot.

For fall protection, employees will either use fall protection such as full body harness will lanyard, or guardrails where falls from heights of 6 feet or more are possible.

Tripping hazards will be minimized by welding lines being placed in order not to create trip and fall hazards. Cables will not block passageways, stairways, or other exits.

Eye protection will be provided by welding helmets being used during all arc welding or arc cutting operations, excluding submerged arc welding. Helpers or attendants will be provided with proper eye protection. Specifications for eye protection are detailed in Appendix E of this safety policy and procedure. Also, see SPP# 1910.132, Personal Protective Equipment, for additional details.

Arc welding ray's protection will be provided by non-combustible or flame-resistant screens, shields or suitable eye protection to workers or other persons adjacent to the welding operations. Booths and screens shall permit circulation of air at floor level.

Protective clothing will vary with the size, nature, and location of the work. Criteria for selection of protective clothing is detailed in Appendix E of this safety policy and procedure.

Electrical protective devices will be used to protect employees from the possibility of electrical shock when welding operations are performed in wet areas or areas where high humidity is present. Refer to SPP# 1910.137, Electrical Protective Devices, for additional detail.

6.2.7 Work in Confined Spaces

No work is to commence until all requirements of the Confined Space Entry Safety Policy and Procedure are met and a Hot Work Permit is submitted. Refer to SPP# 1910.146, Confined Space Entry, for additional details.

Mechanical ventilation will be provided during any confined space welding operation to prevent the accumulation of toxic materials or possible oxygen enrichment or deficiency. All heavy and portable equipment used in confined space welding or torch cutting operations will be secured before operations begin.

When a welder must enter a confined space through a manhole or other small opening, the welder will be attached to a manned lifeline. The lifeline will be attached to not interfere with the welding operation or with the removal of the welder in case of an emergency. A preplanned emergency rescue procedure will be in place prior to the welding operations.

When arc welding operations are completed or temporarily stopped, all electrodes will be removed from the holders. The holders are to be carefully positioned and stored so that accidental contact cannot occur. Additionally, all machines will be disconnected from their power source.

6.2.8 Inspections

All welding equipment including attachments and accessories will be inspected on a monthly basis by the supervisor or his or her designee. A written record including the date, type of equipment, equipment number, and equipment serial number, along with the signature of the employee performing the inspection will be maintained for a period of one year for review by regulatory agencies.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funding is available and budgeted to provide proper equipment, supplies, PPE, and training for welders. They will also be responsible for identifying the employees affected by this safety policy and procedure.

Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will be responsible for ensuring the safe handling of welding and torch cutting equipment and ensuring safety, fire prevention and protection during welding and torch cutting processes.

Supervisors are also responsible for ensuring all welding equipment, including cables, lines and any accessories, are in good working condition. If any indication of damaged equipment is present such as broken or cut insulation on cables, etc., the supervisor will have that equipment removed from service and have it repaired.

6.3.3 Employees

Employees who are involved in welding operations are responsible for ensuring that all fire prevention and fire protection measures have been taken before any torch cutting or welding begins.

Employees are responsible for ensuring that all PPE's is worn properly for the specific hazard involved and that all equipment is in good working condition. Each employee is responsible for bringing hazards to the attention of his or her supervisor for correction as soon as the hazard is recognized.

6.3.4 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training.

Safety and Risk Management will also work with Central Equipment Unit to ensure that all newly purchased compressed gas cylinders equipment and supplies comply with current safety regulations and this safety policy and procedure.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.5 Central Inventory Unit

Central Equipment Unit will maintain an inventory or source through State Contract supplier for related Welding parts and supplies.

Appendix A: Safety Hazard Precautions

- Welding should be done in a permanent location that can be designed to provide maximum safety and fire protection. Otherwise, if the welding and cutting equipment is portable the site should be inspected to determine what fire protection equipment is necessary.
- Where welding is done near combustible materials, special precautions are necessary to prevent sparks or hot slag from reaching such material and starting fires. If the combustible material cannot be removed, it must be covered with a suitable flame-resistant material and a fire watch should be provided.
- Welding or cutting activities should not be allowed in or near rooms containing flammable or combustible vapors, liquids, or dusts. If welding is required in these locations, all of the surrounding premises should be thoroughly ventilated and have frequent gas testing performed.
- Closed containers that have held flammable liquids or other combustibles should be thoroughly cleaned before welding or cutting.

- Supervisors will inspect areas where welding or torch cutting is to take place and take proper measures to ensure fire hazards are eliminated or protected against. If combustibles are within 35 feet of the welding area, welders will use guards or shields to contain sparks and slag.

- Employees trained as fire watchers will be available in areas where welding is taking place. Appropriate fire extinguishers will be immediately available and accessible at the welding operation.

- No welding, torch cutting or heating shall be done where flammable paints, the presence of other flammable compounds, or heavy dust concentrations exist.

- A Hot Work Permit must be completed and followed where torch cutting and welding operations are conducted in close proximity to flammables, combustibles, hazardous materials or processes, and in confined spaces. Hot work permits assure that employees are aware of and use appropriate safeguards when conducting welding operations in these environments.

Appendix B: Hot Work Permit

NCDOT Hot Work Permit

Date: _____

From: _____ Time To: _____ Time

Bldg.: _____ Dept.: _____ Floor: _____

Work to be done: _____

_____

_____

_____

Work performed by: _____

Fire Watch assigned: Yes ☐ No ☐

Names for Fire Watch Personnel: _____

Safety Checklist

Yes ☐	No ☐	Have all flammable or combustible materials been removed from the work area (35 feet radius)?
Yes ☐	No ☐	If any flammables or combustibles cannot be removed, have they been covered by fire resistant shields or tarpaulins?
Yes ☐	No ☐	Is adequate firefighting equipment readily available?
Yes ☐	No ☐	Have vulnerable areas of combustible floors and/or roofs been wet-down or properly covered?
Yes ☐	No ☐	Have wall and/or floor openings been properly covered?
Yes ☐	No ☐	Is the hot work equipment in good working condition?
Yes ☐	No ☐	Is a Confined Space Permit required?
Yes ☐	No ☐	If pressurized lines or lines containing hazardous gases or liquids must be broken or cut, have the appropriate safety measures been taken?
Yes ☐	No ☐	Are Lock-Out Tag-Out Procedures required?
Yes ☐	No ☐	Has the atmosphere been checked with a multi-gas meter for flammable/ explosive gas levels or other atmospheric hazards?
Yes ☐	No ☐	Is ventilation adequate?
Yes ☐	No ☐	If no, has forced ventilation or supplied air been provided?
Yes ☐	No ☐	Is adequate PPE (gloves, eye and hearing protection, breathing apparatus, special clothing, boots, etc.) provided for exposed workers?
Yes ☐	No ☐	Are curtains or shields in place to protect others in the area?
Other special precautions taken:		
_____		

Signatures Required Before Beginning Work

I have been instructed and I understand the hazards as well as the precautions necessary to do this work safely.

_____
Signature of person performing the work

I verify that this work site has been inspected, that all necessary precautions have been taken to prevent fires and/or explosions to control hazard conditions, and the individual signed above is authorized to begin doing this work.

_____ _____
Signature of Supervisor Date & Time (am or pm)

Signatures Required After Completing Work

The work has been completed: _____
Date & Time (am or pm)

_____
Signature of person performing the work

I have personally inspected the worksite after completion of the work and find the area to be in safe condition.

_____
Signature of Supervisor

_____
Date & Time (am or pm)

APPENDIX C: Ventilation Guidelines for Welding Operations

- Mechanical ventilation will be provided for welders and helpers when:
  - Welding is being performed in a space less than 10,000 cubic feet per welder.
  - A room has a ceiling height less than 16 feet.
  - A confined space or welding space contains partitions, balconies, or other structural barriers to the extent that obstruct cross ventilation.

- The minimum rate for mechanical ventilation will be 2,000 cubic feet per minute per welder unless exhaust hoods or air-supplied respirators are provided.

- When using local exhaust hoods, they will be placed as close to the operation as possible. The exhaust hood will provide a rate of 100 linear feet per minute of air flow in the welding zone.

- Air-supplied respirators will be used when mechanical ventilating is not possible or when materials such as beryllium and cadmium are used. Refer to SPP # 1910.134, Respiratory Protection, for additional details.

- Local exhaust ventilation or air-supplied respirators will be used when welding or torch cutting on coated metals (e.g., zinc, mercury, cadmium, lead, etc.) indoors or in confined spaces. Outdoors operations shall be done using respiratory protective equipment.

Electrical Related Safe Work Practices SPP# 1910.333

Table of Contents

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines and procedures for North Carolina Department of Transportation (NCDOT) employees who may be exposed to electrical related hazards.

2.0 Scope and Applicability

Electrical accidents are generally caused by unsafe conditions, unsafe acts, or combinations of the two. Some unsafe electric equipment and installations can be identified by the presence of faulty insulation, improper grounding, loose connections, defective parts, ground faults in equipment, or unguarded live parts.

Environments containing flammable vapors, liquids, or gases, areas containing corrosive atmospheres, and wet and damp locations are some unsafe environments affecting electrical safety. Some unsafe acts such as the failure to de-energize electrical equipment when it is being repaired or inspected, the intentional use of defective and unsafe tools, or the use of tools or equipment too close to energized parts are all contributors to electrical hazards.

This safety policy and procedure provides guidelines for safely working around electrical hazards. It includes provisions for training, lockout/tagout requirements, and discussions of why safety related work practices are required. Guidelines are also presented for specific types of work practices and the required precautionary practices when using portable electric equipment and while being in hazardous locations. Additionally, it presents examples of signs, labels and marking requirements.

This document details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Risk Management within NCDOT.

This safety policy and procedure affects the following job classifications within NCDOT:

- Bridge Maintenance Technicians
- Traffic Control Technicians
- Bridge Maintenance Electricians
- Any other NCDOT Electricians

The following job classifications may be affected by this safety policy and procedure if they are exposed to parts of electrical circuits operating at 50 volts or more:

- Electrical and Electronic Engineers
- Electric and Electronic Technicians
- Machine Operators
- Maintenance Mechanics and Technicians

Additionally, any other employee who as a result of their job duties is exposed to electrical related hazards is also affected by this safety policy and procedure.

3.0 Reference

This safety policy and procedure dealing with Electrical Related Safe Work Practices is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.331-335) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.416- 417).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public.

Therefore, as a minimum, these requirements will be followed in NCDOT:

- Power equipment will be plugged into wall receptacles with power switches in the off position.
- Electrical equipment will be unplugged by grasping the plug and pulling. Cords should never be pulled or jerked to unplug the equipment due to excessive strain exerted on cord insulation which may pull away from the plug resulting in exposed wiring.
- Frayed, cracked, or exposed wiring on equipment cords must be taken out of service and replaced.
- "Cheater plug" (three prong/two prong adapter used for non-grounded receptacles), extension cords with junction box receptacle ends, or other makeshift plug/receptable devices will not be used.
- Temporary or permanent storage of materials must not be allowed within three feet of any electrical panel or electrical equipment.
- Any electrical equipment causing shocks must be taken out of service and tagged with a "DANGER- DO NOT USE" tag or equivalent.

When electrical hazards exist that cannot be eliminated, then engineering practices, administrative practices, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Electrical Related Safe Work Practices will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Electrical Related Safe Work Practices. It is also the responsibility of each NCDOT employee to immediately report any unsafe act or condition to their supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides definitions, establishes general provisions, and identifies specific responsibilities as required by NCDOT's safety policy and procedure on Electrical Related Safe Work Practices.

6.1 Definitions

Classified Location
Locations which are classified depending on the properties of the flammable vapors, liquids or gases, or combustible dusts or fibers which may be present and the likelihood that a flammable or combustible concentration or quantity is present

Electrical Hazards
Any risk of electrical shock that is not reduced to a safe level by the electrical installation.

Exposed
Part of any electrical circuit that is capable of being inadvertently touched or having an unsafe approach distance for an individual.

Hazardous Classified Location
Locations which are classified hazardous depending on the properties of the flammable vapors, liquids or gases, or combustible dusts or fibers which may be present and the potential that a flammable or combustible concentration or quantity is present.

Ground
A conducting connection between an electrical circuit or equipment and the earth, or to some conducting body that serves in place of the earth.

Ground-Fault Circuit-Interrupter (GFCI)
A device whose function is to interrupt the electric circuit to the load when a fault current to ground exceeds some predetermined value that is less than that required to operate the overcurrent protective device (fuse or circuit breaker) of the supply circuit.

Qualified Person
Those persons who are permitted to work on or near exposed energized parts and are trained in electrical safe work practices.

Safety Related Work Practices
Skills and techniques used to safely perform work activities near or on electrical equipment.

Wet Location
Indoor or outdoor locations subject to intrusion or saturation with water or other liquids where electrical equipment or wiring may be present, such as vehicle washing areas, vehicle service areas, and locations unprotected and exposed to weather.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. The provisions adopted by NCDOT are:

- Training
- Lockout/Tagout Requirements
- Safety Related Work Practices
- Portable Electric Equipment
- Hazardous Locations
- Protective Equipment
- Labels, Signs, and Markings

6.2.1 Training

It is the responsibility of each exposed employee's immediate supervisor to ensure that the employee has received the training necessary to safely perform his or her duties. This training will be given via classroom and on-the-job instruction and is to be documented.

Exposed employees shall be trained in and familiar with the safety related work practices required by 29 CFR Part 1910 section 331 through 335, and safety related work practices contained within the National Electric Code as they pertain to their respective job assignments. Additional training requirements for Qualified Persons are also mandated.

Employees will be trained in specific hazards associated with their potential exposure. This training will include isolation of energy, hazard identification, premises wiring, connection to supply, generation, transmission, distribution installations, clearance distances, and emergency procedures.

Qualified Persons shall, at a minimum, be trained in and familiar with:

- The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.
- The skills and techniques necessary to determine the nominal voltage of exposed live parts.
- The approach distances specified in Appendix A and the corresponding voltage to which NCDOT qualified persons may be exposed.
- Arc Flash Hazard Awareness and requirements for PPE for live electrical work.

6.2.2 Lockout/Tagout Procedure

All electrical energy sources must be locked out or tagged out or both when any employee is exposed to direct or indirect contact with parts of fixed electrical equipment or circuits. Refer to SPP# 1910.147, Control of Hazardous Energy (Lockout/Tagout), for additional detail.

6.2.3 Safety Related Work Practices

Safety related work practices will be used to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts. Safety related work practices will be consistent with the nature and extent of the associated electrical hazards.

Specific types of work practices covered by this safety policy and procedure include:

- Working with De-energized Parts
- Working with Energized Parts
- Vehicular and Mechanical Equipment near Overhead Lines and Underground Lines
- Illumination
- Conductive Materials and Equipment
- Portable Ladders
- Housekeeping

Appendix B details these specific work practices. Appendix C provides an electrical safety checklist to assess electrical hazards in your workplace.

6.2.4 Portable Electric Equipment

All portable electric equipment will be handled in such a manner that will not damage or reduce service life. Flexible cords connected to equipment may not be used for raising or lowering equipment and will not be used if damage to the outer insulation is present. Additionally, visual inspections are required and unauthorized alterations of the grounding protection are not allowed to ensure the safety of employees.

Prior to each shift, a visual inspection will be performed for external defects and for possible internal damage.

Attachment plugs and receptacles may not be connected or altered which would prevent proper continuity of the equipment grounding conductor. In addition, these devices may not be altered to allow the grounding pole of a plug to be inserted into slots intended for connection to the current-carrying conductors.

6.2.5 Hazardous Locations

Portable electric equipment and flexible cords used in highly conductive work locations or in job locations where employees are likely to contact water or conductive liquids shall be approved by the manufacturer for those locations. The hazardous locations that employees should be aware of include, wet locations and locations where combustible or flammable atmospheres are present.

For wet locations, employees' hands will not be wet when plugging and unplugging energized equipment. Energized plug and receptacle connections will be handled only with protective equipment if the condition could provide a conductive path to the employee's hand (if, for example, a cord connector is wet from being immersed in water). In addition, ground-fault circuit interrupter (GFCI) protection is required for some equipment/locations and is also recommended for use in all wet or highly conductive locations.

For combustible/flammable atmospheres, all electric equipment and wiring systems in classified locations must meet The National Electric Code requirements for that particular classification. See Appendix D for definitions of Classified Locations.

6.2.6 Protective Equipment

Employees working in areas where there are potential electrical hazards will be provided with and use protective equipment that is appropriate for the work to be performed. *(Traffic Control Technicians who service traffic signal cabinets at ground level will not be required to wear electrical safety boots or rubber insulating gloves. This is because of the low source voltages of the traffic signal cabinets and the concrete pad on which the cabinet resides. However, safe electrical work practices shall still be followed.)*

Examples of Personal Protective Equipment (PPE) which might be needed for protection against electric shock include but are not limited to:

- Nonconductive hard-hats, gloves, and foot protection or insulating mats
- Eye and face protection whenever there is danger from electric arcs or flashes
- Insulated tools or handling equipment
- Protective shields and barriers to protect against electrical shock and burns

Additionally, other ways of protecting employees from the hazards of electrical shock will be implemented, including insulation and guarding of live parts. Insulation provides an electrical barrier to the flow of current. The insulation must be appropriate for the voltage and the insulating material must be undamaged, clean, and dry. Guarding prevents the employee from coming too close to energized parts. It can be in the form of a physical barricade or it can be provided by installing the live parts out of reach from the working surface. For additional detail, refer to SPP# 1910.137, Electrical Protective

6.2.7 Signs, Labels and Markings

Safety signs, safety labels, barricades or other means (see Figure 1) will be used where necessary to warn and protect employees from contact with electrical hazards.

Figure 1

Electrical equipment shall be marked with the manufacturer's name, trademark, or other descriptive marking is placed on the equipment. Other markings shall be provided giving voltage, current, or wattage. The marking shall be of sufficient durability to withstand the environment involved.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funding is available to provide proper equipment, supplies, and training for exposed employees. They will also be responsible for identifying the employees affected by this safety policy and procedure.

Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors are responsible for ensuring that only qualified employees are assigned or permitted to perform work directly on energized parts of equipment. Supervisors are also responsible for ensuring that employees in their charge will comply with the requirements and responsibilities of this safety policy and procedure.

Supervisors are responsible for ensuring areas around electrical equipment, such as circuit breaker panels, disconnects, and fixed power tools, are kept free from stored items, debris, and any liquids or material that would create slippery floors or obstruct access to the equipment for maintenance or emergencies.

Supervisors are responsible for ensuring that a list of all energized equipment including isolation points and procedures for safe operation are developed for review by employees or regulating agencies.

6.3.3 Employees

Each employee will comply with this safety policy and procedure. It is the responsibility of each employee to identify potential hazards when required to work with or near sources of electrical energy.

Employees will not perform work involving exposure to potentially hazardous levels of electrical energy without instruction/training specific to the hazards of the tasks.

Employees shall practice good housekeeping and observe activities that could cause electrical shock hazards.

Good housekeeping will include but is not limited to:

- Not having water on floors near electrical equipment
- Not storing tools or other materials around electrical panels or equipment disconnects
- Not cleaning tools and electrical equipment with solvents

Employees will report suspected hazards to their supervisors immediately. Employees are also responsible for performing daily visual inspections of all portable electric equipment to be used during that work shift.

6.3.4 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as applicable on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing required training.

Additionally, Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: Approach Distances for NCDOT Qualified Employees - AC

Voltage Range (phase to phase)	Minimum Approach Distance
300V and less	Avoid Contact
Over 300V, but less than 750V	1 ft. 0 in. (30.5 cm)
Over 750V, but less than 2kV	1 ft. 6 in. (46 cm)
Over 2kV	Not allowed for NCDOT

APPENDIX B: Specific Types of Work Practices

Conductive Materials and Equipment

Conductive materials and equipment (e.g., hand tools) will be handled to prevent contact with exposed energized conductors or circuit parts.

Conductive articles of jewelry and clothing (such as watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear) will not be worn.

De-energized Parts

All electrical parts exceeding 50 volts will be de-energized before an employee works on or near equipment unless:

- The de-energizing creates a more hazardous situation
- The equipment, by design, cannot be shut down

When any employee is exposed to direct or indirect contact with parts of fixed electrical equipment or circuits which have been de-energized, the electrical energy source will be locked out or tagged out or both.

Supervisors should refer to SPP# 1910.147 Control of Hazardous Energy (Lockout/Tagout), for guidance on these procedures.

Energized Parts

If work must be performed while equipment is energized, additional safety measures will be taken to ensure the safety of the employee.
Protection from energized parts will be suitable for the type of hazard involved. Supervisors should refer to SPP# 1910.137, Electrical Protective Devices, for additional detail.

Only Qualified Persons will be allowed to perform work directly on energized parts or equipment. Qualified Persons will be capable of working safely on energized circuits and will be familiar with special precautionary techniques, Personal Protective Equipment, insulating and shielding materials and insulated tools. Qualified Persons must also have received the training required in section 6.2.1 of this safety policy and procedure.

APPENDIX B: Specific Types of Work Practices (Continued) 2

Illumination

Employees will be provided with adequate light to work on energized equipment or equipment will be relocated to ensure adequate light is available. See SPP# 1926.56, Illumination, for additional details.

Portable Ladders

Portable ladders will have nonconductive surfaces if they are used where the employee or the ladder could be exposed to electrical shock hazards. See SPP# 1910.25, Ladders, for related information.

Reclosing Circuits

If circuits are tripped using a protective device such as ground fault circuit interrupter (GFCI), power will not be restored until the reason for the interruption is determined and corrected. Fuses or breakers will not be replaced or reset until it is determined that the circuit is safe to operate.

Fuses will not be replaced with higher rated fuses or with makeshift devices to bypass circuit protection as designed. Problems will be identified and promptly repaired by a qualified person.

Vehicular and Mechanical Equipment Near Overhead Power Lines

Overhead power lines will be de-energized and grounded before any work is performed by any vehicle or mechanical equipment near the energized overhead power lines. If the overhead lines cannot be de-energized, then the vehicle or mechanical equipment will be operated so that a clearance of 10 feet is maintained.

If the voltage of the overhead line exceeds 50 kV, the distance will be increased 4 inches for every 10 kV increase in power. If lines are protected with properly rated insulating devices, the distance may be decreased.

If the equipment is an aerial lift insulated for the voltage involved and if the work is performed by a Qualified Person, the clearance may be reduced to a distance given in Appendix A. See SPP# 1910.67, Aerial Truck Operations, and SPP # 1910.179, Cranes, for related information.

If protective measures such as guarding or isolation are provided, these measures must protect the employee from contacting such lines directly with any part of the body or indirectly through conductive materials, tools, or equipment.

Employees on the ground or in the vicinity of overhead lines will be instructed to remain clear of the equipment or any other source of energized equipment unless using properly rated Personal Protective Equipment.

Electrical Safety Checklist

Facility:_____

Checked By: _____

Date: _____

ELECTRICAL EQUIPMENT/ MACHINERY

All electrical equipment and machinery must be grounded effectively so that there is no potential difference between the metal enclosures. Use the voltage detector or other test equipment to find discrepancies to determine the corrective action required.

- ☐ All machine and equipment disconnects are properly and easily identifiable which the specific items they shut off.
- ☐ All machinery and equipment have been properly tested for adequate grounding.
- ☐ Disconnects are near their machines or equipment and easily accessible in an emergency.
- ☐ Disconnects have all been tested for operability and checked for damage.
- ☐ Insulation on all cord and cable electrical connections to equipment, machinery, tools, etc. have strain relief and are free of damage.
- ☐ Power cords to and from equipment, machines, and tools do not hang on pipes, nails, hooks, or other sharp edges.
- ☐ Power cords to and from equipment, machines, and tools have plugs with ground in good condition, and cords free from frays, damaged insulation, and/or manual electrical tape fixes.
- ☐ All electrical and service panels on equipment and machinery are free from damage and accessible for maintenance.
- ☐ All switches and breakers are labeled correctly for their respective machines.
- ☐ All non-working and broken equipment, machinery, and tools are properly locked out, tagged, and/or removed from service.

GROUND- FAULT CIRCUIT INTERUPTERS (GFCI)

Where there is an employee exposure to potential line to ground shock hazards, GFCI protection should be provided. Use your GFCI tester to be sure the GFCI is operable.

- ☐ GFCI's are in use in wet/damp places where portable electrical equipment is in use, and also in places that are frequented by the public.
- ☐ All electrical outlets with GFCI protection are labeled as such.
- ☐ All GFCI's have been tested at least monthly to confirm working condition.

LIGHTING/ RECEPTACLES

- ☐ Cord and plug connected lighting have been tested for proper grounding.
- ☐ All receptacles have been tested for proper wiring configuration using a receptacle tester.
- ☐ All cord strain relief have been checked for secure connections
- ☐ All electrical lighting with damaged/frayed cords and plugs have been replaced or removed
- ☐ All receptacle covers are in place and free from damage.
- ☐ Surface mounted receptacle boxes are properly protected from damage from mobile equipment.

APPENDIX C: Electrical Safety Checklist

ALL OTHER ELECTRICAL & MISCELANEOUS

- ☐ All drop cords and surge protectors are grounded and the plug is in good condition.
- ☐ All drop cords and surge protectors are free from burn marks, frays, or other noticeable damage.
- ☐ All circuit panels and service entrance panels have 3 feet of clearance in the front that is free of any Items and/or storage.
- ☐ All unused holes on knockout boxes are sealed with knockout plugs.
- ☐ All electrical equipment is located and/or stored in dry temperate conditions.
- ☐ There are no broken or damaged conduit running to or from any electrical units.
- ☐ All circuits in the breaker cabinet are labeled legibly and correctly.
- ☐ Electrical rooms have clean floors and are free from flammable items.
- ☐ Electrical rooms are adequately ventilated to account for heat load.
- ☐ Emergency lighting is present and in proper working condition
- ☐ There are no surge protectors connected end to end in a “daisy chain” manner.
- ☐ There are no flexible cords or drop cords being used in place of fixed wiring
- ☐ Conductors are free of abrasion at point of entry on all knockout boxes and electrical cabinets.

.

- ☐ Electrical rooms are restricted access only and labeled as such.
- ☐ Lockout/tagout hardware is available to employees for isolating machines, equipment, and tools from their energy sources.
- ☐ All metal pipes are electrically grounded, and the grounding electrode to the cold-water pipe has been checked for grounding.
- ☐ High voltage signs are hung where applicable.
- ☐ Extensions cords are in good condition.
- ☐ Extensions cords do not run through doors or wall openings.

APPENDIX D: Classified Locations

Class I Locations

Those locations in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures. Class I locations include the following:

Class I, Division 1

Those locations in which hazardous concentrations of flammable gases or vapors may exist under normal operating conditions; or in which hazardous concentrations of such gases and vapors may exist frequently because of repair or maintenance operations or because of leakage; or in which breakdown or faulty operation of equipment or processes might release hazardous concentrations of flammable gases or vapors, and might also cause simultaneous failure of electric equipment.

Class I, Division 2

Those locations in which volatile flammable liquids or flammable gases are handled, processed, or used, but in which the hazardous liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment.

Class II Locations

Those locations that are hazardous because of the presence of combustible dusts. Class II locations include the following:

Class II, Division 1

Those locations in which combustible dust is or may be in suspension in the air under normal operating conditions in quantities sufficient to produce explosive or ignitable mixtures; or where mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electric equipment, operation of protection devices, or from other causes; or in which combustible dusts of an electrically conductive nature may be present.

Class II, Division 2

Those locations in which combustible dust will not normally be in suspension in the air in quantities sufficient to produce explosive or ignitable mixtures, and dust accumulations are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus.

Class III Locations

Those locations that are hazardous because of the presence of easily ignitable fibers or flyings but in which such fibers or flying's are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures. Class III locations include the following:

Class III, Division 1

Those locations in which easily ignitable fibers or materials producing combustible flying's are handled, manufactured, or used.

Class III, Division 2

Those locations in which easily ignitable fibers are stored or handled, except in process of manufacture.

Excavation, Trenching and Shoring SPP# 1926.650

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to ensure that each North Carolina Department of Transportation (NCDOT) employee has the training and information needed to perform his or her job safely and effectively when working in or near trenches or other excavations.

2.0 Scope and Applicability

This safety policy and procedure affects any NCDOT employee whose job duties require entrance into trenches or excavation sites or inspections of such sites.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.650) Subpart P - Excavations.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards. This shall be accomplished through proper training and education of its workers and by eliminating as many hazards as possible from the jobsite. Employees working in or near trenches and excavations shall be provided training in recognizing and controlling unsafe conditions. All trenches and excavations shall be evaluated and monitored by a "competent" person prior to employees entering and continuously while employees work within. The "Competent Person" must be a Transportation Supervisor having the authority to take prompt corrective measures to eliminate unsafe conditions and not a Transportation Worker.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure that all phases of this procedure are implemented as prescribed in section 6.

6.0 Procedure

This section provides definitions, establishes general provisions and identifies specific responsibilities required by NCDOT's safety policy and procedure on Excavations, Trenching and Shoring. (Reference Appendix A for Procedure Flow Diagram.)

6.1 Definitions

Bell Bottom Pier Hole
A type of shaft or footing excavation, the bottom of which is made larger than the cross section above, resulting in a bell shape.

Benching
A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal steps, usually with vertical surfaces between levels.

Competent Person
One who is capable of identifying existing and predictable hazards in the working area and who has authority to take prompt corrective action to eliminate them.

Cross Braces
The horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.

Faces or Sides
The vertical or inclined earth surfaces formed as a result of excavation work.

Protective System
A method of protecting employees from trench collapse. This includes sloping, shoring, trench boxes or other systems of protection.

Ramp
An inclined walking or working surface that is used to gain access to one point from another and is constructed from earth or from structural materials such as steel or wood.

Shield System
A structure that is able to withstand the forces imposed on it by a cave-in and thereby protects employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields."

Shoring
A structure such as a metal hydraulic, mechanical or timber shoring system that supports the side of an excavation and which is designed to prevent cave-ins.

Sloping
A method of protecting employees from cave-ins by excavating all sides of an excavation to a stable incline. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable Rock
Natural solid mineral material that can be excavated with vertical sides and shall remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against cave- in or movement by rock bolts or by another protective system that has been designed by a Registered Professional Engineer (RPE).

Support System
A structure such as underpinning, bracing, or shoring the sides of an excavation.

Tabulated Data
Tables and charts approved by a Registered Professional Engineer and used to design and construct a protective system.

Trench
A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench at the bottom is not greater than 15 feet.

Uprights
The vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with, or interconnected to each other are often called "sheeting."

Wales
Horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members or earth.

6.2 General Provisions

The general elements of this program are found in OSHA standard 29CFR 1926.650 (Excavations), 651 (Special Excavation Requirements), 652 (Requirements for Protective Systems), and associated appendices. These elements are adopted for use by NCDOT as follows:

6.2.1 Surface Encumbrances

All surface encumbrances, such as trees, boulders, adjacent structures, utility poles, large equipment, etc. that are located so as to create a hazard to employees shall be removed or supported as necessary to safeguard employees against cave-ins.

6.2.2 Underground Installations

The location of utility installations that may be encountered during excavation work shall be determined prior to opening an excavation. If underground installations are uncovered, they shall be properly supported to protect employees.

6.2.3 Access and Egress

A stairway, ladder, ramp or other means of egress shall be located in any trench that is 4 feet or more in depth so as to require no more than 25 feet of lateral travel for employees.

Structural ramps that are used solely by employees as a means of egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed person qualified in structural design and shall be constructed in accordance with the design.

6.2.4 Vehicular Traffic

Employees exposed to public vehicular traffic in a work area shall wear a safety vest or other high visibility clothing meeting ANSI 107-2010 requirements for high visibility apparel.

6.2.5 Falling Loads

Employees are not permitted under any loads handled by lifting or digging equipment.

Employees shall stand away from any vehicle being loaded or unloaded.

6.2.6 Mobile Equipment

A warning system such as barricades, hand or mechanical signals or stop logs shall be used when mobile equipment is operated near the edge of an excavation and the operator does not have a clear and direct view of the edge.

6.2.7 Hazardous Atmospheres

Air quality tests shall be performed before employees enter any excavation where a hazardous atmosphere exists or could reasonably be expected to exist. Excavations or trenching in the vicinity of gasoline storage tanks, underground pipelines or sewer lines could reasonably be expected to cause a hazardous atmosphere.

Employees shall not enter any excavation that tests as having a hazardous atmosphere.

6.2.8 Water Accumulation

Employees shall not be allowed to enter excavations where water has accumulated unless precautions have been taken to protect employees against the water hazards.

6.2.9 Stability of Adjacent Structures

Support systems such as shoring, bracing or underpinning shall be used to provide stability whenever the stability of adjoining buildings, walls or other structures is endangered by excavation operations.

6.2.10 Employee Protection

Whenever loose rock or soil could pose a hazard to employees by falling or rolling into an excavation, an adequate means of protection shall be provided. Such protection shall consist of scaling to remove loose material, installation of protective barricades, or other means of equivalent protection.

Excavated material or equipment that could pose a hazard to employees by falling or rolling into an excavation shall be kept at least 2 feet from the edge or by the of

retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations..

Walkways or bridges with standard guard rails shall be provided whenever employees are required to cross over excavations. "Jump-overs" are prohibited.

6.2.11 Inspections

Prior to commencement of trenching and excavation, a job hazard assessment including a drawing of the planned slope of trench or excavation will be conducted. See Appendix C for examples of acceptable drawings which may be used. The job hazard assessment must be signed by a person ranking at least one level above the on-site supervisor.

Excavations and trenches shall be inspected by a competent person prior to the start of work and monitored continuously while employees are working within.

The competent person shall conduct an inspection whenever a hazard increasing event (such as a rainstorm) occurs.

Whenever a possible hazardous condition is detected, the competent person shall instruct exposed employees to immediately leave the excavation or trench until an adequate means of protection is provided.

6.2.12 Audits

Audits will be conducted by person one level above the on-site competent person. Feedback on number and results of these audits will be provided to Division Engineer at monthly safety meeting. The audit results will be utilized to fine tune future training and should be retained for 3 years. See Appendix E for Audit Form.

6.2.13 Training

Transportation Supervisors selected to be "competent" persons for NC DOT projects shall receive training on all sections of this procedure. Detailed training shall also be provided on:

- Hazards associated with trenching and excavation
- Class "C" soil
- Safe slopes for different soil types and conditions
- Proper installation of shielding and shoring
- Recognition of hazardous conditions caused by machinery, traffic, utilities and weather conditions

Annual competent person refresher training regarding updates or modifications of procedures, equipment, or policy shall be provided.

Trench hazard awareness training will be provided for all employees who encounter trenching and excavation. Refresher training on trenching and excavation will be provided on a periodic basis as needed. The training will be documented and retained for minimum period of 5 years.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for coordinating required training with Safety and Risk Management.

Sufficient employees shall be trained to provide a "competent" person at each excavation or trench covered by this standard.

Managers/Unit Heads shall ensure that the necessary testing equipment and shoring or shielding is budgeted for, acquired, and maintained as required by the level of excavation activity within their areas of responsibility.

6.3.2 Supervisors

Supervisors shall ensure that a "competent" person is in charge of each trench or excavation covered by this procedure. Specifically, each Bridge Crew, Maintenance Crew, Equipment Unit Crew, and Resident Engineer operation that involves a trench or excavation covered by this procedure shall have at least one competent person on site while work is being done.

6.3.3 Competent Persons

Each site covered in this procedure shall have a competent person who shall evaluate conditions and remain at the site as long as employees are working in the trench or excavation.

Competent persons shall be thoroughly familiar with this procedure.

The competent person shall evaluate the work site prior to excavation and determine what utilities shall be affected. Utility companies shall be notified at least 48 hours prior to starting work unless emergency conditions exist (811).

The competent person shall choose either sloping or shielding/shoring as the protective system. A slope of 1-1/2:1 or flatter shall be used if sloping is the protective system used. (Reference Appendices Table B-1)

The competent person shall inspect and document the condition of the trench or excavation and protective system prior to each workshift, throughout each work shift, and after a rainstorm or other hazard increasing event.

If a hazard is detected, the competent person shall not permit employees to enter or shall immediately remove employees from the trench or excavation until proper protective measures have been taken.

The competent person shall ensure that mobile equipment working near the edge of a trench or excavation has a positive warning system such as stop logs or hand signals.

The competent person shall ensure that testing with a multigas meter is conducted whenever the possibility of atmospheric hazards in the trench or excavation exists.

The competent person shall ensure that information on the site evaluation and protective system selected is available on-site.

6.3.4 Employees

Employees shall be responsible for reporting suspected unsafe conditions or equipment to the competent person.

Employees shall immediately evacuate any trench or excavation when they suspect a collapse is imminent or when directed to do so by the competent person.

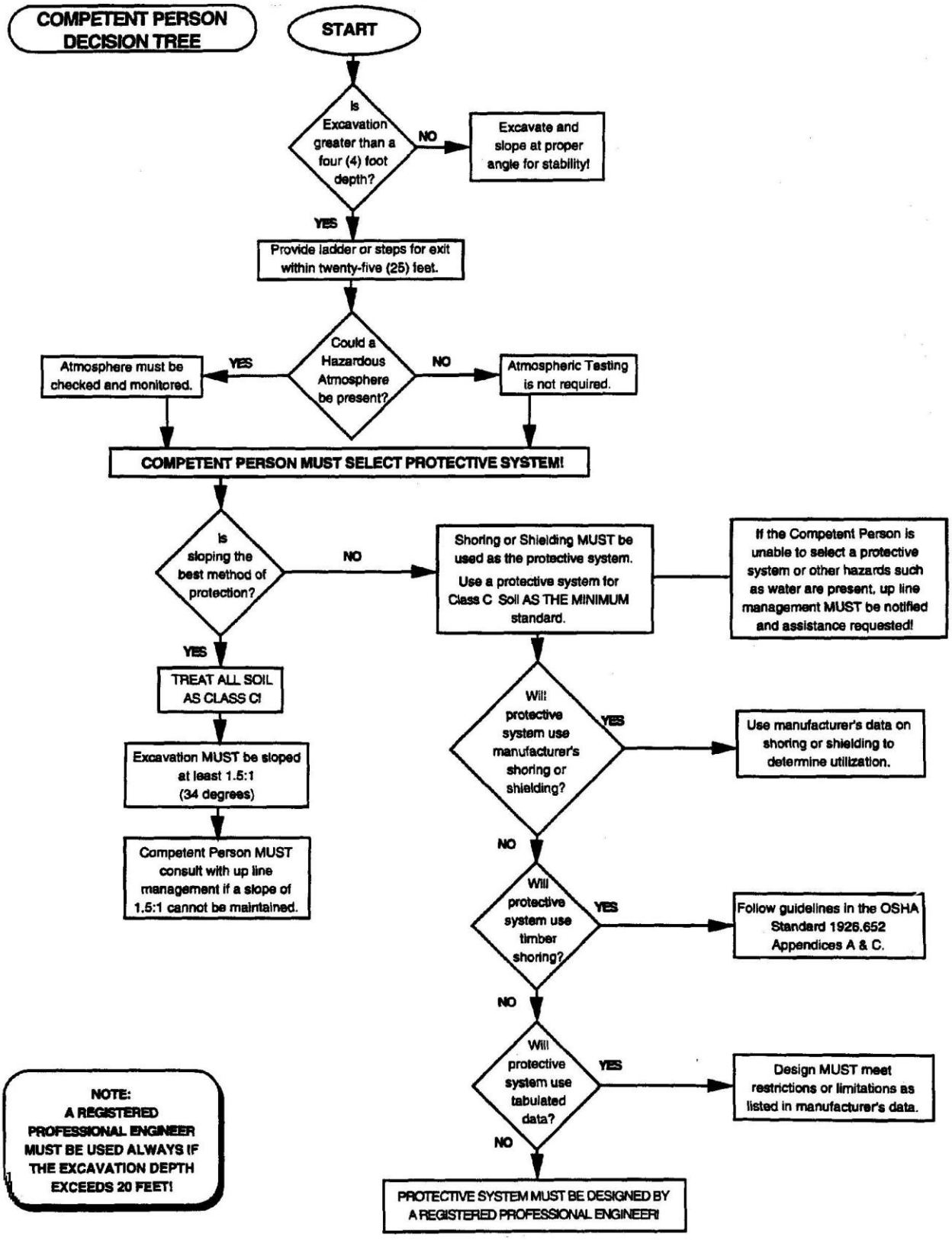
6.3.5 Safety and Risk Management

Safety and Risk Management shall conduct competent person training and coordinate related training.

Safety and Risk Management shall audit protective systems and atmospheric monitoring equipment.

Safety and Risk Management shall provide prompt assistance to managers/unit heads, supervisors, competent persons, the Central Equipment Unit, or others on any matter concerning this procedure.

APPENDIX A: Competent Person Decision Tree



APPENDIX B: Job Reminder Checklist

1. **Pre-Inspect Jobsite**
   What is the best protection method?(sloping/shoring/shielding)
   How likely are utilities?
   What additional equipment is necessary?
   Water removal? Air Monitoring? Ladders? Soil testing? Stop logs?

2. **Employee and Equipment Access**
   Employee ramp designed by Competent Person
   Equipment ramp designed by person qualified in structural design
   Exit means located within 25' of employees

3. **Determine Soil Conditions**
   All soil is to be classified as type "C" and proper employee protection used based on "C"
   Inspect excavation for changing soil conditions

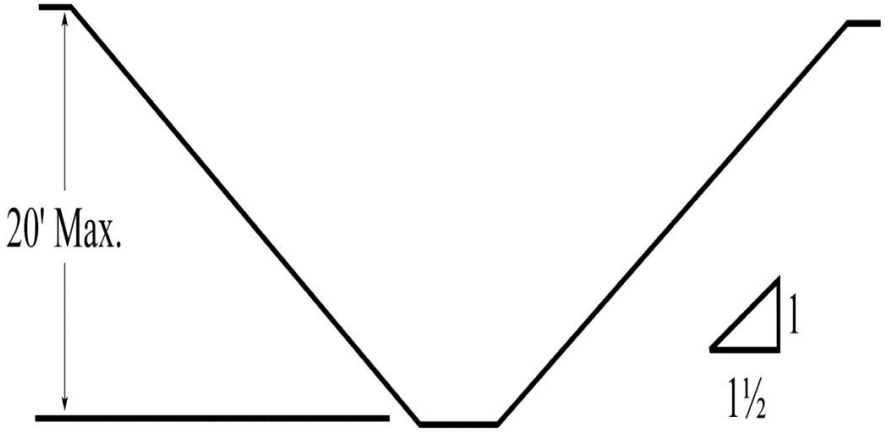
4. **Protection Systems**
   Appropriate protection system selected
   Installed according to manual or tabulated data
   Inspect equipment at start of shift
   Remove employee working outside protected area

5. **Monitor Environmental Conditions**
   Remove employees from trench where water is accumulating
   Monitor use of water removal equipment
   Monitor air quality levels if hazardous atmosphere is suspected

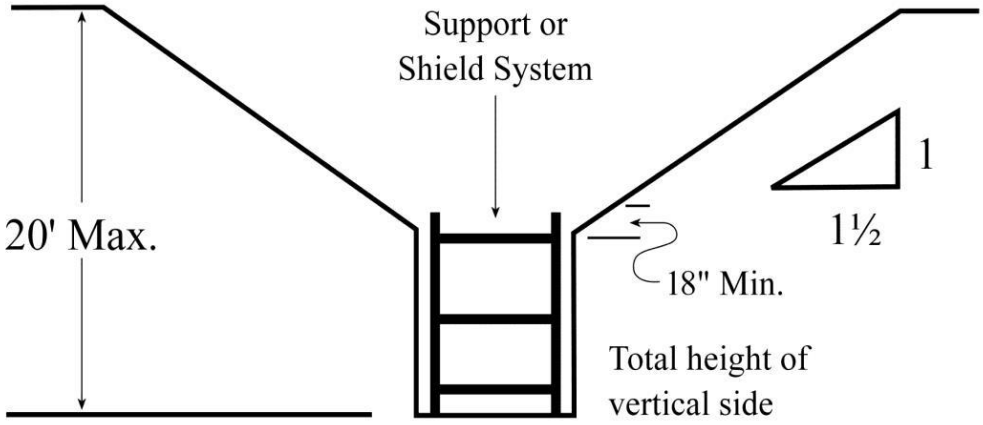
6. **Required to Consult with Registered Professional Engineer (RPE) When:**
   Trenches are over 20' deep
   Specifically designed shoring or bracing is required Excavation or trench endangers nearby structure Standard protection measures cannot be used

   May Consult with RPE When:
   Unusual or changing soil conditions exist or are anticipated
   Soil is unusually good and shoring reduction is required
   Soil is unusually poor and may require going to more protective system

APPENDIX C: Slope Configurations; OSHA Type "C" Soil



Simple Slope



Support or Shield System

APPENDIX D: Excavation Evaluation

Detailed Evaluation

1. All open trenches have been inspected?
2. All excavated soil was located at least 2 feet away from the edge of the trench?
3. Were any tension cracks observed along top of any slopes?
4. Were slopes cut at the proper angle for stability?
5. Was any water seepage noted in trench walls or trench bottom?
6. Was bracing system installed in accordance with design?
7. Was there evidence of shrinkage cracks in trench walls?
8. Was there any evidence of caving or sloughing of soil since the last field inspection?
9. Were there any zones of unusually weak soils or materials not anticipated?
10. Was there any evidence of significant fracture planes in soil or rock?
11. Were there any noted dramatic dips in bedrock?
12 All short-term trench(s) covered within 24 hours?
13. Trench box(s) certified?
    Shield Capacity in pounds per square foot?
14. Were hydraulic shores pumped to design pressure?
15. Type shoring being used_____secure?
16. Did shoring plan include adequate safety factor to allow for equipment actually being used?
17. Traffic in area adequately away from trenching operations with barricades?
18. Trees, boulders, or other hazards in area?
19. Vibrations from equipment or traffic too close to trenching operation?

APPENDIX E: Trenching/Excavation Audit Form

NCDOT TRENCHING/EXCAVATION AUDIT FORM					
Date:	**Time:**			**Auditor Name:**	
Division - County:	**Unit:**				
Worksite Location:	**Operation Being Audited:**				
Category	**Rating**			**Observations/Corrective Actions**	**Abatement Date**
	S	**U**	**N/A**	**S=Satisfactory, U=Unsatisfactory, N/A=Not Applicable**	**If corrective action required**
Excavation					
Inspected by Competent Person					
Excavated Soil 2' Away from Edge					
Slopes Cut Properly for Class C Soil (1 ½: 1)					
No Visible Tension Cracks @ top of Excavation					
No Evidence of Cracks in Trench Walls					
No Evidence of Caving or Sloughing of Soil					
Water Removal in Bottom of Trench Acceptable					
Hazards					
Vibration from Equipment, Pile Driving, or Traffic Too					
Traffic in Area adequately away from Excavation					
Overhead Hazards					
Trees, Boulders, or Loose Rock					
Water Removal in Bottom of Trench Acceptable					
Egress					
Means of Egress every 25'					
If Ladder used for Egress; extends 3' above surface					
Trench Box/Shoring					
Trench Box Certified					
Trench Box Shield Capacity Identified in Lbs./Sq. Ft.					
Trench Box extends 18" above vertical wall of trench					
Hydraulic Shores Pumped to Design Pressure					
ORM Tailgate Safety Meeting					
Identify Task					
Assess Hazards					
Identify Controls					
Perform Work w/ Controls					
Re-Assess					

APPENDIX F: Shoring Tables

TIMBER TRENCH SHORING — MINIMUM TIMBER REQUIREMENTS*

SOIL TYPE C P_a - 80 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES						WALES		UPRIGHTS					
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN.)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE				
4 TO 10	UP TO 6	6 X 8	6 X 8	6 X 8	8 X 8	8 X 8	5	8 X 10	5	2 X 6				
	UP TO 8	8 X 8	8 X 8	8 X 8	8 X 8	8 X 10	5	10 X 12	5	2 X 6				
	UP TO 10	8 X 10	8 X 10	8 X 10	8 X 10	10 X 10	5	12 X 12	5	2 X 6				
	See Note 1													
10 TO 15	UP TO 6	8 X 8	8 X 8	8 X 8	8 X 8	8 X 10	5	10 X 12	5	2 X 6				
	UP TO 8	8 X 10	8 X 10	8 X 10	8 X 10	10 X 10	5	12 X 12	5	2 X 6				
	See Note 1													
	See Note 1													
15 TO 20	UP TO 6	8 X 10	8 X 10	8 X 10	8 X 10	10 X 10	5	12 X 12	5	3 X 6				
	See Note 1													
	See Note 1													
	See Note 1													
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.

** Manufactured members of equivalent strength may be substituted for wood.

Note 1: Must be designed and approved by a Professional Engineer

APPENDIX F: Shoring Tables (Continued) 2

TABLE N-7

TIMBER TRENCH SHORING — MINIMUM TIMBER REQUIREMENTS*

SOIL TYPE C P_a - 80 X H + 72 psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN.)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE				
4 TO 10	UP TO 6	6 X 6	6 X 6	6 X 6	6 X 6	8 X 8	5	8 X 8	5	3 X 6				
	UP TO 8	6 X 6	6 X 6	6 X 6	8 X 8	8 X 8	5	10 X 10	5	3 X 6				
	UP TO 10	6 X 6	6 X 6	8 X 8	8 X 8	8 X 8	5	10 X 12	5	3 X 6				
	See Note 1													
10 TO 15	UP TO 6	6 X 8	6 X 8	6 X 8	8 X 8	8 X 8	5	10 X 10	5	4 X 6				
	UP TO 8	8 X 8	8 X 8	8 X 8	8 X 8	8 X 8	5	12 X 12	5	4 X 6				
	See Note 1													
	See Note 1													
15 TO 20	UP TO 6	8 X 8	8 X 8	8 X 8	8 X 10	8 X 10	5	10 X 12	5	4 X 6				
	See Note 1													
	See Note 1													
	See Note 1													
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

Note 1: Must be designed and approved by a Professional Engineer

APPENDIX F: Shoring Tables (Continued) 3

ALUMINUM HYDRAULIC SHORING WALER SYSTEMS FOR SOIL *TYPE C*

Depth of Trench (Feet)	Wales		Hydraulic Cylinders						Timber Uprights		
			Width of Trench (Feet)						Max. Horizontal Spacing (on Center)		
			Up to 8		Over 8 Up to 12		Over 12 Up to 15				
	Vertical Spacing (Feet)	Section Modulus (In³)	Horiz. Spacing	Cylinder Diameter	Horiz. Spacing	Cylinder Diameter	Horiz. Spacing	Cylinder Diameter	Solid Sheet	2 Feet	3 Feet
Over 4 Up to 10	4	3.5	6.0	2 IN	6.0	2 IN Note (1)	6.0	3 IN	3 X 12	—	—
		7.0	6.5	2 IN	6.5	2 IN Note (1)	6.5	3 IN			
		14.0	10.0	3 IN	10.0	3 IN	10.0	3 IN			
Over 10 Up to 15	4	3.5	4.0	2 IN	4.0	2 IN Note (1)	4.0	3 IN	3 X 12	—	—
		7.0	5.5	3 IN	5.5	3 IN	5.5	3 IN			
		14.0	8.0	3 IN	8.0	3 IN	8.0	3 IN			
Over 15 Up to 20	4	3.5	3.5	2 IN	3.5	2 IN Note (1)	3.5	3 IN	3 X 12	—	—
		7.0	5.0	3 IN	5.0	3 IN	5.0	3 IN			
		14.0	6.0	3 IN	6.0	3 IN	6.0	3 IN			
Over 20	NOTE (1)										

Note 1: Must be designed and approved by a Professional Engineer

APPENDIX G: Competent Person Guide to an OSHA Inspection

As a Competent Person for a NCDOT excavation, you should be prepared to discuss the trench configuration and associated information with an OSHA Inspector should one visit your operation. The following information is provided as guidance. Feel free to refer to this document and any other documentation during your conversation with the Inspector.

1. The OSHA Inspector must show his credentials.

2. You shall be asked about your length of experience in this occupation.

3. You shall be asked about your training as a competent person.

   Be prepared to identify when your last Competent Person training was conducted.

4. You shall be asked about your expertise in soils analysis.

   You should inform the OSHA Inspector of NCDOT's position that all soils are treated as Class C soils unless determined by supervision trained in soils classification. Use Appendix A of this procedure to demonstrate the decision process used in determining how to make the excavation a safe working environment.

5. You may be questioned about the protective systems especially if you are working with a trench box or are utilizing shoring at the work site.

   Explain the configuration and how the type protection was chosen.

6. You may be asked specific questions regarding 29CFR 1926.650, the OSHA standard on Excavation, Trenching and Shoring.

   Utilize this procedure as your reference for any questions which might arise.

7. You shall be asked if you as the Competent Person have the authority to take immediate corrective measures to eliminate existing and predictable hazard as well as the authority to stop work.

   As the Competent Person, you have this authority and should so state.

8. You shall be asked about inspections of the excavation you have performed.

   It is recommended that you maintain a log of all inspections performed as well as of any actions you have taken to reduce hazards. Inspections should be not only of the excavation but also of the adjacent areas and protective systems if they are being used for the specific job. Utilize Appendices B and C for these inspections.to an OSHA Inspection (Continued) 2

APPENDIX G: Competent Person Guide to an OSHA Inspection (Continued) 2

9. If water is present, you shall be asked about it.

   Explain what precautions have been taken to preclude water from creating a hazard. This may consist of de-watering equipment, repetitive inspection of de-watering operations or, where de-watering equipment is not used, constant monitoring of water/soil conditions.

10. If a structural ramp is in place for employees, you shall be asked about it.

    Explain its function, who designed and installed it, and how it was determined where it would be located.

11. If an equipment ramp is in place, you shall be asked if it was designed by a person qualified in structural design.

    Explain who designed the ramp and their qualifications.

12. You may be asked about air monitoring for oxygen deficiency or toxic gases.

    If you are using air monitoring equipment, explain your rationale for doing so. If not, explain why air monitoring is not required.

There are a variety of other questions that may arise during a conversation with an OSHA Inspector. Be sure you understand his questions and answer them truthfully. If asked questions which you cannot answer, try to find the answer for him/her.

Always attempt to notify your supervisor immediately when you are visited by an OSHA Inspector. Make detailed notes about any conditions or potential hazards the Inspector identifies to you. The quality of your notes at this time plays an important part in our being able to address any hazards identified in a timely manner.

Fall Protection SPP# 1926.500

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to identify fall protection controls to be used on construction projects by North Carolina Department of Transportation (NCDOT) employees to prevent falls from elevated walking/working surfaces 6 feet or more above a lower level.

2.0 Scope and Applicability

This policy and procedure sets forth minimum requirements for fall protection for NCDOT employees engaged in construction work on a walking/working surface 6 feet or more above a lower level. If work occurs in areas other than defined walking/working surfaces (e.g. trailers or shear rock cliffs) contact the Safety Engineer or Safety and Risk Management to develop specialized procedures. Fall protection, related to facility maintenance work or inspection work prior to or after a construction project is complete, is required for elevated walking/working surfaces 4 feet or more above a lower level.

This policy does not apply to mobile elevating work platforms (MEWPs), ladders, scaffolds, stairs, vehicles, or trailers; however, there are other safety policies and procedures that do address these items.

This safety policy and procedure provides minimum guidelines for the proper selection and use of conventional fall protection systems as well as fall protection plans. It also contains training provisions for fall protection.

This safety policy and procedure details the areas of responsibility for managers/unit heads, supervisors, qualified persons, competent persons, safety monitors, employees, Safety and Risk Management, Safety Consultants, and the Central Equipment Unit within NCDOT.

3.0 Reference

This safety policy and procedure is established in accordance with 29 CFR 1926.500 - 503, Fall Protection and incorporates parts of 1926.750 Steel Erection and 1926.701(b) Concrete and Masonry Construction. ANSI/ASSE Z359 Fall Protection Code is also referenced as recognized industry best practice.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees. When fall hazards exist that cannot be eliminated, then engineering practices, administrative practices, Personal Protective Equipment (PPE), and proper training regarding Fall Protection will be implemented.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Fall Protection. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are found in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure for Fall Protection.

6.1 Definitions

Active Fall Protection Systems
A fall protection system that requires authorized persons to wear or use fall protection equipment and that requires training.

Administrative Controls
Employer-mandated safe work practices or procedures that are designed to prevent exposure to a fall by signaling or warning an employee to avoid approaching a fall hazard.

Anchorage
A secure connecting point or a terminating component of a fall protection system or rescue system capable of safely supporting the impact forces applied by a fall protection system or anchorage subsystem.

Arrest Distance
The total vertical distance required to arrest a fall. The arrest distance includes the deceleration distance and activation distance.

Attachment Element
A connector integral to the body support that provides a point on the body harness to which other components or connecting subsystems may be attached. *The D-Ring is the most common attachment element.*

Authorized Person
A person assigned by the employer to perform duties at a location where the person will be exposed to a fall hazard.

Body Belt
A belt with 2 side D-rings made of synthetic materials. ***NCDOT employees shall not use body belts.***

Body Support (Harness)
An assembly of webbing arranged to support the human body for fall protection purposes, including during and after fall arrest.

Clearance
The distance from a specified reference point, such as the working platform or anchorage of a fall arrest system, to the lower level that a worker might encounter during a fall.

Clearance Requirement (Fall Arrest)
The distance below an authorized person that must remain clear of obstructions in order to ensure that the authorized person does not make contact with any objects that would cause injury in the event of a fall. The clearance requirement includes total fall distance; the deflection of anchorage and anchorage connectors; the length and elongation of the full body harness and the body; the vertical component of any swing fall and a clearance safety factor.

Competent Person
An individual designated by the employer to be responsible for the immediate supervision, implementation and monitoring of the employer's fall protection program who, through training and knowledge, is capable of identifying, evaluating and addressing existing and potential fall hazards, and who has the employer's authority to take prompt corrective action with regard to such hazards.

Connector
A component or element that is used to couple parts of the system together. A connector may be an independent component (such as a carabiner) of a system or it may be an integral element of a component, hybrid component, subsystem or system (such as a buckle or D-Ring sewn into a body support or a snap hook spliced or sewn into a lanyard or self-retracting lanyard). Connectors are sometimes referred to as hardware.

Controlled Access Zone
An area where certain types of work may take place without the use of guardrail systems, personal fall arrest systems, or safety net systems where access to and within the zone is controlled by a safety monitor. *Use of controlled access zones is not recommended and requires a project specific written fall protection plan.*

Deceleration Distance
The vertical distance between the user's fall arrest attachment at the onset of fall arrest forces during a fall, and after the fall arrest attachment comes to a complete stop.

Energy (Shock) Absorber
A component whose primary function is to dissipate energy and limit deceleration forces which the system imposes on the body during fall arrest.

Fall Arrest
The action or event of stopping a free fall or the instant where the downward free fall has been stopped.

Free Fall
The act of falling before a personal fall arrest system begins to apply force to arrest the fall.

Free Fall Distance
The vertical distance an employee travels before the fall arrest system begins to operate. The vertical distance is measured from the attachment point of the lanyard or lifeline on the employee's body harness before the onset of the fall to the point just before the fall arrest system begins to apply force to stop the fall. The distance measured does not include deceleration distance or lifeline/lanyard elongation but does include self-retracting lifeline/lanyard extension/slide distance before they grab or apply arrest forces.

Gate
The element of a connector that opens to receive an object and closes when released to retain the object.

Guardrail System
A passive system of horizontal rails and vertical posts that prevents a person from reaching a fall edge.

Harness (Full Body)
A body support designed to contain the torso and distribute the fall arrest forces over at least the upper thighs, pelvis, chest, and shoulders.

Hole
A gap or void 2 inches or more in its least dimension in a floor, roof, or other walking/working surface.

Lanyard
A component consisting of a flexible rope, wire rope, or strap, which typically has a connector at each end for connecting to the body support and to a fall arrester, energy absorber, anchorage connector or anchorage.

Leading Edge
The edge of a floor, roof, or formwork for a floor or other walking/working surface (such as a deck) which changes location as additional decking, floor, roof, or formwork sections are placed, formed, or constructed. A leading edge is considered to be an "unprotected side and edge" during periods when it is not actively and continuously under construction.

Lifeline
A component of a fall protection system consisting of a flexible line designed to hang either vertically (vertical lifeline), or for connection to anchorages or anchorage connectors at both ends to span horizontally (horizontal lifeline).

Low-Slope Roof
A roof that has a slope less than or equal to 4 in 12 (vertical to horizontal).

Lower Levels
An area or level below the working surface that an employee can fall to. These areas include but are not limited to, ground levels, floors, platforms, ramps, runways, excavations, pits, tanks, materials, water, equipment, structures, or portions of such surfaces.

Openings
Any opening or gap 30 inches or more high and 18 inches or more wide in a wall or partition through which an employee can fall through to a lower level.

Overhand Bricklaying and Related Work
The process of laying bricks and masonry units in a manner that the wall to be jointed is on the opposite side of the wall from the mason. This requires the mason to lean over the wall to complete the work. Related work includes mason tending and electrical installation incorporated into the brick wall during the overhand bricklaying process.

Personal Fall Arrest System
A system used to stop an employee in a fall from a working level. It consists of an anchorage, connectors, and a body harness and may include a lanyard, deceleration device, lifeline, or suitable combinations of these. *Body belts are not to be used as part of a personal fall arrest system.*

Positioning Device System
A body harness system rigged with lanyards 2 feet long that support an employee on an elevated vertical surface, such as a wall or reinforcing steel. This system allows an employee to work with both hands freely while leaning or being supported by the system.

Qualified Person
A person who by possession of a recognized degree, certificate or professional standing or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to fall protection.

Rope Grab
A deceleration device that travels on a lifeline and automatically, by friction, engages the lifeline and locks so as to arrest the fall of an employee.

Roof
The exterior surface on the top of a building that does not include floors or formwork that may temporarily become the top surface of the building while under construction.

Roofing Work
The hoisting, storage, application, and removal of roofing materials and equipment including related insulation, sheet metal, and vapor barrier work. It does not include the construction of the roof deck itself.

Safety Monitoring Systems
A safety system in which a competent person is responsible for recognizing and warning employees of fall hazards. Safety monitors are required to monitor entry into a controlled access zone as well as to monitor the safety of employees working in the controlled access zone.

Self-Retracting Lifeline/Lanyard
A deceleration device containing a drum-wound line which can be slowly extracted from or retract onto the drum under slight tension during normal employee movement. This device automatically locks the drum and stops the fall typically within 2 feet of the onset of the fall.

Snap hook
A connector comprised of hook-shaped member with a closed keeper which may be opened to receive an object such as a D-ring, and, when released, automatically closes to retain the object. Locking snap hooks have a self-closing, self-locking keeper which remains closed and locked until unlocked and pressed open for connecting or disconnecting. *Only locking snap hooks are permitted for use with fall arrest systems, travel restraint, and work positioning device systems.*

Steep Roof
A roof with a slope greater than 4 in 12 (vertical to horizontal).

Toeboard
A low protective barrier, that prevents material, equipment, and personnel from falling off of a working surface to a lower level.

Unprotected Sides and Edges
Any side or edge of a walking/working surface (except at entrances to points of access) such as a floor, roof, ramp, or runway where there is not wall or guardrail system at least 39 inches high.

Walking/Working Surface
Any surface, whether horizontal or vertical, on which an employee walks or works, including, but not limited to, floors, platforms, decks, roofs, ramps, bridges, runways, formwork, concrete reinforcing steel, and steel erection. It does not include ladders, stairs, and vehicles or trailers on which employees must be located in order to perform their job duties.

Warning Line System
A barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge. This line designates an area where roofing work on low slope roofs may take place without the use of a guardrail system, a personal fall arrest system or a safety net system. *Warning line systems are not recommended as a primary fall protection control.*

6.2 Fall Protection General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Hierarchy of Controls
- Training
- Safety Requirements for Elevated Walking/Working Surfaces
- Conventional Fall Protection Systems Criteria and Use
- Fall Protection Plans Criteria and Use

6.2.1 Hierarchy of Controls

When encountering potential fall hazards, elimination of the hazard shall always be the first measure of control. Elimination of a fall hazard can include reordering of a job process, replacement of equipment or job materials, performing an activity at ground level, or using equipment that doesn't require employees to work at a height greater than 6 feet.

If elimination is not feasible, then other means of controls should be considered in the following order of preference:

1. Elimination/Substitution
2. Guardrail System
3. Travel Restraint
4. Personal Fall Arrest System
5. Safety Net
6. Warning Line, Controlled Access Zone, & Safety Monitor

6.2.2 Training

There are three levels of employee fall protection training: Awareness, Authorized Person, and Competent Person.

Awareness Level
Employees with limited to no exposure to fall hazards and will not use fall protection PPE. Participants gain knowledge and skills necessary to identify and avoid hazards associated with elevated work locations.

Authorized Person

Employees exposed to fall hazards shall receive training regarding:

- Fall hazard recognition
- Fall prevention and control measures
- Applicable standards
- Responsibilities of designated persons under this policy
- Understanding fall protection and rescue plans
- Inspection, use, and care of fall protection equipment and systems

Authorized Person training shall be conducted by, at minimum, a competent person. This training should be completed before an employee begins working in an area where fall hazards exist. Retraining is recommended every two years, but shall occur when equipment, fall protection program, or job conditions change. Retraining should also occur if there is an indication or incident that suggests lack of knowledge or skill.

Competent Person

Training for NCDOT designated competent person shall include:

- Fall protection hierarchy of controls
- Applicable fall protection regulations and standards
- Surveying of fall hazards
- Responsibilities of designated persons under this policy
- Detailed inspection of equipment components and systems
- Fall protection system assessments and determining when a system is safe or unsafe for use
- Implementing fall protection and rescue procedures

Competent Person training shall be conducted by a designated employee who has completed a competent person train-the-trainer course. This training should be completed before an employee is assigned Competent Person duties. Retraining must occur every two years or when equipment, fall protection program, or job conditions change. Retraining should also occur if there is an indication or incident that suggests lack of knowledge or skill.

6.2.3 Safety Requirements for Elevated Walking/Working Surfaces

When working at heights 6 feet or greater above a lower level, employees must be protected from falling by using one or more fall protection systems.

Each type of walking/working surface presents different challenges and hazards. The following is a discussion of the different types of walking/working surfaces and the safety requirements for each.

All surfaces: Structural Integrity

Prior to beginning work on any elevated walking/working surface, the structural integrity and strength of the surface must be evaluated at minimum by a competent person, to determine if it is sufficient to support both the worker(s) and any needed equipment.

Unprotected Sides and Edges
Each employee on a walking/working surface with an unprotected side or edge which is 6 feet or more above a lower level shall be protected from falling by guardrail systems, travel restraint system, and/or personal fall arrest systems.

Leading Edge
Each employee who is constructing a leading edge 6 feet or more above lower levels shall be protected from falling by guardrail systems, travel restraint system, and/or personal fall arrest systems.

Each employee on a walking/working surface where leading edges are under construction, but *who is not engaged* in the leading-edge work, may be protected by a fall protection plan and controlled access zone. Guardrail systems and fall protection PPE are preferred.

Bridge
Each employee working on a bridge shall be protected from falling 6 feet or more to a lower level by a guardrail system, travel restraint system, or personal fall arrest system. NCDOT has evaluated portable clamp-on bridge guardrail systems for temporary bridge work and identified three that perform well on the majority of bridges within North Carolina. The top three recommended models include:

- The Bodyguard Rail
  - Model #CC120
  - Model #MCC130
- ParaClamp by BlueWater

Hoist Areas
Each employee in a hoist area shall be protected from falling 6 feet or more to a lower level by a guardrail system, travel restraint system, or personal fall arrest system. If the guardrail systems are removed to facilitate the hoisting operation and the employee must lean out over the edge of the access opening; then that employee shall be protected from fall hazards by a travel restraint system or personal fall arrest system.

Holes
All holes will be protected to prevent employees from tripping or falling through. These covers are also used to prevent objects from falling through to lower levels. These covers must be capable of supporting twice the weight of a worker, equipment, or load that may be imposed on the cover. All covers shall be secured to prevent disengagement and shall be marked with the word “HOLE” or “COVER.”

If covering a hole is infeasible (e.g. skylights), cages, guardrail systems, travel restraint systems, or personal fall arrest systems may be used.

Formwork and Reinforcing Steel
Each employee on the face of formwork or reinforcing steel shall be protected from falling 6 feet or more to lower levels by personal fall arrest systems and/or work positioning device systems.

All protruding reinforcing steel that an employee could fall onto or into shall be guarded or covered to eliminate the hazard of impalement.

Ramps, Runways, Headwalls, and Other Walkways
Each employee on ramps, runways, and other walkways shall be protected from falling 6 feet or more to lower levels by guardrail systems.

Excavations, Caissons, Pits, Shafts
Each employee at the edge of an excavation 6 feet or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barriers.

Each employee at the edge of a caisson, pit, shaft, or similar opening 6 feet or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers.

Steel Erection
Each employee working on steel erection projects shall be protected from falls of 6 feet or more by the use of a guardrail system, work positioning system, travel restraint system, and/or personal fall arrest system.

Overhand Bricklaying and Related Work
Employees engaged in overhand bricklaying and related work 6 feet more above lower levels shall be protected by a guardrail system, travel restraint system, and/or a personal fall arrest system, or, if justified, a controlled access zone as outlined by a job specific fall protection plan.

Any employee engaged in overhand bricklaying work 6 feet more above lower levels, where they must reach 10 inches or more below the level of the walking/working surface on which they are working, shall be protected by a guardrail system, personal fall arrest system.

Roofing

- **Low-slope roofs (Slope less than 4 in 12)**
  Each employee engaged in roofing activities on low-slope roofs, with unprotected sides and edges 6 feet or more above lower levels shall be protected from falling by guardrail systems, travel restraint system, or personal fall arrest system. If all of these measures are determined infeasible a safety net, warning line system, and safety monitoring system may be considered with a specific fall protection plan.

- **Steep roofs (Slope greater than 4 in 12)**
  Each employee on a steep roof with unprotected sides and edges 6 feet or more above lower levels shall be protected from falling by using a guardrail system with toeboards, travel restraint system, or a personal fall arrest system.

Pre-Cast Concrete Erection

Each employee engaged in the erection of pre-cast concrete members (including, but not limited to the erection of bridge beams and columns) who is 6 feet or more above lower levels shall be protected from falling by either a guardrail system, travel restraint system, or a personal fall arrest system. If, however, a qualified person, can demonstrate that it is infeasible or creates a greater hazard to use these systems, then the qualified person shall develop and implement a specific fall protection plan.

Wall Openings

Employees working on, at, above or near wall openings, including those with chutes attached, where the outside bottom edge of the wall openings is 6 feet or more above a lower level and the inside bottom edge of the wall opening is less than 39 inches above the walking/working surface, shall be protected from falling by either a guardrail system, a personal fall arrest system or a safety net system.

6.2.4 Fall Protection Systems, Criteria and Use

The conventional fall protection systems used by most workers include guardrail systems, travel restraint systems, personal fall arrest systems. Guardrail systems offer a passive barrier to prevent falls and should be considered first when selecting a fall protection system. Travel restraint systems prevent an employee from falling by restricting access to a fall point. Personal fall arrest systems do not prevent falls but are designed to arrest a fall, thereby preventing an employee from striking a lower level.

In addition to the systems mentioned above, work positioning device systems are allowed for specific operations (namely vertical walking/working surfaces). Warning line systems and safety nets are allowed for some types of work but are not recommended due to the complexity of installation and maintenance required.

Each of these systems and the requirements for each are outlined in the following sections.

6.2.4.1 Guardrail Systems

Guardrails must contain a top-rail, mid-rail, post, and possibly a toeboard. Toeboards are required when employees or others are below a walking/working surface and there is a potential for material, equipment, or tools to fall below. *Under no circumstances should an employee climb onto a guardrail or use a guardrail as a fall arrest anchor point.*

Guardrails must meet the following requirements:

Strength: Guardrail systems shall be capable of withstanding, without failure, a minimum of 200 lbs. applied within 2 inches of the top edge of the top rail in any direction. Mid-rails must be capable of withstanding 150 lbs. applied in any direction along the mid-rail.

Materials: The following material specifications shall be followed when constructing guardrails:

- **Wood**: (construction grade lumber)
  Top Rail & Post: 2x4
  Mid-rail: 2x4
  Toeboard: 1x4
- **Wire Rope:** Minimum ¼ inch wire rope with flags every 6 ft. Manila, plastic, or synthetic rope shall not be used for top rails or mid-rails.
- **Metal Pipe:** All rails & post schedule 40 pipe with a minimum diameter of 1 ½ inch.
- **Structural Steel:** All rails & post, 2 inch by 2 inch by 3/8 inch angles

Post Spacing All materials listed above: 8 feet on center.

Height Requirements:

- **Top Rail:** Must be 42 inches plus or minus 3 inches above the walking/working surface.
- **Mid-Rail:** Must be midway between the top rail and the walking/working surface.
- **Toe Board:** Must be at least 3 ½ inches tall, with no more than ¼ inch clearance above the walking working surface.

6.2.4.2 Travel Restraint & Work Positioning Systems

Travel Restraint Systems

A travel restraint system is not to be confused with a personal fall arrest system. A travel restraint system is designed to allow an employee to work on a walking/working surface that is flat or less than 4:12 slope while restricting access to the fall point.

A full body harness with either a lanyard or self-retracting lanyard (SRL) that is sized and/or adjusted to limit the user from reaching the fall point. *Body belts are not allowed for use as part of a travel restraint system at NCDOT.*

A personal fall arrest system shall be used if the worker is exposed to falling 6 feet or more to a lower level while traveling to the surface where a travel restraint system will be used.

Each component of a travel restraint system is vital and dependent on all elements. For this reason, the requirements for the system and each component are discussed in the following sections:

System Requirements

- The strength requirements for the travel restraint system as outlined in this section are limited to employees whose combined tool and body weight is less than 310 lbs. (ANSI) and/or the manufactures weight rating. It is important to ensure the full body harness and connecting device are equally rated.
- The travel restraint system shall be designed and installed to not allow the user to reach the fall point.

Anchorage

Anchorages selected for restraint systems shall have a strength capable of sustaining static loads applied in the directions permitted by the system.

Anchorages must be capable of supporting at least 1,000 lbs. for non-certified anchorages or at least two time the foreseeable force for certified anchorages.

Connectors

Connectors shall be drop forged, pressed, or formed with a corrosion-resistant finish and a minimum tensile strength of 5000 lbs. and a gate rated to 3,600 lbs. All surfaces should be smooth to prevent damage to interfacing parts of the system.

Snap hooks shall:

- Be self-locking and double actuated
- Never be connected together
- Not be connected to any object that is not dimensionally compatible or that does not allow the snap hook to fully lock closed.

Lanyards & SRL's

- Lanyards and SRL's shall have a minimum tensile strength of 5000 lbs.
- Lanyards and SRL's shall only be used in travel restraint systems if the total deployment length of the lanyard does not permit the user to reach and be exposed to a fall hazard.
- Should include a visual load indicator to indicate the need to remove from service.

Full Body Harness

- Each employee shall be fitted with an approved full body harness that should fit correctly without slack in the straps and an appropriate weight rating.
- The dorsal D-ring shall be used for travel restraint.
- Should include a visual load indicator to indicate the need to remove from service.
- Recommend all full body harnesses be equipped with rescue straps to reduce the effects of suspension trauma in the event of a fall.

Inspection Requirements

All parts of the travel restraint system (hardware, webbing, stitching, & labels) shall be inspected by the authorized user prior to use for signs of fraying, corrosion, burns, and overall condition. Annual documented inspection by a competent person is required for all components of a travel restraint system, unless otherwise specified by the manufacture.

All components of a travel restraint system that have been damaged, deployed, or have reached an end of service life date shall be removed from service immediately.

Work Positioning Systems

Work positioning system holds the user in place while allowing for hands free work. A typical work positioning set-up consists of full body harness with side D-rings, a "y" type connecting device consisting of two snap hooks and a short piece of webbing or chain with a larger rebar snap hook attached between them to connect to the anchorage. Although work positioning should not allow the user to fall it is required to have a backup personal fall arrest system at all times.

6.2.4.3 Personal Fall Arrest Systems

A personal fall arrest system is designed to arrest and stop a falling employee from contacting a lower level. It consists of an anchorage, body harness, and connecting device. *Body belts are **not** to be used as part of a personal fall arrest system.*

Each component of a personal fall arrest system is vital. The success of the system to arrest and then stop an employee that has fallen is dependent on all elements of the system. For this reason, the requirements for the system and each component are discussed below.

System Requirements

- The strength requirements for the personal fall arrest systems as outlined in this section is limited to employees whose combined tool and body weight is greater than 130 lbs. and less than 310 lbs. or otherwise specified by the fall protection equipment manufacture.

- The system shall be designed to limit the free fall of an employee to 6 feet, and limit the arresting force on an employee's body to at a maximum 1,800 lbs. *There are SRL's and energy absorbing lanyards that will reduce the maximum arresting force to a safer 900 lbs.*

- Self-rescue after a fall while using a personal fall arrest system is not a rescue plan. The competent person needs to establish a rescue plan specific for each job site where fall protection systems are in place. Relying on emergency services is not enough. These plans may include the use of a simple extension ladder, a MEWP, or possibly the crew has been trained in the use of controlled decent rescue devices. All employees involved in the rescue plan need to be trained on the rescue plan and rescue equipment.

All Components

- **Inspection Requirements**
  All parts of the personal fall arrest system (hardware, webbing, stitching, & labels) shall be inspected by the authorized user prior to use for signs of fraying, corrosion, burns, and overall condition. Annual documented inspection by a competent person is required for all components of a personal fall arrest system, unless otherwise specified by the manufacture.

  All components of a personal fall arrest system that have been damaged, deployed, or have reached an end of service life date shall be removed from service immediately.

  A competent person will either send back to manufacture for replacement or destroy the components. This includes the anchor point, connecting device (SRL/Lanyard), and full body harness.

Anchorage

The selection of adequate anchorage points is critical. Anchorages must be capable of supporting at least 5,000 lbs. per employee attached or designed by a qualified person to at least two times the maximum arresting for certified anchorages.

Anchorages used for attachment of personal fall arrest systems shall be independent of any anchorage being used to support or suspend platforms.

Horizontal Lifelines

Horizontal lifelines shall be designed and certified by a qualified person with experience and training in designing and using horizontal lifeline systems. Non-certified anchorages shall not be used for horizontal lifelines. *It is recommended to only use engineered horizontal lifelines in accordance with the manufacture's instructions.*

If the lifeline is supported with stanchions or post between anchorage's, that do not allow the snap hook on a lanyard to pass freely by the stanchion or post, then two lanyards/SRL's must be used to maintain 100% tie off.

Vertical Lifelines

Vertical lifelines shall have a minimum breaking strength of 5000 lbs. and shall only support one worker per line.

Connectors

Connectors shall be drop forged, pressed, or formed with a corrosion-resistant finish and a minimum tensile strength of 5000 lbs. and a gate rated to 3,600 lbs. All surfaces should be smooth to prevent damage to interfacing parts of the system.

Snap hooks shall:

- Be self-locking and double actuated
- Never be connected together
- Not be connected to any object that is not dimensionally compatible or that does not allow the snap hook to fully lock closed.

SRL's & Lanyards

- Lanyards and SRL's shall meet minimum strength of 5,000 lbs.
- Must have an energy absorber that does not exceed 1,800 lbs. of arresting force. *There are SRL's and energy absorbing lanyards that will reduce the maximum arresting force to a safer 900 lbs.*
- Ensure the lanyard and SRL are the proper length for the application and fall clearance needed.
- Standard SRL's and lanyards are weight rated for 130 lbs. to 310 lbs. Anything outside of this standard range needs to be certified by the fall protection manufacture.
- Should include a visual load indicator to indicate the need to remove from service.

Body Harness

- Each employee shall be fitted with an approved full body harness that should fit correctly without slack in the straps and an appropriate weight rating.
- Must include a load bearing pelvic strap, strap retainers, and lanyard parking attachment with a maximum breaking strength of 120 lbs.
- Must include a visual load indicator to indicate the need to remove from service.
- Must include a dorsal D-ring that should be centered at the base of the user's neck.
- Side or chest D-rings are not to be used for fall arrest.
- Recommend all full body harnesses be equipped with rescue straps to reduce the effects of suspension trauma in the event of a fall.

6.2.4.4 Warning Line Systems

Employees performing low slope roofing work with unprotected sides and edges 6 feet or more above lower levels may use the warning line system in conjunction with the following systems:

- Guardrail system
- Personal fall arrest system
- Safety Monitoring system

A warning line system is designed to provide an isolated zone around all edges of the roof work area. The warning line system must comply with the following:

System requirement:
Only employees performing roof work shall be allowed in the area between the roof edge and the warning line system. If a safety monitoring system is used, employees must comply with the directions of the safety monitor.

Strength:
The warning line shall have a minimum tensile strength of 500 lbs.

Materials:

- Warning lines consist of ropes, wires, or chains and supporting stanchions flagged with high visibility tape every 6 feet.
- The lowest point of the line, including sag, can be no less than 34 inches from the walking/working surface.
- The highest point in the line can be no more than 39 inches from the walking/working surface.
- The stanchions shall be capable of resisting without tipping, a force of 16 pounds applied perpendicular to the line and horizontally against the stanchion 30 inches above the walking/working surface.
- Lines shall be attached to the stanchion such that pulling on one section will not result in slack being taken up in adjacent sections before the stanchion tips over.

Layout

- Warning lines shall be erected no less than 6 feet from the roof edge when no mechanical equipment is in use.
- If mechanical equipment is being used, the warning line must be erected as follows:
  - Lines perpendicular to the direction of travel must be 10 feet from the roof edge
  - Lines parallel to the direction of travel must be 6 feet from the roof edge.
- Access Points, material handling areas, storage areas and hoisting areas shall be connected to the work area by 2 warning lines and, when not in use, shall be barricaded by an equivalent material to prevent a person from walking directly into the work area.

6.2.4.5 Safety Net Systems

Safety nets are designed to catch a falling worker, tools and/or debris before they reach a lower level. Safety net systems are not used by NCDOT; however, private contractors occasionally may use them. If a contractor is using a safety net system and a NCDOT employee will be using this system as a fall protection system, contact your safety engineer for assistance.

6.2.5 Fall Protection Plans, Criteria and Use

Fall protection plans are only available to workers engaged in leading edge work or precast concrete erection work and who can demonstrate that it is not feasible or that a greater hazard is created when conventional fall protection systems are used.

A fall protection plan, must conform to the following provisions:

- A written fall protection plan shall be prepared by a qualified person and developed specifically for the site where the leading edge or precast concrete erection work will take place.
- The plan must be updated when any changes are made.
- The qualified person must approve any changes to the plan.
- A copy of the plan with any approved changes must be onsite.
- Implementation of the plan shall be under the supervision of a competent person.
- If an employee falls, or some other serious event occurs, the circumstances of the fall or event shall be investigated to determine if the fall protection plan needs to be changed. If changes are needed, they shall be implemented to prevent similar types of falls or incidents.

6.2.5.1 Documentation Requirements

The fall protection plan shall include the following documentation in detail:

- Why conventional fall protection systems are not feasible or why their use creates a greater hazard.
- The fall hazards in the work area and a discussion of other measures that will be taken to reduce or eliminate the fall hazard for workers who will work under the plan.
- The specific location where conventional fall protection methods cannot be used. These locations will immediately be classified as controlled access zones and the criteria for controlled access zones and Safety Monitor Systems will be in effect.
- The plan must contain the names of employees designated to work in the controlled access zone. No other employee may be in the controlled access zone.
- The plan must contain the name of the safety monitor.

6.2.5.2 Training

Employees working under a fall protection plan shall be trained on the following:

- The fall protection plan for the work site
- The fall hazards in the work area
- Avoidance of fall hazards
- Recognition of unsafe practices or working conditions
- The function, use and operation of the controlled access zone and the safety monitoring system
- The correct procedure for erecting, maintaining or disassembling of the system used

6.2.5.3 Controlled Access Zones

Controlled access zones may be used as part of a fall protection plan or when over-hand bricklaying work is taking place. Only employees engaged in work inside the controlled access zone are permitted in the zone.

Controlled access zones shall be defined by a control line or any other means that restricts access. The requirements for Control lines are as follows:

Strength:
Control lines shall have a minimum breaking strength of 200 lbs.

Materials:

- Control lines consist of ropes, wires, or tapes or equivalent materials and supporting stanchions flagged with high visibility tape every 6 feet.
- Each line shall be rigged and supported so that its lowest point is not less than 39 inches from the walking/working surface and its highest point in not more than 45 inches. (For overhand bricklaying the highest point should not exceed 50 inches.)

Control Line Layout

- Control lines shall extend along the entire length of the unprotected or leading edge and shall be approximately parallel to that edge, except for overhand bricklaying work.
- Each end of the control line shall be connected to a guardrail system or wall, except for overhand brick laying work.
- For leading edge work:
  The control line shall be erected no less than 6 feet but no more than 25 feet from the unprotected side or leading edge.

For precast concrete member work:
The control line shall be erected no less than 6 feet but no more than 60 feet or half the length of the member being erected whichever is less, from the unprotected side or leading edge.

For overhand bricklaying and related work:

- The control line shall be erected no less than 10 feet but no more than 15 feet from the working edge.
- The control line shall extend a sufficient distance to enclose all employees performing overhand bricklaying and related work at the working edge.
- The control line shall be approximately parallel to the working edge.
- Additional control lines shall be erected at each end of the work area, to enclose the controlled access zone.

6.2.5.4 Safety Monitoring System

A safety monitoring system is a fall protection procedure in which a competent person is responsible for recognizing and warning employees of fall hazards while working near unprotected sides or edges, classified as controlled access zones. It is used as part of a fall protection plan or can be used when overhand bricklaying is taking place. This system relies on the ability of the monitor to see all employees working in the controlled access zone, the worker to hear the safety monitor and the timely reaction of the employee to such warnings. Safety monitoring systems shall meet the following requirements:

- Only a competent person shall be designated as a Safety monitor.
- A competent person shall warn employees when it appears that the employee is unaware of a fall hazard or is acting in an unsafe manner.
- The safety monitor shall be on the same walking/working surface, within visual sight distance and close enough to communicate orally with employees in the controlled access zone.
- A safety monitor shall not have any other responsibilities, which could take their attention away from employees working in the controlled access zone.
- Each employee working in a controlled access zone shall immediately follow all directions and/or warnings from the safety monitor regarding fall hazards.
- Mechanical equipment shall not be used or stored in areas where a safety monitoring system is being used to monitor employees engaged in low slope roof activities.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will ensure adequate funds are available and budgeted for the purchase of fall protection equipment and training in their areas. They will also identify the employees affected by this safety policy and procedure as well as ensure that qualified and competent persons are available. Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will communicate appropriate needs to managers/unit heads and consult with a qualified/competent person regarding fall protection systems.

Supervisors will not allow any employee who has not received the required training to be exposed to a fall hazard greater than 6 feet and will ensure that employees are provided with the PPE necessary for their job. Supervisors will ensure that a competent person is managing fall protection.

6.3.3 Qualified Person

A qualified person shall, through education, professional certification in a related field or both, have knowledge and understanding of applicable fall protection regulations, standards, equipment and systems, physical sciences, engineering principles, and mandatory requirements for fall protection equipment and systems used by the employer. The qualified person shall meet the qualifications of a competent person.

Qualified person will be responsible for supervising the design, installation, selection, or approval of anchorage points or any horizontal lifeline systems.

6.3.4 Competent Person

The competent person shall be responsible for the immediate supervision, implementation, and monitoring of the fall protection program. Competent persons are responsible to anticipate, recognize, and evaluate workplace fall hazards and have the authority to taking prompt corrective action.

6.3.6 Employees

Employees shall attend appropriate training and comply with all applicable guidelines contained in this safety policy and procedure. Report all near misses, unsafe acts, unsafe conditions, and fall incidents to supervision.

6.3.7 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, and others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing required training. Safety and Risk Management will also work with Purchasing and Central Equipment Unit to ensure that all newly purchased fall protection equipment and PPE complies with current safety regulations and this safety policy and procedure.

6.3.8 Safety Engineers

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

6.3.9 Central Equipment Unit

Central Equipment Unit will be responsible for ensuring that purchased equipment meets or exceeds current safety regulations.

Bloodborne Pathogens SPP#1910.1030

Quick Reference

1.0 Purpose

The purpose of this document is to eliminate or minimize employee occupational exposure to blood or certain other body fluids and to fully comply with the referenced OSHA Bloodborne Pathogens Standard.

2.0 Scope and Applicability

This safety policy and procedure affects all North Carolina Department of Transportation (NCDOT) employees that, as a result of performing their job duties, are "reasonably anticipated" to come into contact with bodily fluids or other contaminated sources/materials.

3.0 Reference

This safety policy and procedure is established in accordance with 29 CFR 1910.1030 of the Occupational Safety & Health Act.

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. When hazards exist that cannot be eliminated, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Bloodborne Pathogens will be implemented according to the referenced OSHA standard. This safety policy and procedure will include Exposure Control Plan and is not limited to the Hepatitis B Virus (HBV) and Human Immune Deficiency Virus (HIV) which causes AIDS. NCDOT will ensure that those employees who are exposed to bloodborne diseases are provided with confidential, fair, and equal treatment.

5.0 General and Specific Responsibilities

It is the responsibility of each manager/unit head, supervisor and employee to ensure implementation of NCDOT's safety policy and procedure on Bloodborne Pathogens. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor.

5.1 Supervision

It is the responsibility of NCDOT to provide accurate and timely information to employees concerning exposure, identification of labels and signs, proper use of PPE, and safeguards to prevent infection. Those who supervise others within NCDOT will ensure that all affected employees receive the applicable Bloodborne Pathogen training listed in LMS for their Unit.

5.2 Employees

NCDOT employees whose primary job may expose them to Bloodborne Pathogens must receive initial and annual training concerning exposure, identification of labels and signs, proper use of PPE, and safeguards to prevent infection. Those who supervise these employees will ensure that all affected employees receive Bloodborne Pathogen training. The appropriate LMS online course "OSHA – Bloodborne Pathogens (Vivid)" should be assigned to affected employees. Classroom Bloodborne Pathogen listed in LMS may also be used.

5.3 Safety & Risk Management

Safety and Risk Management will provide prompt assistance to Managers/Unit Heads, Supervisors and others as necessary on any matter concerning this safety policy and procedure.

Division Safety Engineers, Consultants, and Officers will provide consultative assistance within their respective division to ensure the effective administration of this safety policy.

6.0 General Provisions

- Definitions
- Exposure Determination and Exposure Control Plan
- Engineering and Work Practice Controls
- Disposal of Contaminated Materials
- Training Requirements
- Pre-Exposure Vaccinations
- Post-Exposure Vaccinations
- Recordkeeping
- Confidentiality

6.1 Definitions

Blood
Blood means human blood, human blood components, and products made from human blood.

Bloodborne Pathogens
Pathogenic microorganisms that are present in human blood and can cause disease in humans. These pathogens include, but are not limited to, Hepatitis B Virus (HBV) and Human Immune Deficiency Virus (HIV).

Bodily Fluids
Bodily fluids include but are not limited to blood, semen, vaginal fluids, saliva, vomit, amniotic fluid, or other body fluids that contain blood.

Contaminated
The presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.

Contaminated Sharps
Any contaminated object that can penetrate the skin including, but not limited to, needles, scalpels, broken glass, broken capillary tubes, and exposed ends of dental wires.

Decontamination
The use of chemical or physical means to remove, inactivate, or destroy bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles and the surface or item is rendered safe for handling, use, or disposal.

Disinfectant
An EPA approved agent that disinfects by destroying, neutralizing, or inhibiting the growth of harmful microorganisms. The most common disinfectant is a solution of at least 10 percent chlorine bleach mixed with water.

Occupational Exposure Incident
Skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious material that may result from the performance of an employee's duties.

Other Potentially Infectious Materials
Human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids.

Parenteral
Piercing mucous membranes on the skin barrier through such events as needle sticks, human bites, cuts, and abrasions.

Personal Protective Equipment (PPE)
Equipment used to prevent the spread of infectious diseases. Examples include disposable gloves, face shields, protective garments, mouth-to-mouth resuscitation devices, etc. Normal work attire is not considered to be protective clothing.

Regulated Biohazardous Waste
Liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials if compressed; items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling; contaminated needles; any other wastes containing blood or potentially infectious materials.

Universal Precautions
The concept of universal precaution is to treat all blood and body fluids as if they contain infectious Bloodborne Pathogens regardless of the source.

6.2 Exposure Determination and Exposure Control Plan

In developing an exposure control plan, NCDOT has evaluated the work tasks associated with the functions of NCDOT to determine which tasks could be reasonably anticipated to result in exposure to Bloodborne Pathogens. NCDOT uses the following categorical distinctions to determine the level of potential exposure:

Category I:

Tasks that involve exposure to blood, body fluids, or tissues. All procedures or other job-related tasks that involve an inherent potential for mucous membrane or skin contact with blood, body fluids, or tissues, or a potential for spills or splashes of them are Category I tasks. Category I tasks are those normally associated with frequent and repetitive handling and working directly with blood products such as those performed by physicians, nurses, Emergency Medical Technicians (EMTs), etc. These jobs by design require an almost constant exposure to the potential for infection.

NCDOT has identified no employees or job task that require Category I level tasks of potential exposure to Bloodborne Pathogens.

Category II:

Tasks that involve no exposure to blood, body fluids, or tissues, but employment may require performing unplanned Category I tasks. The normal work routine involves no exposure to blood, body fluids or tissues, but exposure may be required as a condition of employment.

Category II tasks are those normally associated with employees whose primary job function does not require them normally to be exposed to blood or body fluids but who are trained to respond to emergency medical situations and are distinctly identified as emergency responders by the organization. This does not include all employees who have received employer provided first aid and Cardiopulmonary Resuscitation (CPR) training, but only those specifically designated as emergency responders. Others who are trained and respond to emergencies do so as a "good Samaritan" and should also follow all universal precautions. Category II tasks also include employees that may be exposed to biological hazards while performing tasks such a Bridge Inspection Divers and Rest Area Custodians. Those employees identified in Category II tasks are offered vaccinations free of charge prior to exposure for Hepatitis B Virus should they desire. If the employee declines the vaccination, he or she is required to signify this in writing using Appendix A.

NCDOT has identified the following tasks as Category II tasks.

First Responders - Ferry Division
Enforcement Officers - Division of Motor Vehicles
Rest Area Custodians – Division of Highways
Bridge Inspector Divers – Division of Highways

Ferry Division First Responders have been identified in the Category II tasks. In an incident that could prove life threatening to a ferry passenger, immediate contact of Emergency Medical Technicians is not always practical. Therefore, First Responders in this situation may be called upon to perform Category I tasks.

Division of Motor Vehicle Enforcement Officers have been identified in the Category II tasks. In incidents on our highways such as automobile accidents, DMV Enforcement Officers may be in a response situation where Category I tasks are required. In addition, due to possible confrontational situations during an arrest, exposure potential to blood or body fluids is an elevated risk.

Division of Highways Bridge Divers have also been identified in the Category II tasks. These divers are required to work in water bodies where the level of contamination varies. While they are not categorized as a classification that would be required to perform Category I tasks, they do have an elevated risk of acquiring the Hepatitis B Virus from possible exposure to contaminated water bodies.

Rest Area Custodians have been identified in the Category II tasks. Most Rest Areas are staffed by Contract personnel, but some Divisions may utilize NCDOT personnel to perform Custodial duties at certain Rest Areas.

While their normal work routines are not expected to expose them to blood, body fluids, or tissues, the potential exists for them to be exposed. Therefore, precautionary measures should be followed by these personnel in the performance of their duties.

Category III:

Tasks that involve no exposure to blood, body fluids, or tissues, and Category I tasks are not a condition of employment. The normal work routine involves no exposure to blood, body fluids, or tissues (although situations can be imagined or hypothesized under which anyone, anywhere, might encounter potential exposure to body fluids).

Persons who perform these duties are not called upon as part of their employment to perform or assist in emergency medical care or first aid or to be potentially exposed in some other way.

Category III tasks are those tasks associated with normal work routines where there are no direct work tasks or pre-planned emergency response actions reasonably anticipated for the employee. All Category III employees should follow universal precautions in the performance of their duties, avoiding contact with blood, body fluids, or physical items contaminated with blood or body fluids.

The following sections detail NCDOT's Exposure Control Plan which shall be reviewed and updated as needed.

6.3 Engineering and Work Practice Control

Engineering and work practice controls are to be used to eliminate or minimize the risk of employee exposure. Engineering controls and/or work practice controls are reviewed by supervisors on a regular basis not to exceed one year and any time a work task changes where the potential for occupational exposure is present. Where potential occupational exposures remain after placing engineering and work practice controls in place, PPE shall also be used.

Hand-washing facilities with hot and cold running water that are readily accessible to employees are to be provided in NCDOT facilities. Where it is not feasible to provide hand washing facilities such as on a work site, first aid kits will include an appropriate antiseptic hand cleanser or antiseptic towelettes. If an occupational exposure occurs where antiseptic hand cleansers or antiseptic towelettes are used, the employee should be transported to the nearest facility with hand washing facilities with hot and cold running water and the affected area thoroughly washed with soap and running water.

When gloves or other PPE are used and removed, employees are to wash their hands immediately after removal of the protective gear. All gloves, PPE, or clothing contaminated with blood or body fluid will be disposed of in sealed containers according to disposal procedures.

Equipment that may become contaminated with blood or potentially infectious materials are to be visibly examined before use and decontaminated as necessary.

Areas including floors where an incident occurred resulting in the presence of bloodborne pathogens shall be thoroughly cleaned with appropriate disinfectant and contaminated items will be collected in Biohazard bags for proper disposal.

6.4 Disposal of Contaminated Materials

All items that have been contaminated with blood or other potentially infectious materials are to be disposed of as a regulated waste. While it is not practical or economically feasible to place specially designed waste receptacles at all NCDOT facilities and work sites, this does not diminish the requirement for proper labeling, handling, and disposal of biohazardous materials. If there is waste material generated which contains or is contaminated with blood or body fluids, take the following steps:
Do not handle in any manner contaminated items without proper PPE.
Place all contaminated items in a sealable container being careful not to contaminate the outside of the container. If the contaminated item is sharp or likely to puncture the container, use a container that is sufficiently sturdy to prevent the puncture of the container walls.
Label the container prominently to identify that the contents are blood and/or body fluids

Red bags or containers may be substituted for labels.
Place the container in a secure area with the label completely visible.
Dispose of gloves and other protective equipment in the same container. Ensure that glove outer surfaces do not touch the skin as they are removed.
Notify your Safety Officer immediately. Your Safety Officer will make the necessary arrangement to have the waste material properly contained, labeled, and disposed of.
Safety Officers will maintain appropriate regulated biohazardous waste containers with appropriate labeling and use these containers for the disposal of contaminated articles.
Safety and Risk Management will ensure that contracts are maintained with Hazardous Waste Contractors designated by DOT Roadside Environmental Unit to also include biohazardous waste and arrangements for the pickup and disposal of materials contained in biohazardous waste containers. Check with local hospitals and law enforcement as a free source of disposal.

6.5 Training Requirements

All employees performing at risk tasks shall receive education about precautionary measures, epidemiology, modes of transmission, and prevention of HIV/HBV and other associated infectious agents. This training is provided at no cost to the employee and during normal work hours. Training will be provided at the time of initial assignment to tasks where occupational exposures are “reasonably anticipated” to occur and at least annually thereafter. Training shall include:

- A copy of the regulatory text of this standard is available for review by any employee.
- NCDOT Exposure Control Plan for Bloodborne Pathogens shall be reviewed.
- Location and proper use of PPE, proper work practices, and the concept of Universal Precautions as it applies to their work practices.

- The meaning of color coding or other methods used to designate and dispose of contaminated articles or infectious waste.
- The actions to take if there is personal exposure to fluids or tissues, appropriate reporting procedures, and the medical monitoring recommended in cases of needle-stick injuries or other exposure to blood or body fluids.
- Information on the Hepatitis B vaccine, including information on its safety, method of administration, the benefits of being vaccinated, and that a pre-exposure vaccine is offered free of charge for Category I and II employees, and post- exposure vaccines free of charge for all employees who encounter an occupational exposure.
- Information on the post-exposure evaluation and follow-up that NCDOT provides for the employee following an exposure incident.

6.6 Pre-Exposure Vaccinations

Employees identified as having Category I or II work tasks will be provided at no cost the Hepatitis B vaccination. If the employee refuses the HBV vaccination, he or she must sign a Hepatitis B vaccination declination form (See Appendix A). When completed, this form must be retained indefinitely in the employee's file.
If an employee has received an HBV vaccination from a previous employer, evidence of that vaccination must be obtained by the employee and placed in the employee's file.

6.7 Post-Exposure Vaccinations

Employees who report work-related exposure will be provided at no cost a Hepatitis B vaccination. If the employee refuses the HBV vaccination, they must sign a Hepatitis B vaccination declination form (See Appendix A). When completed, this form must be retained indefinitely in the employee's file. If an employee has received an HBV vaccination from a previous employer, evidence of that vaccination must be obtained by the employee and placed in the employee's file.

Post-exposure medical evaluation will be provided at no cost through Safety & Risk Management Worker's Compensation third party administrator. A Workers Compensation claim must be filed for exposure to Bloodborne Pathogens.

Medical counseling for any employee found, as a result of the monitoring described above, to be seropositive for HBV or HIV, will be provided at no cost. Counseling guidelines have been published by the Public Health Service. For detailed information, reference the Occupational Safety & Health Bloodborne Pathogen Standard 29 CFR part 1910.1030.

Following a report of an exposure incident, a confidential medical evaluation and follow-up shall be made available to the exposed employee. The medical evaluation and follow-up provided by the physician shall include the following as a minimum:

- Documentation of routes of exposure and circumstances under which the exposure occurred.

- Identification and documentation of source individual unless prohibited by law. Results of source individual testing shall be made available to the exposed employee. (If the source denies permission for testing, the local or state health director may order testing of the source if that director determines that the exposure poses a significant risk of transmission of HIV and that the source is at high risk for HIV infection.)
- Testing of the exposed employee's blood by consent.
- Post-exposure vaccination and treatment, when medically indicated, as recommended by the United States Public Health Service.
- Counseling and evaluation of reported illnesses.

NCDOT Safety and Risk Management Workers Compensation unit shall ensure that the physician or healthcare professional responsible for medical evaluation is provided with a copy of 29 CFR 1910.1030 (Bloodborne Pathogen Standard).

6.8 Recordkeeping

NCDOT shall maintain records at the Division/Unit level for each employee involved in a Category I task or for Category II and III employees who have been exposed to bloodborne pathogens for a minimum period of their employment duration plus 30 years. These records will consist of:

- Training Records that indicate the dates of the training sessions, the content of the training sessions, trainer's name and qualifications.
- Inspection reports for the areas and/or tasks where biohazardous tasks are performed, identifying conditions noted and corrective actions taken.
- Incident Investigation Reports for each incident of mucous membrane or
- parenteral exposure to body fluids or tissue, an evaluation of these conditions, and a description of corrective measures taken to prevent a recurrence or similar exposure.

A medical record consisting of the following:

- Employee name and social security number.
- A copy of the employee's hepatitis B vaccination records and medical records relative to the employee's ability to receive vaccination.
- A copy of all results of physical examinations, medical testing and follow-up procedures as they relate to the employee's ability to receive vaccination or to post exposure evaluation following an exposure incident.
- NCDOT's copy of the physician's written opinion. A copy of all information provided to the physician.

6.9 Confidentiality

All employee medical records shall remain confidential. No information regarding employee medical information is to be disclosed or reported to any person outside the workplace except as may be required by law.

Employee medical and training records shall be provided upon request for examination and copying to the subject employee and to anyone having the express and written consent of the employee.

Copies of medical records shall be transferred to successor employer if employees leave NCDOT employment.

APPENDIX A: Hepatitis B Vaccination Declination

HEPATITIS B VACCINE DECLINATION

Completion of this form is mandatory for all Category I and II employees with work tasks that may have potential for exposure who decline to receive the Hepatitis B vaccination in the event of an exposure incident .

I fully understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring the Hepatitis B virus (HBV) infection.

I have been provided with the opportunity to be vaccinated with the Hepatitis B vaccine at no charge to myself. However, I decline the Hepatitis B vaccination at this time.

I fully understand that, by declining this vaccine, I continue to be at risk of acquiring Hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with Hepatitis B vaccine, I can receive the vaccination series at no charge to me.

Enter Brief Description of Event or Situation causing exposure with Date and Time.

_____

_____

_____

_____
Employee Name

_____
Employee Signature

_____
Beacon Number

_____
Date

APPENDIX B: Universal Precautions

INFECTION THROUGH BLOOD AND BODILY FLUIDS

Universal Precautions will be utilized to ensure NCDOT employees are safeguarded against the spread of infectious diseases through contact with human blood or other bodily fluids. Regardless of the "perceived" risk involved, all employees should protect themselves from potential infection.

- Any accident/incident involving the transfer of blood or bodily fluids should be reported by the supervisor before shift end.
- Personal Protective Equipment (PPE) will be provided for and used by all employees considered to be at risk of infection.
- Gloves should be worn for touching blood and bodily fluids, mucous membranes or non- intact skin of all persons, for handling items or surfaces soiled with blood or bodily fluids, and for rendering assistance to injured persons. Always wash hands and arms after helping avictim.
- For those employees trained to perform CPR, separate yourself from direct contact with the victim by using a face shield or mask or one-way resuscitating device.
- Needlestick injuries should be reported to the supervisor immediately.
- Any items located that are believed to be human waste products (i.e., blood, soiled clothing, needles, or items identified with the universal biohazard symbol) should be handled only by a properly trained employee.
- All known items soiled with blood or other bodily fluids (i.e., clothing) should be disposed by a properly trained employee.
- All equipment and working surfaces shall be decontaminated with an appropriate disinfectant to eliminate the potential for infection.
- NCDOT will provide at no cost Hepatitis B vaccination series to supervisors and those employees considered to be at the greatest risk of infection.
- A post-exposure evaluation will be provided at no cost to the employee.

APPENDIX C: Biohazard Symbol

The following is a universal symbol identifying material or objects contaminated with human blood or bodily fluids. When this symbol is identified, follow all Universal Precautions in this safety policy and procedure to ensure infectious diseases are not transmitted.

Author:	Paul Roberts	Revision #:	3
Approved By:	Walt Gray	Date Revised:	May 20, 2016

SAFETY POLICY & PROCEDURE

Hazard Communication SPP # 1910.1200

Quick Reference

Contents

1.0 Purpose

The purpose of this safety policy and procedure is the establishment of a program meeting the OSHA Hazard Communication Standard to protect North Carolina Department of Transportation (NCDOT) employees who are exposed to hazardous chemicals during the performance of their job duties.

2.0 Scope and Applicability

NCDOT purchases, stores, and uses a variety of chemicals in its everyday operations. Employees must be provided with information about the hazardous chemicals to which they may be exposed.

This safety policy and procedure provides the NCDOT Hazard Communication program to be used by NCDOT facilities and worksites to protect employees from chemical hazards. It includes provisions for training, discussion of classified chemical hazards, and discussion on the importance and structure of the safety data sheet (SDS), labeling requirements of the OSHA Hazard Communication standard consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS). It also presents information for accessing safety data sheets (SDS).

This document also details the areas of responsibility for managers/unit heads, supervisors, employees, Safety and Risk Management, Purchasing, and Central Equipment Unit within NCDOT.

This safety policy and procedure affects all NCDOT employees who are exposed to chemical hazards during the performance of their job duties.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for General Industry (29 CFR 1910.1200 and mandatory Appendices) and Occupational Safety and Health Standards for Construction Industry (29 CFR 1926.59).

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that may cause death or serious physical harm to employees or the public. Therefore, employees will not handle hazardous chemicals until they have been trained in the NCDOT Hazard Communication program. When chemical hazards exist that cannot be eliminated, then engineering practices, administrative controls, safe work practices, Personal Protective Equipment (PPE), and proper training regarding Hazard Communication will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Hazard Communication. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to his or her supervisor. Specific responsibilities are outlined under Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT safety policy and procedure on Hazard Communication.

6.1 Definitions

Chemical Manufacturer
An employer with a workplace where chemical(s) are produced for use or distribution.

Chemical Name
The scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) or a name that will clearly identify the chemical for the purpose of conducting a hazard classification.

Classification
To identify the relevant data regarding the hazards of a chemical; review those data to ascertain the hazards associated with the chemical; and decide whether the chemical will be classified as hazardous according to the definition of hazardous chemical in this section. In addition, classification for health and physical hazards includes the determination of the degree of hazard, where appropriate, by comparing the data with the criteria for health and physical hazards.

Common Name
Any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.

Container
Any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical.

Distributor
Any business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.

Hazard Category
The division of criteria within each hazard class, e.g., oral acute toxicity and flammable liquids include four hazard categories. These categories compare hazard severity within a hazard class and should not be taken as a comparison of hazard categories more generally.

Hazard Class
The nature of the physical or health hazards, e.g., flammable solid, carcinogen, oral acute toxicity.

Hazard Not Otherwise Classified (HNOC)
An adverse physical or health effect identified through evaluation of scientific evidence during the classification process that does not meet the specified criteria for the physical and health hazard classes addressed in the Hazard Communication standard.

Hazard Statement
A statement assigned to a hazard class and category that describes the nature of the hazard(s) of a chemical, including, where appropriate, the degree of hazard.

Hazardous Chemical
Any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, combustible dust, pyrophoric gas, or hazard not otherwise classified.

Health Hazard
A chemical which is classified as posing one of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard.

Label
An appropriate group of written, printed or graphic information elements concerning a hazardous chemical that is affixed to, printed on, or attached to the immediate container of a hazardous chemical, or to the outside packaging.

Label Elements
The specified pictogram, hazard statement, signal word and precautionary statement for each hazard class and category.

Physical Hazard
Chemical that is classified as posing one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas.

Pictogram
A composition that may include a symbol plus other graphic elements, such as a border, background pattern, or color, that is intended to convey specific information about the hazards of a chemical. Eight pictograms are designated under the Hazard Communication standard for application to a hazard category.

Precautionary Statement
A phrase that describes recommended measures that should be taken to minimize or prevent adverse effects resulting from exposure to a hazardous chemical or improper storage or handling.

Product Identifier
The name or number used for a hazardous chemical on a label or in the SDS. It provides a unique means by which the user can identify the chemical. The product identifier used shall permit cross-references to be made among the list of hazardous chemicals required in the written hazard communication program, the label and the SDS.

Pyrophoric Gas
A chemical in a gaseous state that will ignite spontaneously in air at a temperature of 130 degrees F (54.4 degrees C) or below.

Safety Data Sheet (SDS)
Written or printed material concerning a hazardous chemical provided by the manufacturer or importer which includes the required information listed in Section 6.2.3 of this procedure.

Signal Word
A word used to indicate the relative level of severity of hazard and alert the reader to a potential hazard on the label. The signal words used are "Danger" and "Warning." "Danger" is used for the more severe hazards, while "Warning" is used for the less severe.

Simple Asphyxiant
A substance or mixture that displaces oxygen in the ambient atmosphere, and can thus cause oxygen deprivation in those who are exposed, leading to unconsciousness and death.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Hazard Classification
- NCDOT Hazard Communication Program
- Safety Data Sheets
- Obtaining Safety Data Sheets
- Labels and Labeling
- Training

6.2.1 Hazard Classification

OSHA requires chemical manufacturers to classify the physical and health hazards of their chemicals, and where appropriate, the category of each class that applies. A hazardous chemical is any chemical which is classified as a physical hazard or a health hazard, a simple asphyxiant, a combustible dust, a pyrophoric gas, or a hazard not otherwise classified.

Physical hazards pose one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas); self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas. Refer to 1910.1200 Appendix B for more Physical Hazard Criteria associated with these materials.

Health hazards can cause health damage either immediately from short term (acute) exposure or slowly through long-term exposure (chronic). Exposures to these chemical hazards can occur through inhalation (breathing dust, vapors, or mists), ingestion (eating or smoking while working around hazardous chemicals), or absorption (chemicals entering the body through cuts, scratches, or broken skin). Refer to 1910.1200 Appendix A for more Health Hazard Criteria associated with these materials.

Combustible dust is fine particles that present an explosion hazard when suspended in air under certain conditions.

A simple asphyxiant displaces oxygen which causes oxygen deprivation to those exposed and can lead to unconsciousness or possible death.

A pyrophoric gas is a chemical in a gaseous state that will ignite spontaneously in air at a temperature of 130 degrees F (54.4 degrees C) or below. Examples of pyrophoric gases are arsine, silane, disilane, dichlorosilane, diborane, and phosphine.

Hazard Not Other Classified (HNOC) is a chemical where adverse physical or health effect identified through evaluation of scientific evidence during the classification process that does not meet the specified criteria for the physical and health hazard classes addressed in the Hazard Communication standard. This hazard classification is intended to ensure that hazards by the previous version of Hazard Communication Standard continue to be covered.

Common types of hazardous chemicals found in NCDOT include but are not limited to:

• Acids	• Flammables	• Pesticides
• Adhesives	• Glues	• Petroleum products
• Caustics	• Greases	• Solders
• Cleaning agents	• Inks	• Strippers
• Compressed Gases	• Lacquers	• Thinners
• Degreasing agents	• Paints	• Sealers
• Dusts		

6.2.2 NCDOT's Written Hazard Communication Program

Appendix A presents NCDOT's Written Hazard Communication Program that can be used by any facility, worksite, work unit, or work location in NCDOT. NCDOT's Hazard Communication Program includes:

- Facility or worksite identification
- Program element contact list
- Chemical list
- Container labeling provisions
- SDS requirements and availability
- Non-routine tasks hazard awareness provisions
- Hazard communication provisions for contractors
- Employee training documentation

Each facility or worksite with a hazard communication program should have a hazard communication program coordinator to oversee all the program elements. Additionally, all employees should know the location and availability of their hazard communication program.

6.2.3 Labels and Workplace Labeling

It is the responsibility of the chemical manufacturer, importer, or distributor to ensure that each container of shipped hazardous chemicals received by NCDOT is labeled, tagged or marked. Hazards not otherwise classified do not have to be addressed on the container. The following information shall be provided on shipped containers received:

1. Product Identifier (Name found on SDS)
2. Signal Word ("**Danger"** for more severe or "**Warning"** for less severe)
3. Hazard Statement (Describes Nature of Hazard)
4. Pictogram (Appendix B displays HCS Pictograms)
5. Precautionary Statement (Measures to minimize exposure to hazards)
6. Chemical Manufacturer name, address, and telephone number

These labels shall not be remove or defaced on incoming containers of hazardous chemicals.

For chemicals transferred from the manufacturer container to portable containers workplace labeling is required. These labels must be prominently displayed and contain product identifier, words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

On individual stationary containers such as storage tanks, signs or placards may be used in place of the labels.

Portable containers of chemicals transferred from labeled containers for intended for immediate use by the employee who performs the transfer are not required to be labeled unless that portable container is transferred for use on another work shift.

6.2.4 Safety Data Sheet (SDS)

The safety data sheet (SDS) is a fact sheet for hazardous chemicals provided by the chemical manufacturer or importer. They must be available for every hazardous chemical in the work area and must contain information about the chemical including: Appendix C presents the minimum SDS information for each of (16) sections listed below:

Safety Data Sheets (SDS) – The 16 Required Sections	
1. Identification	9. Physical and chemical properties
2. Hazard(s) identification	10. Stability and reactivity
3. Composition/ information on ingredients	11. Toxicological information
4. First aid measures	12. Ecological information
5. Fire-fighting measures	13. Disposal considerations
6. Accidental release measures	14. Transport information
7. Handling and storage	15. Regulatory information
8. Exposure controls and personal protection	16. Other information, including date of preparation or last revision

6.2.5 Obtaining SDS Sheets

SDS sheets can be obtained from:

- Internet access through 3E website established for NCDOT
- Call 3E Company for SDS (800-451-8346)
- Send Fax Request to 3E using Fax form. See Appendix D for Fax form.
- Some Units may maintain hard copies of SDS

For Internet access to NCDOT SDS use 3E website set up for NCDOT contact your supervisor or Safety & Risk Management for assistance.

The advantage of this method is that worksites and work locations do not necessarily have to maintain paper copies of SDSs. Rather, the availability and accessibility of SDSs is determined by need.

SDS requests fall into two categories:

- Routine
- Emergency

For routine requests, employees should request SDS from their immediate supervisor. For emergency requests, any employee can call 3E Co. (800-451-8346) to request SDS. If problems are encountered while obtaining a SDS, contact Safety & Risk Management or your unit Safety staff.

New chemical product purchases should result in the SDS being added to the electronic 3E NCDOT database by the location making the purchase.

6.2.6 Training

Employees will be trained to work safely with chemicals. Training will include:

- The Hazard Communication standard and its requirements
- Operations in the work area where hazardous chemicals are present
- The location and availability of the written hazard communication program
- The physical, health, simple asphyxiation, combustible dust and pyrophoric gas hazards, as well as hazards not otherwise classified, of the chemicals in the work area
- Measures employees can take to protect themselves including NCDOT's specific procedures to provide engineering controls, work practices, and Personal Protective Equipment (PPE)
- Methods and observations to detect the presence of a hazardous chemical
- How to read and interpret information on labels and SDS

Employees will be trained at the time of initial employment or assignment and whenever a new chemical hazard is introduced into their workplace. Refresher training shall be provided annually.

All training will be documented. See Appendix E for the training documentation form. A copy of the training documentation shall be placed in the employee's personnel record file. Training may also be documented electronically through LMS.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for the purchase of equipment and supplies for successful implementation and maintenance of NCDOT's Hazard Communication Program in their work areas. They will be also responsible for appointing a Hazard Communication Coordinator for their work area(s) and for identifying the employees affected by this safety policy and procedure.

Managers/Unit Heads will obtain and coordinate the required training for the affected employees. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

6.3.2 Supervisors

Supervisors will ensure that labels on hazardous chemicals are legible. They shall also ensure refresher training is provided to employees on NCDOT's Written Hazard Communication Program.

Supervisors will ensure that employees are provided with and instructed on the use of any PPE when working with hazardous chemicals.

6.3.3 Employees

Employees will be trained before working with any hazardous chemicals. They are responsible for reviewing chemical labels for procedures and hazards before using any hazardous chemicals.

Employees shall wear the necessary PPE before working with any hazardous chemical. Also, employees shall report any unlabeled or defaced hazardous chemical containers to their immediate supervisor.

6.3.4 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. Safety and Risk Management will assist in developing or securing the required training.

Safety Engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

APPENDIX A: NCDOT Hazard Communication Program

NCDOT Hazard Communication Program

Facility/Worksite: _____

Program Coordinator: _____

To ensure that information about the dangers of all hazardous chemicals used by NCDOT personnel at this location is known by all affected employees, the following Hazard Communication Program has been established. Under this program, employees will be informed of the contents of the OSHA Hazard Communications standard, the hazardous properties of chemicals with which you work, safe handling procedures, and measures to protect yourself from these chemicals. The requirements of this program are intended to be consistent with the provisions of the United Nations Globally Harmonized System of Classification and Labeling of Chemicals (GHS).

This program applies to all work operations where employees may be exposed to hazardous chemicals under normal working conditions or during an emergency situation. All work units will participate in the Hazard Communication Program. A copy of this Hazard Communication Program, Chemical List, and Safety Data Sheets shall be made available for review by any interested employee in your work unit.

Facility/Worksite Info

The Hazard Communication Program shall list the facility or worksite and identify the title of program coordinator for your location. The program coordinator is responsible for reviewing and updating this plan and the Chemical List of hazardous chemicals used.

Chemical List

All facilities or worksites shall compile and maintain a Chemical List of hazardous chemicals being used. This list will contain the product name used on the SDS and container label. The Chemical List may be compiled for the workplace as a whole or for individual work areas. It shall be updated as new chemicals are added or existing chemicals are deleted by the designated SDS administrator for the location.

Labels and Labeling System

Manufacturer container labels are sufficient to meet labeling requirements of the Hazard Communication Program. If contents are transferred from the original manufacture container to another container, a labeling system must be used to label the unmarked container with product identity and appropriate hazard information.

APPENDIX A: NCDOT Hazard Communication Program (Continued) 2

Safety Data Sheets (SDS)

SDS information shall be made available for all hazardous chemicals used at a facility or worksite through on-line access or by phone/fax request to NCDOT SDS system provider. Employees who are working with a hazardous chemical may request copy of the SDS from their immediate supervisor. The supervisor can obtain SDS by:

- Internet access through 3E website established for NCDOT
- Call 3E Co. for SDS; 800-451-8346
- Send Fax Request to 3E using Fax form. See Appendix D for Fax form.
- Access to hard copies of SDS if available in unit.

For Internet access to NCDOT SDS use the following hyperlink to 3E website set up for NCDOT; 3E Online NCDOT Access

It is recommended that users create a short cut on computer desk top page for quick access. The advantage of this method is that worksites and work locations do not necessarily have to maintain paper copies of SDSs. Rather, the availability and accessibility of SDSs is determined by need. If problems are encountered while obtaining a SDS, contact Safety & Risk Management or your unit Safety staff.

Hazards of Non-Routine Tasks

Supervisors will inform employees of any special non-routine tasks that may involve possible exposure to hazardous chemicals. Safe work practices, use of required PPE, and standard operating procedures (SOPs) shall be reviewed prior to the start of such tasks.

Contractor Communication

All onsite contractors (and subcontractors) are responsible for adhering to NCDOT's Hazard Communication Program while they are on NCDOT worksites. Information on hazardous chemicals known to be used on the worksite will be exchanged with contractors.

Contractors are required to exchange SDS information with NCDOT personnel as requested. Additionally, all onsite contractors shall be provided a copy of NCDOT's Hazard Communication Program. Contractors will be responsible for providing necessary information to their employees and subcontractors.

APPENDIX B: Hazard Communication Standard Pictograms

HCS Pictograms and Hazards

Health Hazard	Flame	Exclamation Mark
		
• Carcinogen • Mutagenicity • Reproductive Toxicity • Respiratory Sensitizer • Target Organ Toxicity • Aspiration Toxicity	• Flammables • Pyrophorics • Self-Heating • Emits Flammable Gas • Self-Reactives • Organic Peroxides	• Irritant (skin and eye) • Skin Sensitizer • Acute Toxicity (harmful) • Narcotic Effects • Respiratory Tract Irritant • Hazardous to Ozone Layer (Non Mandatory)
Gas Cylinder	**Corrosion**	**Exploding Bomb**
		
• Gases under Pressure	• Skin Corrosion/ burns • Eye Damage • Corrosive to Metals	• Explosives • Self-Reactives • Organic Peroxides
Flame over Circle	**Environment (Non Mandatory)**	**Skull and Crossbones**
		
• Oxidizers	• Aquatic Toxicity	• Acute Toxicity (fatal or toxic)

APPENDIX C: Safety Data Sheets (SDS)

A safety data sheet (SDS) shall include the information specified in Table below under the section number and heading indicated for sections 1-16. If no relevant information is found for any given section, the SDS shall clearly indicate that no applicable information is available.

	Section Heading	Information Provided
1.	**Identification**	(a) Product identifier used on the label; (b) Other means of identification; (c) Recommended use of the chemical and restrictions on use; (d) Name, address, and telephone number of the chemical manufacturer, importer, or other responsible party; (e) Emergency phone number.
2.	**Hazard(s) identification**	(a) Classification of the chemical in accordance with paragraph (d) of §1910.1200; (b) Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of §1910.1200. (Hazard symbols may be provided as graphical reproductions in black and white or the name of the symbol, e.g., flame, skull and crossbones); (c) Describe any hazards not otherwise classified that have been identified during the classification process; (d) Where an ingredient with unknown acute toxicity is used in a mixture at a concentration = 1% and the mixture is not classified based on testing of the mixture as a whole, a statement that X% of the mixture consists of ingredient(s) of unknown acute toxicity is required.
3.	**Composition/ information on ingredients**	Except as provided for in paragraph (i) of §1910.1200 on trade secrets: **For Substances** (a) Chemical name; (b) Common name and synonyms; (c) CAS number and other unique identifiers; (d) Impurities and stabilizing additives which are themselves classified and which contribute to the classification of the substance. **For Mixtures** In addition to the information required for substances: (a) The chemical name and concentration (exact percentage) or concentration ranges of all ingredients which are classified as health hazards in accordance with paragraph (d) of §1910.1200 and (1) are present above their cut-off/concentration limits; or (2) present a health risk below the cut-off/concentration limits. (b) The concentration (exact percentage) shall be specified unless a trade secret claim is made in accordance with paragraph (i) of §1910.1200, when there is batch-to-batch variability in the production of a mixture, or for a group of substantially similar mixtures (See A.0.5.1.2) with similar chemical composition. In these cases, concentration ranges may be used. **For All Chemicals Where a Trade Secret is Claimed** Where a trade secret is claimed in accordance with paragraph (i) of §1910.1200, a statement that the specific chemical identity and/or exact percentage (concentration) of composition has been withheld as a trade secret is required.

APPENDIX C: Safety Data Sheets (SDS) (Continued) 2

	Section Heading	Information Provided
4.	First-aid measures	(a) Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion; (b) Most important symptoms/effects, acute and delayed. (c) Indication of immediate medical attention and special treatment needed, if necessary.
5.	Fire-fighting measures	(a) Suitable (and unsuitable) extinguishing media. (b) Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products). (c) Special protective equipment and precautions for fire-fighters.
6.	Accidental release measures	(a) Personal precautions, protective equipment, and emergency procedures. (b) Methods and materials for containment and cleaning up.
7.	Handling and storage	(a) Precautions for safe handling. (b) Conditions for safe storage, including any incompatibilities.
8.	Exposure controls/personal protection	(a) OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available. (b) Appropriate engineering controls. (c) Individual protection measures, such as personal protective equipment.
9.	Physical and chemical properties	(a) Appearance (physical state, color, etc.); (b) Odor; (c) Odor threshold; (d) pH; (e) Melting point/freezing point; (f) Initial boiling point and boiling range; (g) Flash point; (h) Evaporation rate; (i) Flammability (solid, gas); (j) Upper/lower flammability or explosive limits; (k) Vapor pressure; (l) Vapor density; (m) Relative density; (n) Solubility (o) Partition coefficient: n-octanol/water; (p) Auto-ignition temperature; (q) Decomposition temperature; (r) Viscosity.
10.	Stability and reactivity	(a) Reactivity; (b) Chemical stability; (c) Possibility of hazardous reactions; (d) Conditions to avoid (e.g., static discharge, shock, or vibration); (e) Incompatible materials; (f) Hazardous decomposition products.

APPENDIX C: Safety Data Sheets (SDS) (Continued) 3

	Section Heading	Information Provided
11.	**Toxicological information**	Description of the various toxicological (health) effects and the available data used to identify those effects, including: (a) Information on the likely routes of exposure (inhalation, ingestion, skin and eye contact); (b) Symptoms related to the physical, chemical and toxicological characteristics; (c) Delayed and immediate effects and also chronic effects from short- and long-term exposure; (d) Numerical measures of toxicity (such as acute toxicity estimates). (e) Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Report on Carcinogens (latest edition) or has been found to be a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest edition), or by OSHA.
12.	**Ecological information**	(a) Eco toxicity (aquatic and terrestrial, where available); (b) Persistence and degradability; (c) Bio accumulative potential; (d) Mobility in soil; (e) Other adverse effects (such as hazardous to the ozone layer).
13.	**Disposal considerations**	Description of waste residues and information on their safe handling and methods of disposal, including the disposal of any contaminated packaging.
14.	**Transport information**	(a) UN number; (b) UN proper shipping name; (c) Transport hazard class(es); (d) Packing group, if applicable; (e) Environmental hazards (e.g., Marine pollutant (Yes/No)); (f) Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code); (g) Special precautions which a user needs to be aware of, or needs to comply with, in connection with transport or conveyance either within or outside their premises.
15.	**Regulatory information**	Safety, health and environmental regulations specific for the product in question.
16.	**Other information, including date of preparation or last revision**	The date of preparation of the SDS or the last change to it.

APPENDIX D: NCDOT SDS Fax Request Form

Request Type: Emergency (15 mins)_____ Immediate (2 hrs.)_____ Standard (24hrs)_____

FOR MEDICAL EMERGENCIES CALL 1-800 451-8346

FOR ROUTINE SDS FAX REQUESTS;
COMPLETE THE FOLLOWING AND FAX TO (760) 602-8888

REQUESTOR INFORMATION

Date Requested: _____

Name of Person Requesting:_____

Street Address: _____

City:_____, NC Zip: _____

Telephone: (_____)_____Fax: (_____)_____

MANUFACTURER AND PRODUCT INFORMATION

(PROVIDE AS MUCH INFORMATION AS POSSIBLE.)

Complete Label Name on Product: _____

Manufacturer Product/ Item Number: _____

UPC: _____

Manufacturer's Name: _____

City:_____State: _____

Manufacturer's Phone # (If available): (_____)_____

MEDICAL EMERGENCY INFORMATION

Medical Provider: _____

Medical Provider: Fax No: (___)_____

Medical Provider Phone No: (__)_____

Questions, other than SDS requests, may be directed to:
3E Company, 1905 Aston Avenue, Carlsbad, CA 92008 by calling (800) 360-3220

Appendix D updated 5-11-2016

APPENDIX E: Hazard Communication Training Documentation

Employee Training

Date:_____ Location: Instructor:_____

_____ Title: **SAF 130 Hazard Communication**

Program Elements to be Covered

- The Hazard Communication standard and its requirements
- Operations in work area where hazardous chemicals are present
- The location and availability of the written Hazard Communication program
- Physical and health hazards of the chemicals in the work areas
- Measures employees can take to protect themselves including NCDOT's specific procedures to provide engineering controls, work practices, and PPE
- Methods and observations to detect the presence of a hazardous chemical
- How to read and interpret information on labels and SDS

Employees Trained

Name	Title	Employee #	Signature

Author:	Paul Roberts	Revision #:	2
Approved By:	Bobby Lewis	Date Revised:	March 2019

SAFETY POLICY & PROCEDURE

Right of Inspection SPP# 1926.03

Table of Contents

1.0 Purpose

The purpose of this safety policy and procedure is to establish guidelines for North Carolina Department of Transportation (NCDOT) employees to cooperate effectively with Occupational Safety and Health Administration (OSHA) compliance inspections and to ensure that OSHA compliance inspections are conducted in a professional and structured manner.

2.0 Scope and Applicability

The North Carolina Department of Labor, Division of Occupational Safety and Health, is designated to administer and enforce OSHA within both the private and public sectors in North Carolina. The enforcement of OSHA is accomplished in part by work site inspections conducted by compliance officers.

This safety policy and procedure provides guidelines to be followed when an OSHA inspection occurs. It includes provisions for informing employees about typical OSHA inspections and discussion on the components of an OSHA inspection.

This safety policy and procedure also details the areas of responsibility for managers/unit heads, supervisors, employees, and Safety and Risk Management within NCDOT.

This safety policy and procedure affects every NCDOT employee.

3.0 Reference

This safety policy and procedure is established in accordance with the Occupational Safety and Health Act of 1970 which authorizes OSHA to conduct workplace inspections.

4.0 Policy

It is the policy of NCDOT to provide the right of entry to any regulatory agency official or its representative to any work site or facility owned or operated by NCDOT upon presentation of appropriate credentials**.**

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on OSHA Inspections. It is also the responsibility of each NCDOT employee to report immediately any OSHA inspection activity to his or her supervisor.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's safety policy and procedure on OSHA Inspections.

6.1 Definitions

Compliance Officer
A representative of OSHA who has been trained and has been authorized to conduct work place safety inspections.

OSHA
Occupational Safety and Health Act. In North Carolina, the OSHA Act is administered by the North Carolina Department of Labor (NCDOL).

Types of Inspections (Defined)

1. **Employee Complaint Inspection –** Employee or former employee files a complaint alleging a violation of OSHA standard in their workplace.
2. **Programmed Inspection –** OSHA schedules their Program Inspections of workplaces based on historical DART (Days Away from Work and Restricted Work or Job Transfer) rates. This is the most common type of Inspection.
3. **Follow-Up Inspection –** To determine if violation cited by prior Inspection has been corrected.
4. **Investigation Inspection –** To determine if violation of OSHA standards resulted in event of workplace fatality or hospitalization of employee.
5. **Imminent Danger Inspection –** If an OSHA compliance officer observes situation at worksite where a danger of serious harm or fatality may be present.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Validating OSHA Officers' Credentials
- NCDOT Notification Process
- Opening Conference
- OSHA Inspection Process
- Closing Conference

6.2.1 Training

No formal training is to be provided to employees. However, employees and supervisors should be informed about the typical inspection process that may be performed by North Carolina Occupational Safety and Health Administration (NCOSHA). This information should be provided upon initial employment or on a one-time basis and should contain:

- How a typical OSHA compliance inspection is conducted
- Employees' responsibilities when an OSHA compliance officer arrives on a job site

6.2.2 Validating OSHA Compliance Officer's Credentials

OSHA compliance officers should present their credentials once they arrive on site for an inspection. Employees should ask to see their identification if it is not presented. As needed, NCDOL can be called to verify the identity of the compliance officer.

The OSHA compliance officers should be asked to wait for the assigned qualified safety professional who has been notified prior to the start of inspection process. Let the OSHA compliance officer know what the estimated response time by the safety professional may be.

6.2.3 NCDOT Notification Process

Your site NCDOT management and assigned safety professional as well as the Safety and Risk Management's office should be contacted immediately in the event of an OSHA inspection. All employees should inform the compliance officer that they are required to notify their supervisor and NCDOT's safety personnel. All employees should make every effort to contact their supervisor and NCDOT's assigned safety professional, so they can be present during the inspection.
In the event your local safety professional is not available, Safety and Risk Management will provide onsite assistance.

6.2.4 Opening Conference

The OSHA compliance officer will conduct an initial meeting in which he or she will explain how the site was selected, the purpose and type of inspection for the visit, the scope of the inspection, and the standards that apply.

NCDOT will be asked to select a representative(s) to accompany the officer during the inspection. This representative(s) should be NCDOT managers/unit heads and qualified safety professional or supervisors and a qualified safety professional or a Safety and Risk Management representative, if possible.

6.2.4 OSHA Inspection Process

The inspection process typically begins with a walk through of the work site or facility. The compliance officer will take statements, photographs, videos, measurements, and talk with employees. The compliance officer will examine safety and health conditions and practices, examine records, collect air samples, measure noise levels, and monitor employee exposure to toxic fumes, gases, and dusts. The compliance officer will interview employees and take statements from selected individuals. By regulatory mandate, NCOSHA can conduct private interviews without management's presence.

All employees should truthfully respond to all questions from the compliance officer. If a response is not known to a question, employees should simply state, "I do not know. You will need to speak with my supervisor."

If possible, NCDOT should take the same photographs and videos of the same items as the compliance officer. This will allow NCDOT to document the conditions at the time of the inspection.

6.2.4 Closing Conference

At the end of the inspection, the compliance officer will conduct a closing conference. The compliance officer will discuss all unsafe or unhealthful conditions observed during the inspection and will indicate all apparent violations for which a citation and a penalty may be issued or recommended. The compliance officer will apprise NCDOT of its rights under the OSHA Act.

If the compliance officer deems that a second closing conference or follow-up is necessary by phone or in person, the DOT Safety Professional will schedule for suitable date when they can be present. The OSHA compliance officer should not just show up unannounced for second closing conference or follow-up.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available for the purchase of proper equipment and training for compliance with applicable safety policy and procedures. Managers/Unit Heads will ensure they maintain on site Workplace Safety and Safety Policy and Procedure Manuals. Compliance with applicable standard operating procedures and safety policy and procedures will help ensure compliance with applicable OSHA regulations.

Managers/Unit Heads will obtain and coordinate the required training for affected employees. Managers/Unit Heads will also ensure compliance with all applicable safety policy and procedures through their auditing process.

Managers/Unit Heads will contact Safety and Risk Management or their assigned safety engineer as soon as possible when OSHA compliance officers arrive on site.

6.3.2 Supervisors

Supervisors are responsible for ensuring that their employees are aware of what they should do if an OSHA compliance officer arrives for an Inspection.

Speaking to a compliance officer is not a requirement, it is a right. Therefore, supervisors are NOT compelled to answer questions during a private interview with a compliance officer.

6.3.3 Employees

Employees are responsible for informing their supervisors when OSHA compliance officers arrive on site.

Employees should truthfully respond to all questions posed by the compliance officer. Guesses or speculation is not acceptable.

6.3.4 Division or Unit Safety Staff

Division and Unit Safety Staff are qualified Safety Professionals that shall make every effort to attend OSHA Compliance Inspections upon notification of Unit being inspected.

Communications that occur with NCDOL after a walkthrough should make every effort to protect Personal Health Information. If 300 Logs are to be transmitted they should be transmitted utilizing fax, encrypted email, or certified mail.

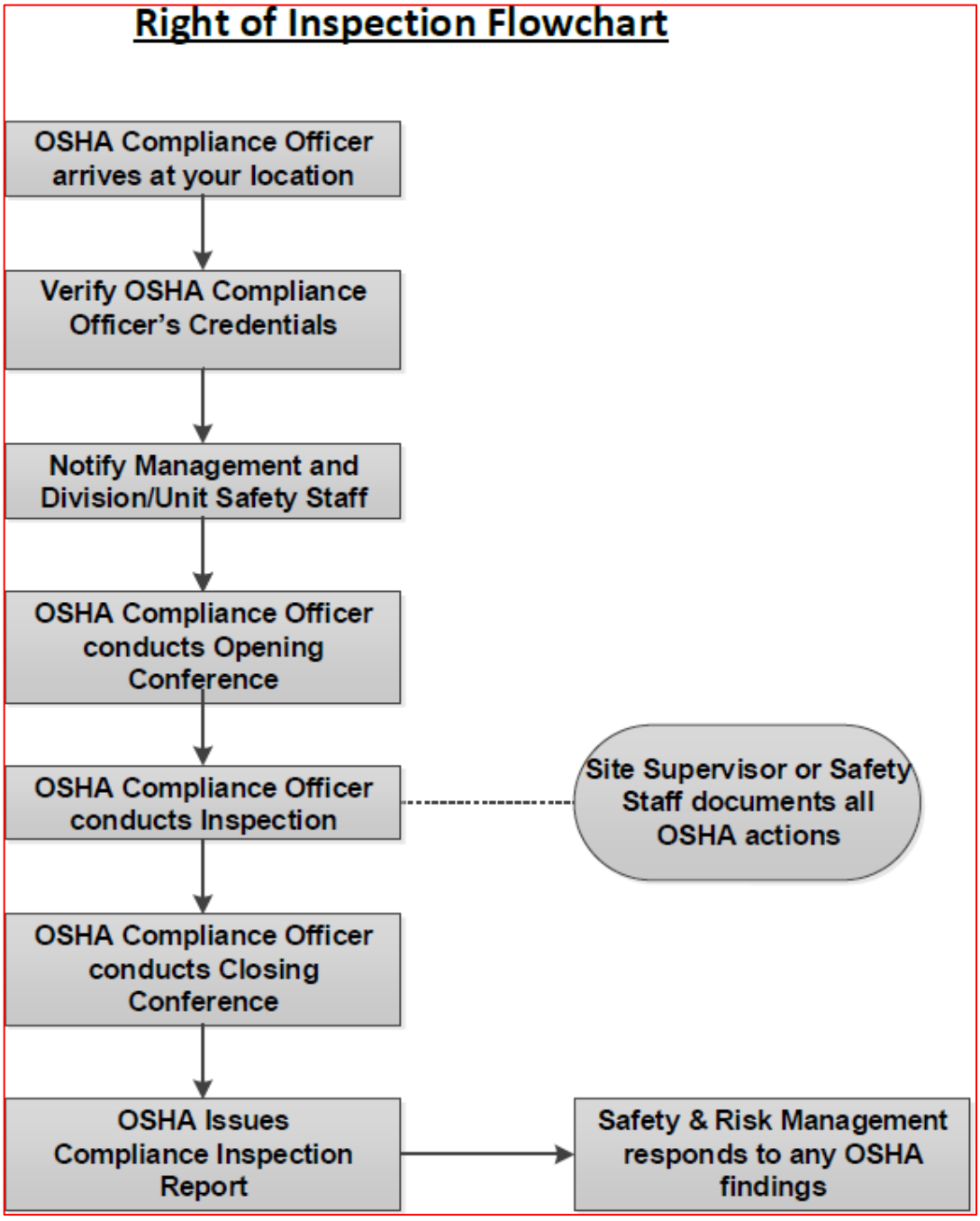
The designated safety professional shall be the primary point of contact while the inspection is being conducted.

6.3.5 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary when notified of an OSHA compliance inspection or on any matter concerning an OSHA inspection. Safety and Risk Management will assist in developing or securing the required training. Safety and Risk Management will take a lead role in assessing any outcome of an OSHA inspection and in determining the appropriate follow up action to an OSHA inspection.

Additionally, safety engineers will provide consultative and audit assistance to ensure effective implementation of this safety policy and procedure.

Appendix A: Right of Inspection Flowchart



Appendix B: NCDOT OSHA Inspection Checklist Form

Yes No

❑ ❑ Did the OSHA Compliance Officer show identification?

General

OSHA Compliance Officer's Name _____
Date of Inspection _____
Location of Inspection _____
Time Inspection Began _____
Time Inspection Ended _____

What safety and health conditions and practices were examined? _____
_____
_____

What records were examined? _____
_____
_____

Air Samples

Yes No

❑ ❑ Were any air samples taken? If yes, indicate below

Air Sample Log					
Air Sample #	Date	Time	Type of Sample	Location	Work Conditions

Noise Measurements

Yes ❑ No ❑ Were any noise measurements taken? If yes, indicate below.

Noise Measurements Log						
Noise Sample #	Date	Time	Type of Instrument Used	Location	Work Conditions	dB Reading

Exposure Measurements

Yes ❑ No ❑ Were any other exposure measurements taken? If so, describe.

Exposure Measurements Log							
Contaminant	Sample ID	Date	Start Time	End Time	Media Measurement Instrument	Location	Work Conditions

Author:	Paul Roberts	Revision #:	4
Approved By:	Darryl Bass	Date Revised:	November 2020

SAFETY POLICY & PROCEDURE

Lead in Construction SPP# 1926.62

Quick Reference

1.0 Purpose

The purpose of this safety policy and procedure is to establish a program to prevent absorption, inhalation, or ingestion of lead by North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Lead exposure can occur in NCDOT job activities that involve the disturbance of lead paint or lead-containing materials. Lead overexposure adversely affects numerous body systems and causes health impairment and disease.

This safety policy and procedure (SPP) provides guidelines to protect NCDOT employees from the immediate and long-term effects of lead exposure. It includes a discussion on training, exposure assessment, and methods of compliance. Requirements are presented for Personal Protective Equipment (PPE), housekeeping, hygiene facilities, signs, and recordkeeping. It also presents provisions for medical surveillance and medical protection.

This safety policy and procedure covers the following job activities within NCDOT:

- Welding, grinding, and torch cutting on bridge projects
- Manual and mechanical removal of lead-based paints

Additionally, this safety policy and procedure covers any other types of work that may expose an employee to lead.

3.0 Reference

This safety policy and procedure is established in accordance with Occupational Safety and Health Standards for the Construction Industry (29 CFR 1926.62)

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, employees will not perform any lead related job activity without the proper training and PPE. Where lead hazards exist that cannot be eliminated, additional engineering practices, administrative practices, safe work practices, PPE, and proper training will be implemented.

These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's safety policy and procedure on Lead in Construction. Specific responsibilities are outlined in Section 8.0.

6.0 Definitions

Action Level (AL)
Airborne concentration of lead at 30 micrograms per cubic meter of air (30 µg/m^3) calculated as an 8-hour time weighted average.

Competent Person
Person who can identify existing and predictable lead hazards in the surroundings or working conditions and has the authority to take prompt corrective measures to eliminate them.

Permissible Exposure Limit (PEL)
Airborne concentration of lead at 50 micrograms per cubic meter of air (50 µg/m^3) calculated as an 8-hour time weighted average.

Qualified Person
Person having the training and experience in lead work, air monitoring, exposure assessment, and workplace evaluations.

7.0 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Initial Exposure Assessment
- Employee Exposures Above the PEL
- Compliance Plans
- Respiratory Protection
- Personal Protective Clothing
- Housekeeping
- Hygiene Facilities
- Signs
- Medical Surveillance Program
- Medical Removal Protection
- Recordkeeping
- Lead Waste Disposal

7.1 Compliance Plans

A written compliance plan shall be developed and implemented prior to beginning any job involving lead to ensure employees are not exposed to lead without proper protections. The lead work supervisor shall submit the plan to the Division Safety Engineer for approval prior to the beginning of work. See *Appendix A: Lead Compliance Plan*

7.2 Training

Employees and with potential job-related lead exposure will be trained by a qualified person prior to their initial job assignment and annually thereafter. Employees and competent persons shall be trained in:

- Specific hazards associated with their work environment
- Protective measures which can be taken against these hazards
- The danger of lead to their bodies and their families

Competent persons shall receive training to identify and predict lead hazards in various working conditions learn of the corrective measures to eliminate. They will receive this training initially and receive retraining if deemed necessary by the Division Safety Engineer. This training shall include as a minimum.

- Symptoms of lead exposure
- Thresholds of airborne and blood level lead concentration
- Lead work procedures
- Lead work area set up
- Disposal of lead waste

The Division Safety Engineer will provide both employee and competent person training or coordinate the training with an acceptable third party.

7.3 Initial Exposure Assessment

Situations that could lead to reasonable suspicion of lead exposure:

- Any painted system on bridges constructed prior to 1985 unless the bridge has been re-painted since 2000.
- Any information or observations of job site which would indicate presence of lead.
- Any previous measurements of airborne lead during similar work.
- Any employee complaints or symptoms which may be attributable to lead exposure.

If lead exposure is a hazard in any work environment; then one of the following shall be done:

- An initial exposure assessment to determine concentration; or,
- Assumption that employee exposure will exceed the action level.

This initial assessment will document the exposure an employee would have without the use of a respirator.

This initial exposure assessment is not required if:

- Objective data is available which can conclusively demonstrate that no employee will be exposed in excess of the action level.
- An exposure assessment has been conducted within the last 12 months for a project with very similar aspects as the project in question.

This initial exposure assessment may be limited to a representative number of employees who are reasonably expected to have the highest exposure levels.

The initial assessment of employee exposure may be categorized as:

- Less than the action level (AL)
- At or above the action level but less than the PEL
- Above the PEL

Employee exposures below the action level require no further monitoring.

Employee exposures at or above the AL but at or below the PEL require monitoring every 6 months. This monitoring shall be continued at the required frequency until at least 2 consecutive measurements, taken at least 7 days apart, are below the AL, at which time monitoring may be discontinued for that activity.

Employee exposures above the PEL require quarterly monitoring. This monitoring shall continue at this frequency until at least 2 consecutive measurements taken at least 7 days apart are at or below the PEL.

Within 5 working days after receiving monitoring results, the employee shall be notified in writing of the exposure results including a description of the corrective action to be taken to reduce exposure below that level. See APPENDIX B: Lead Air Monitoring Notification Letter

7.4 Employee Exposures Above the PEL

Based on exposure data for NCDOT employees, there are four major lead-related tasks/operations that presume employee lead exposure above the PEL:

1. Manual scraping, manual sanding, and power tool cleaning with dust collection systems
2. Inspection of contract lead abatement bridge projects
3. Grinding and power tool cleaning without dust collection systems
4. Welding and torch cutting lead-containing materials

For other lead-related tasks/operations presume lead exposures are above the PEL and implement full lead work protections until exposure assessment can be completed.

7.5 Engineering Controls

Local exhaust or general ventilation shall be provided during any indoor or enclosed area lead work to reduce employee exposures to below the PEL. Mechanical paint scalers should have vacuum attached local exhaust. Torch cutting and welding operations should have general ventilation fans in the work area.

7.6 Respiratory Protection

- Lead operations involving abatement inspection or manual scraping, sanding, or cleaning require (at minimum) a 1/2 face tightly fitting respirator with an assigned protection factor (APF) of 10.
- Lead operations involving power tools, abrasive blasting, welding, or torch cutting require (at minimum) a powered air purifying respirator (PAPR) with a protection factor of at least 25.
- For welding and torch cutting of lead or lead paint containing material, a PAPR with integrated welding shield shall be used.

Refer to **SPP# 1910.134 Respiratory Protection**, and NCDOT's Respiratory Protection Program for additional details on the basic requirement for selection, use, cleaning, and maintenance of respirators

7.7 Protective Clothing

Appropriate protective clothing and equipment shall be provided to employees who are exposed to lead at no cost to the employee. Protective clothing and equipment is necessary to protect employees from transporting lead from work to home. Appropriate protective clothing and equipment can include:

- Disposable coveralls
- Work gloves
- Boots or boot coverlets

If safety toe boots are worn for the job, lead wipes shall be used to remove any lead particles from boots while in the change area. The contaminated lead wipes shall be disposed of as lead waste.

Protective clothing is required to be removed in a change area. The contaminated protective clothing is to be placed in a closed labeled container in the change area or disposed of as lead waste.

7.8 Housekeeping

All surfaces should be maintained as free as practical of lead dust accumulation. Vacuuming these surfaces with high-efficiency particulate air (HEPA) filters is the preferred method of housekeeping. The HEPA filters shall be emptied in a manner which minimizes lead dust reentry into the workplace. Dry or wet sweeping, shoveling or brushing may be used only if vacuuming or equally effective methods are not feasible.

7.9 Hand and Face Washing Facilities

All employees who perform lead-related tasks/operations shall be provided hand and face water and hand soap washing facilities or disposable hand wipes. Employees are prohibited from smoking, eating, drinking and applying lotions in the work areas. Additionally, no tobacco products, food items, or drinks are to be taken to or kept in lead work areas.

7.10 Signs

Warning signs shall be posted in work areas where the exposure of lead exceeds the PEL. These signs shall contain of the following words or phrases:

DANGER
LEAD WORK AREA
MAY DAMAGE FERTILITY OR THE UNBORN CHILD
CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM
DO NOT EAT, DRINK OR SMOKE IN THIS AREA

The employer shall ensure that all warning signs are illuminated and cleaned as necessary, and that no statement appears on or near any sign that contradicts or detracts from the meaning of the required signage.

7.11 Lead Waste Disposal

Prior to start of lead work plastic tarps shall be laid down to prevent lead from contaminating the work environment. At the completion of the work, tarps will be cleaned of debris and carefully rolled up for storage or disposal at the end of the project. All lead waste debris from paint removal shall be collected into barrels for proper hazardous waste disposal.

The empties contents of a HEPA vacuum must also be treated as hazardous lead waste when used during lead activities.

7.12 Medical Surveillance

The purpose of medical surveillance is to prevent lead-related disease. Although controls may be in place to prevent overexposure to lead, control systems may fail and hygiene and respirator programs may be inadequate. Therefore, a medical program with periodic surveillance will help detect those failures.

Medical surveillance provisions include two phases:

Initial medical surveillance is to be provided to employees prior to lead exposure. This initial medical surveillance will consist of an initial medical examination and biological monitoring. The examination will provide information to establish a baseline to which subsequent data can be compared. Biological monitoring consists of blood lead level (BLL) and zinc protoporphyrin (ZPP) level tests.

Annual medical surveillance program is to be provided to employees that are exposed to lead or can reasonably be expected to be exposed to lead at levels above the PEL. Biological monitoring shall be offered during annual training. If an employee's BLL exceeds 25 µg/dl, then the employee shall be notified in writing within 5 working days of the receipt of the test results. See Appendix C: Biological Monitoring Notification Letter.

BLL results are to be kept in the employees' personnel file. Employees may decline the offer for either initial or annual medical surveillance testing. If an employee chooses to deny receiving a test, the Division Safety Engineer will document and keep the documented denial in the employee's personnel file (Appendix D). If an employee is found to have an elevated BLL, follow-up testing may occur more frequently. This will be at the discretion of the Division Safety Engineer.

7.13 Medical Removal Protection

Medical Removal Protection (MRP) is a means of protecting employees when engineering controls, work practices, and respirators have failed to provide the required protection to employees. MRP involves the temporary removal of an employee from lead-related work and transfer to a job with no exposure to lead.

Temporary medical removal can occur:

- When an employee's blood lead level exceeds 25 µg/dl
- Upon the recommendation of the examining physician

Employees who are removed due to an elevated BLL shall receive a **monthly** BLL test. If medical opinion caused employee removal, the employee shall be provided medical tests or examinations that the physician believes to be appropriate. The employee shall not return to normal (i.e. lead-related) work activities until acceptable BLL are returned.

7.14 Recordkeeping

Medical surveillance records shall be retained for the duration of employment plus 30 years. Retained records shall include:

All exposure monitoring records for airborne lead. These records shall include:

- Name and job classification of the employees
- Details of the sampling and analytical techniques
- Results of the sampling
- Type of respiratory protection worn by the person sampled

All biological monitoring and results of medical examinations. These records shall include:

- Names of the employees
- Physician's written opinion
- Copy of the results of the examination

Medical removal protection records as applicable. These records shall include:

- Name of employee
- Employee's personnel number
- Date of employee removal
- Date of employee return
- How the removal was accomplished
- Whether or not the removal was for an elevated blood lead level

Employee and competent persons training records. These records shall include:

- Name and job classification of the employees
- General overview of materials covered
- Date of training

8.0 Specific Responsibilities

8.1 Managers / Unit Heads

Managers/Unit Heads are responsible for ensuring that adequate funds are available and budgeted for equipment and supplies to protect employees from lead overexposure.

Managers/Unit Heads will obtain and coordinate the required training for affected employees. They will also designate competent persons for those work activities affected by this safety policy and procedure. Managers/Unit Heads will also ensure compliance with this safety policy and procedure through their auditing process.

8.2 Supervisors

Supervisors will ensure that no lead-related task/operation is performed without the appropriate controls being in place as prescribed in this safety policy and procedure. They will also assist competent and qualified persons as requested in the performance of their duties.

8.3 Competent Persons

Competent persons will be responsible for identifying existing and predictable lead hazards in lead-related task/operations. As part of this they shall perform frequent and regular inspections of job sites, materials, and equipment. They will be also responsible for taking prompt corrective measures to eliminate lead hazards.

8.4 Qualified Persons

Qualified persons shall be responsible for conducting lead exposure assessments in accordance with this safety policy and procedure and established exposure assessment protocols.

8.5 Employees

Employees shall comply with the provisions outlined in this safety and procedure. They are also responsible for immediately reporting any task/operation to their supervisor where there is suspicion of lead exposure.

8.6 Safety & Risk Management

Safety and Risk Management (S&RM) will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this safety policy and procedure. S&RM will assist in developing or securing the required training, and revise and update the written program at least annually to reflect the status.

8.7 Division Safety

The Division Safety Engineer will be responsible for providing employee lead training, expertise, and guidance to qualified person to perform lead exposure assessments.

Appendix A: Lead Compliance Plan

1. Job Site: _____ Date: _____

Bridge # or Yard Anticipated Completion Date: _____

2. Personnel: _____ _____

Supervisor Employee

_____

TS I Employee

_____

Employee Employee

_____

Employee Employee

_____

Employee Employee

3. Activities: (check all that apply)

Welding (arc)	_____	Mechanical Cleaning	_____
Welding (gas)	_____	Hand Cleaning	_____
Cutting (torch)	_____	Other	_____

4. Personal Protective Equipment (check all items to be used):

Safety Glasses	_____	Fall Protection	_____
Racal Breath-Easy Resp.	_____	Life Vest	_____
Goggles/Face Shield	_____	Ear Plugs	_____
Gloves	_____	Hard Hat	_____
Coveralls	_____	Safety Shoes	_____

5. Work Practices (check all that apply, initial upon completion):

Water, Soap, Towels	_____	Hazardous Waste Removal	_____
Tarp or Plastic Sheet	_____	Job Site Inspection	_____
Vacuum (end of shift)	_____	Personal Sampling	_____

6. Training:

Lead Video	_____	Needle Gun	_____
Respirator Use	_____	Compliance Plan	_____

7. Comments

_____

_____

_____

_____

Appendix B: Air Monitoring Notification Letter

DATE:

TO: _____

FROM: _____

SUBJECT: **Lead Monitoring Results**

On_____your work exposure to lead was monitored to determine the level of exposure while _____ The airborne lead exposure was_____**micrograms/meter cubed of air** which indicates an exposure below/above the Permissible Exposure level of 50 micrograms/meter cubed of air as set by OSHA. The respirator you were using does provide protection against this level of lead exposure.

Your health is very important to NCDOT. To protect yourself from lead poisoning, please review the lead compliance program with your supervisor and strictly adhere to the following general requirements:

- Always wear your respirator correctly and always wash it after each use. No facial hair shall be allowed between the mask and your skin.
- Always use the HEPA vacuum cleaner to ventilate the tools you are using and for clean-up of the work area.
- Always wash your face and hands immediately after exiting the work area. Never eat, drink or use tobacco products before you have washed.
- Always wear your protective clothing so as to prevent the contamination of your skin and personal clothing.

Work practices and engineering controls will be evaluated on an ongoing basis to reduce the potential exposures to lead. If you have any suggestions as to reduce lead exposures, please discuss them with your supervisor and call me so I can evaluate them.

Thank you for participating in the lead airborne monitoring program. Please sign this letter and return it to your supervisor.

Signed: _____

Appendix C: Biological Monitoring Notification Letter

DATE:

TO: _____

FROM: _____

SUBJECT: **Biological Monitoring Results**

On_____your blood was analyzed for lead levels. Your blood contained _____ micrograms of lead per deciliter of whole blood, which is below the limit of 40 micrograms per deciliter of whole blood as set by OSHA. It was below/above the level of 25 micrograms per deciliter of whole blood as the level that NC Public Health Dept. of Epidemiology considers acceptable. The average adult who is not exposed to lead has a lead level of between 4 and 8 micrograms per deciliter of whole blood.

Your health is very important to NCDOT. To protect yourself from lead poisoning, please review the lead compliance program with your supervisor and strictly adhere to the following general requirements:

- Always use the Powered Air Purifying Respirator (PAPR) correctly and assure it wash it after each use. It should be stored in a clean container.
- It is highly recommended that you be provided with a general ventilation fan.
- Always wash your face and hands immediately after exiting the work area. Never eat, drink or use tobacco products before washing. Disposable hand wipes are acceptable.
- Always wear of protective clothing so as to prevent the contamination of the skin and personal clothing. Please use either disposable fire resistant coveralls or washable cotton coveralls.
- Please restrict your exposure to lead until you have been re-tested. Your blood-lead test should be below 25 micrograms per deciliter of whole blood prior to returning to work on surfaces contaminated with lead paints.

Thank you for participating in the blood lead monitoring program. Please sign this letter and return it to your supervisor.

Signed: _____

Appendix D: BLL Test Denial Documentation Example

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

ROY COOPER
GOVERNOR

ERIC BOYETTE
SECRETARY

Date:

From: Division Safety Engineer

Subject: Decline Blood Lead Monitoring

As a part of the Lead program, the employer is required to make available to all employees exposed to lead in the workplace a blood test every six months to determine the amount of lead in the blood system.

The primary exposures for NCDOT employees are from welding, cutting, or grinding on metal surfaces painted with lead-based paints. Typical operations are activities involving I-beams, diaphragms, bolts, or stripping of lead-based paints. All workers who currently do this type of work are offered and are encouraged to be tested.

The following employee has been offered this test and has declined at this time to be tested:

NAME:

SIGNATURE:

DATE:

Please place the signed copy in the employee's personal file in lieu of the blood-lead results. Send a copy to Division Engineer for recordkeeping as required by law.

Mailing Address:

Telephone:
Fax:
Customer Service:

Location:

Website: www.ncdot.gov

Author:	Mark Scott, Jim Sawyer (RSO-M&T)	Revision #:	New
Approved By:	Bobby Lewis	Date Revised:	July 2020

SAFETY POLICY & PROCEDURE

Ionizing Radiation SPP# 1910.1096

Quick Reference

Contents

Special Notice:

SPP# 1910.96 Ionizing Radiation and revisions are cancelled as of this date. Appropriately destroy all hard copies which shall be replaced with SPP# 1910.1096 Ionizing Radiation in accordance with OSHA General Industry Standards.

Information Security. N.C.G.S.104E-9(a)(4) outlines authority to withhold information from public disclosure as defined by this and other N.C.G. Ss, except to individuals with a need to know. The Materials and Test (M&T) Unit, Radiation Safety Officer (RSO), Director, Safety and Risk Management (SRM) and Communication, NCDOT will coordinate and forward request by public for agency radioactive material information to the Radiation Protection Section, North Carolina Department of Health and Humans Services, (RPS-NCDHHS)for approval to release information and/or directed response from RPS-NCDHHS.

1.0 Purpose

The purpose of this Safety Policy and Procedure (SPP) is to establish guidelines for radiation protection and safety of North Carolina Department of Transportation (NCDOT) employees.

2.0 Scope and Applicability

Radiation is a form of energy. Ionizing radiation has very damaging effects on skin tissue and can serve as a precursor to several forms of cancer. Materials and Test Unit's Nuclear Density gauges are the primary radiation source in NCDOT.

This SPP provides guidelines for the safe handling of Ionizing Radiation. It includes provisions for training, description of ionizing equipment used in NCDOT, and the necessity of warning signs for restricted areas. Additionally, it includes discussion on the monitoring of personnel for ionizing radiation exposure and the reporting of ionizing radiation overexposure.

This document also details the areas of responsibility for M&T Unit, managers/unit heads, supervisors, employees, SRM, and Division Safety Staff within NCDOT.

The M&T Unit, NCDOT is the designated custodian of nuclear density gauges for this Agency responsible for Program Management, Security, Recordkeeping, Training, Leak Testing, Personnel Monitoring, Exposure Reporting Procedure, Emergency Procedures, Loss/Theft/Damage/Misplacement Reporting, Inspections, Compliance, Etc.… .

This SPP affects any employee who because of their job duties will handle and operate equipment producing or containing ionizing radiation sources. Specifically, this safety policy and procedure affects Materials and Tests Unit employees who use, maintain, and transport nuclear density gauges and field construction employees assigned to projects as nuclear gauge operators.

3.0 Reference

This SPP is established in accordance with Occupational Safety and Health Standards for General Industry and the below listed standards, regulations, guidelines, applicable statutes, laws, manufactures Instructions, this should not be considered an all-inclusive list.

10 CFR 20	Standards for Protection Against Radiation	Nuclear Regulatory Commission
29 CFR 1910.1096	Ionizing Radiation	Occupational Safety and Health Administration (OSHA)
29 CFR 1926.53	Ionizing Radiation	OSHA
N.C.G.S. Chapter 104E	North Carolina Radiation Protection Act	NC General Assembly
13 NCAC 07	Office of Occupational Safety and Health	NC Department of Labor (NCDOL)

10 NCAC 15	Radiation Protection Section	NC Department of Health and Human Service (NCDHHS)
Regulations/Guidelines/ Information	Radioactive Materials Section http://www.ncradiation.net	Radioactive Materials Section (RMS)-NCDHHS
Radioactive Materials License	092-0104-1	Division of Highways, NCDOT and RMS-NCDHHS
Manufacture Instructions and Manuals	Item/s by Manufacture	Specific Manufactures Guidance

4.0 Policy

It is the policy of NCDOT to provide a place of employment that is free from recognized hazards that cause or are likely to cause death or serious physical harm to employees or the public. Therefore, unauthorized handling of radiation sources is strictly prohibited. When radiation hazards exist that cannot be eliminated, then engineering practices, administrative practices, Personal Protective Equipment (PPE), safe work practices, and proper training regarding Ionizing Radiation will be implemented. These measures will be implemented to minimize those hazards to ensure the safety of employees and the public.

5.0 General Responsibilities

It is the responsibility of each manager/unit head, supervisor, and employee to ensure implementation of NCDOT's policy on Ionizing Radiation. It is also the responsibility of each NCDOT employee to report immediately any unsafe act or condition to their supervisor. Specific responsibilities are in Section 6.3.

6.0 Procedure

This section provides applicable definitions, establishes general provisions, and identifies specific responsibilities required by NCDOT's policy on Ionizing Radiation.

6.1 Definitions

Dose
The quantity of ionizing radiation absorbed, per unit of mass, by the body or by any portion of the body.

Film Badge or Dosimetry
Uses optically stimulated luminescence technology with an aluminum oxide- based detector. Radiation exposure is measured by scanning the dosimetry.

Ionizing Radiation
Electromagnetic or particulate radiation capable of producing ions, directly or indirectly, by interaction with matter.

Nuclear Density Gauge
A piece of equipment with a radioactive source used for density measurements of asphalt, aggregate base course and concrete.

Radiation
Includes alpha, beta, gamma, x-rays, neutrons, electrons, protons, and other atomic particles. This term does not include sound or radio waves, or visible light, or infrared or ultraviolet light.

Radioactive Material
Any material which emits, by spontaneous nuclear disintegration, corpuscular or electromagnetic emanations.

Restricted Area
Any area to which access is controlled by M&T Unit, NCDOT for purposes of protection of individuals from exposure to radiation or radioactive materials.

Radiation Safety Officer (RSO)
A RSO is an individual appointed in writing by the licensee (NCDOT), to be responsible for implementing the radiation protection program. The licensee, through the RSO, shall ensure that radiation safety activities are being performed in accordance with licensee-approved procedures and regulatory requirements. A licensee's management may appoint, in writing, one or more Associate RSOs (ARSO) to support the RSO. The RSO, must assign the specific duties and tasks to each ARSO which are restricted. The RSO may delegate duties and tasks to the ARSO but shall not delegate the authority or responsibilities for implementing the radiation protection program.

6.2 General Provisions

This section details the provisions of this safety policy and procedure with each provision discussed in a separate subsection. These provisions are:

- Training
- Equipment
- Warning Signs
- Personnel Monitoring
- Recordkeeping
- Exposure Reporting Procedure
- Emergency Procedures
- Equipment Security, Damage, Loss, Theft, Misplacement Reporting
- Audits and Inspections

6.2.1 Training

Materials and Tests Unit shall train employees affected by this SPP. The M&T Unit shall certify as nuclear gauge operators those affected employees and will train other employees who handle nuclear gauge equipment. Nuclear gauge operators and other employees may be required to complete other training on associated equipment and other job-related duties. Successful completion of the following classroom and field training is required to become a certified nuclear gauge operator:

Topic	COURSE #	Course Covers
Initial Course	MAT-250 Nuclear Safety and Hazardous Materials	Initial Training Awareness and Information Training
Base Course Type Materials (i.e. ABC, CTBC, FDR, etc.)	MAT 370 - Nuclear Density Testing	Base, FDR, and Select Materials
Field Certification	Field Certification	M&T staff provides one-on-one field training and observation
Asphalt Materials	MAT 380 - Density Gauge Operator	Equipment use and information
Field Certification	Field Certification	M&T staff provides one-on-one field training and observation

Material & Testing Unit staff is responsible for all radiation safety training and training documentation. Future training packages and additional recordkeeping may be included in the Learning Management System (LMS).

Nuclear Gauge Refresher Training **is required every** ***three years (triennially)*** **for any DOT employee actively receiving a film badge, unless directed to be conducted sooner.**

Additional information regarding training classes is provide at the following M&T website: https://connect.ncdot.gov/resources/materials/Pages/default.aspx

6.2.2 Equipment

Nuclear Gauge are the primary piece of ionizing equipment used within NCDOT. Nuclear Gauges are used to determine the density of asphalt and aggregate base course. The radioactive material used to perform these tests is in pellet-form, encapsulated inside the equipment.

Nuclear Gauges must be leak tested every 12 months in accordance with our licensing agreement with the North Carolina Radiation Protection Section.

Materials and Tests Unit will maintain records of all NCDOT Nuclear Gauges in receipt of/transferred to or from/ Disposed of/Procured/Leak Testing/Repairs regardless, of how acquired Owned/ Rental/ Lease. Records must be maintained 5 years after appropriate disposal.

Figures 1, 2, and 3 – Sample Nuclear Gauges Photos

Figure 1 - Humboldt Nuclear Gauge

Figures 2 & 3 - Toxler Nuclear Gauges

6.2.3 Warning Signs/Employee Notice Posters

Any facility storing Nuclear Gauges ***shall*** have signs outside the restricted area notifying employees of the potential dangers. These signs shall contain the standard radiation symbol with the conventional radiation caution signage. When storing in magazines magnetic signs are permitted.

Notice to Employee Poster (Appendix A) must be posted in a sufficient number of places in every establishment where employees perform activities regulated by NC Radiation Protection; to permit employees working in or frequenting any portion of a restricted or controlled area to observe a copy on their way to or from their place of employment.
Figure 4 shows sample Radiation Caution Sign and Notice to Employee Poster.

Figure 4

6.2.4 Personnel Monitoring

All employees who use the Nuclear Gauge will always wear film badges to monitor the amount of radiation to which they may be exposed. Film badges are assigned to a specific person and cannot be shared among individuals. These badges are part of a continuous monitoring program and are replaced quarterly.

Materials and Tests Unit will maintain records of the replacement/testing result of all film badges. See Figure 5 – Sample Film Badge Photo.

Figure 5 – Film Badge

6.2.5 Recordkeeping

Materials and Tests Unit, NCDOT shall maintain records of exposures for employees who are required to wear film badges. Materials and Tests Unit shall disclose exposures to employees upon request from the employee. These records of exposures shall be maintained for a period not less than 30 years from the termination of employment with NCDOT.

6.2.6 Exposure Reporting Procedure

For employees not protected by the NRC, all exposures over the allowable threshold limits shall be reported to the NC Commissioner of Labor or their duly authorized representative. In addition, exposure notification in writing shall be submitted to the NC Commissioner of Labor or the duly authorized representative within 30 days of the original exposure date. A record of all radiation exposures must be made available to future employers at the request of former NCDOT employees. The Director, SRM shall be notified in these cases.

6.2.7 Emergency Procedures

Written emergency procedures for nuclear equipment accidents are maintained by M&T Unit as required by license issued by North Carolina Radiation Protection Section (NCRPS). The Director, SRM shall be provided a copy of these emergency procedures.

6.2.8 Security and Reporting Damage, Loss, Theft, Misplacement

Key control is limited to individuals authorized by the RSO.

Nuclear gauge storage facilities must be secure with access limited to authorized personnel. The following individuals should have access to nuclear gauge storage: Certified nuclear gauge operators, M&T Staff, and Resident Engineer.

Field offices assigned a nuclear gauge must designate a certified nuclear gauge operator to perform a weekly security check on assigned nuclear gauge(s). This process requires visually verifying a nuclear gauge is secure and properly stored.

Each security check must be documented on the utilization log sheet (including name and date). A legible copy of the log sheet(s) must be sent to the M&T Unit with the film badge package when returning used badges.

Immediately report evidence of any issues or security concerns to the M&T Staff listed on the emergency procedures, supervisor, and Director, SRM.

6.2.9 Audits and Inspections

Weekly security check noted on daily utilization log sheet must be maintained for three (3) years after a copy is submitted to the M&T Unit. Scanning and maintaining logs electronically is permissible provided the scanned copy is legible.

Announced audits/inspections may be conducted by RSO, NCDOL, NPS-DHHS, and NRC. Safety Staff should accompany inspectors to learn process. Copy of inspections record to Director, SRM.

Unannounced audits/inspections may be conducted by RSO, NCDOL, NPS-DHHS, and NRC. Safety Staff should accompany to learn process. May be conducted without RSO presence. Copy of inspections record to Director, SRM.

Properly trained and assigned M&T Staff will perform semi-annual physical inventories of all nuclear gauges during June and December per the RADIOACTIVE MATERIALS LICENSE. During the inventory process, storage locations are inspected to verify compliance. The Radioactive Materials License requires completion of a documented physical inventory of all every 6 months.

6.3 Specific Responsibilities

6.3.1 Managers/Unit Heads

Managers/Unit Heads will be responsible for identifying the employees affected by this SPP. Managers/ Unit Heads will also ensure compliance with this SPP through their auditing process.

The licensee shall institute the provisions of 10A NCAC 15 .1610 when an occupationally exposed woman voluntarily informs her supervisor, in writing, of the pregnancy and the estimated date of conception. The Supervisor's response and actions must be appropriately documented. Both the individual's voluntary information disclosure and Supervisor's response/s must be protected from unauthorized disclosure/release since potentially they may contain Protected Health Information under HIPAA (Health Insurance Portability and Accountability Act). Additionally, this is a personal matter.

6.3.2 Supervisors

Supervisors will ensure that affected employees are trained in the safe use and handling of equipment, instruments or sources which contain ionizing radioactive materials.

The licensee shall institute the provisions of 10A NCAC 15 .1610 when an occupationally exposed woman voluntarily informs her supervisor, in writing, of the pregnancy and the estimated date of conception. The Supervisor's response and actions must be appropriately documented. Both the individual's voluntary information disclosure and Supervisor's response/s must be protected from unauthorized disclosure/release since potentially they may contain Protected Health Information under HIPAA (Health Insurance Portability and Accountability Act). Additionally, this is a personal matter.

Due to added safety concerns and restrictions during pregnancy, M&T requires reassignment of job duties regarding use of a nuclear gauge when a woman declares a pregnancy. Radiation exposure to an unborn fetus must be strictly monitored and controlled. A temporary job duty reassignment for the duration of the pregnancy is the most effective control method.

6.3.3 Employees

Employees shall not operate any equipment without the proper training. Employees shall not operate any equipment or instrument which is damaged or in any other way malfunctioning. Employees will immediately inform their supervisor if any unsafe condition occurs (e.g., leaks, damage, theft, loss, or misplacement).

Additionally, employees shall not remove or otherwise modify any part of any instrument except to perform allowed routine maintenance or service. Employees shall wear film badges as prescribed.

The licensee shall institute the provisions of 10A NCAC 15 .1610 when an occupationally exposed woman voluntarily informs her supervisor, in writing, of the pregnancy and the estimated date of conception.

6.3.4 Safety and Risk Management

Safety and Risk Management will provide prompt assistance to managers/unit heads, supervisors, or others as necessary on any matter concerning this SPP.

Additionally, NCDOT assign Safety Engineers, Consultants, or Officers will provide consultative and audit assistance to ensure effective implementation of this SPP.

6.3.5 Materials and Test Unit

Materials and Tests Unit will provide guidelines for the safe transport of nuclear gauges or other related equipment containing radioactive materials. Materials and Tests Unit will coordinate all training with the North Carolina Radiation Protection Section for the affected employees.

Materials and Test's Radiation Safety Officer must be designated in writing and is responsible for maintaining and updating the radiation license from the Radiation Protection Section with copy forwarded to Director, SRM.

6.4 Reporting Safety Concerns

ANYRISK is a safety reporting tool for NCDOT personnel. NCDOT Employees may report safety concerns anonymously, if desired (24/7/365) to:

1. https://connect.ncdot.gov/anyrisk
2. 1-866-361-1818

Appendix A: Radiation Notice to Employees Poster

NC DEPARTMENT OF HEALTH AND HUMAN SERVICES
Division of Health Service Regulation

NOTICE TO EMPLOYEES

Standards for Protection Against Radiation; Notices; Instructions and Reports to Workers; Inspections

NORTH CAROLINA RADIATION PROTECTION

EMPLOYEE'S RESPONSIBILITY AS A WORKER:
Familiarize yourself with the provisions of the radiation protection regulations and operating procedures that apply to the work in which you are engaged. Observe those provisions for your own protection, the protection of your co-workers and others. If you observe conditions which may lead to violations or have a safety concern, promptly report them to your supervisor.

WHAT IS COVERED BY THESE REGULATIONS?
1. Limits on exposure to radiation and radioactive materials in restricted and unrestricted areas;
2. Measures to be taken after accident exposure;
3. Personnel monitoring, surveys, and equipment;
4. Caution signs, labels and safety interlock equipment; and
5. Exposure records and reports.

YOUR EMPLOYER'S RESPONSIBILITY:
1. Comply with the requirements of North Carolina Regulations for Protection Against Radiation 10A NCAC 15 pertaining to work involving sources of radiation; departmental orders and registration or licensing conditions;
2. Post or otherwise make available to you a copy of the North Carolina Regulations for Protection Against Radiation 10A NCAC 15, certificates, registrations or licenses and the operating procedures that apply to the work you perform, and explain those provisions to you;
3. Post Notices of Violation involving radiological working conditions and orders.
4. Provide adequate radiation safety training to you, including the use of radiation producing devices or radioactive materials you may be expected to use.
5. Keep your radiation exposure as far below the maximum allowable limits as is "reasonably achievable."
6. Provide you with information on your exposure to radiation.

REPORTS ON YOUR RADIATION EXPOSURE HISTORY
Your employer is required to maintain records of your exposure to radiation as required by 10 CFR 20.2106. Your employer is required to provide you with written notification or a report of your exposure history under 10 CFR 19.13 if:
1. Your dose exceeds 100 millirem TEDE or 100 millirem to any organ or tissue over the monitoring year, or if you request your annual dose.
2. You receive an exposure in excess of the annual dose limits. Your employer is required by 10 CFR 20.2205 to give you this report within 30 days of the discovery of the exposure exceeding the dose limits. The exposure limits for occupational workers are found in 10 CFR 20.1201.
3. You are no longer employed by the licensee, and you request your exposure history from your former employer. 10 CFR 19.13(e) requires your former employer to provide you with this report within 30 days of your request, or 30 days after your dose is determined, whichever is later.

POSTING REQUIREMENT
Copies of this notice must be posted in a sufficient number of places in every establishment where employees perform activities regulated by NC Radiation Protection; to permit employees working in or frequenting any portion of a restricted or controlled area to observe a copy on their way to or from their place of employment.

INSPECTIONS
All licensed or registered activities are subject to inspections by representatives of the NC Department of Health and Human Services. During inspections, agency inspectors may confer privately with workers; and workers may bring to the attention of the inspectors any past or present condition which they believe contributed to or caused any violation as described above. The employer must not prevent you from talking with an inspector. If you believe your employer has not corrected violations involving radiological working conditions, you may request an inspection. The request must specify exactly what is wrong and must be signed by the worker or worker representative. The agency will make all reasonable efforts to protect your identity where appropriate and possible.

REPORTING SAFETY CONCERNS
Inquiries dealing with the matters outlined above are to be made to the Radiation Protection Section. Agency representatives may be reached during normal weekday work hours (8 a.m. – 5 p.m.) **by phone at (919) 814-2250 or by mail to: Section Chief, NC Radiation Protection, 5505 Creedmoor Road, Suite 100, 1645 Mail Service Center, Raleigh, NC 27699-1600.**

RADIOACTIVE MATERIALS BRANCH INCIDENT 24 HOUR EMERGENCY LINE:
(919) 602-7151.
After normal hours, calls may be directed to the NC Emergency Management Operation Center at
(800) 858-0368.

EMPLOYMENT DISCRIMINATION
The North Carolina Employment Discrimination Bureau (EDB) enforces the Retaliatory Employment Discrimination Act (REDA). Employees who have questions about the application of REDA or employees who believe they have been discriminated or retaliated against, should contact the EDB information officer. They will advise you of the proper procedures to file a complaint. You may contact them by sending mail to N.C. Department of Labor, Employment Discrimination Bureau, 1101 Mail Service Center, Raleigh, NC 27699-1101 or by fax at (919) 807-2824 or by phone at (800) 625-2267 or fax (919) 807-2856 That website is **http://www.nclabor.com.**

www.ncdhhs.gov • N.C. DHHS is an equal opportunity employer and provider. • 5,000 copies of this public document were printed at a cost of $320.30 or $.06406 per copy. 9/19

Author:	John Cala/Paul Roberts	Revision #:	3
Approved By:	Bobby Lewis	Date Issued:	March 2020

SAFETY POLICY & PROCEDURE

Silica ExposureControl Plan SPP# 1926.1153A

NCDOT Written Silica Exposure Control Plan

Created: March 2018
Last Reviewed: March 2020
Reviewed By: John Cala, CIH
Revision: 3

NCDOT Written Silica Exposure Control Plan

Introduction

This Written Exposure Control Plan is to be used department-wide by NCDOT, along with SPP 1926.1153, to ensure compliance with OSHA's 29 CFR 1926.1153 Respirable Crystalline Silica Standard for Construction, 29 CFR 1910.1053 Respirable Crystalline Silica Standard for General Industry, and Maritime regulations for respirable crystalline silica. The establishment and implementation of this plan specifically satisfies the w*ritten exposure control plan* requirements described in 29 CFR 1926.1153(g) and 29 CFR 1910.1053(f)(2). This plan will be reviewed and redistributed at least annually.

This plan describes all foreseeable tasks that could reasonably be expected to expose employees to hazardous levels of respirable crystalline silica. For each task, a general description of the following is provided:

- Tasks that involve potential exposure
- Engineering and work practice controls
- Respiratory protection / other PPE
- Housekeeping
- Procedures for restricting work access

This Written Exposure Control Plan is to be made readily available for examination and copying, upon request, to each employee covered by Safety Policy and Procedure (SPP) 1926.1153, their designated representatives, the Assistant Secretary, and the Director. When performing the listed activities, strict adherence to this Written Exposure Control Plan is required to ensure the protection of employees. If the controls for a listed task are unable to be implemented, or if a potentially hazardous silica-related activity is not listed in this plan, please contact the divisional safety engineer or one of the following Safety and Risk Management personnel:

John Cala, CIH
(919) 814.2182
jmcala@ncdot.gov

Paul Roberts, CSP, AOES
(919) 814.2184
proberts@ncdot.gov

Jarvis Gray, Deputy Director, SRM
(919) 814.2185
jkgray1@ncdot.gov

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Acronyms/Definitions

- **APF**: Assigned Protection Factor; the workplace level of respiratory protection that a respirator or class of respirators is expected to provide to employees when the employer implements a continuing, effective respiratory protection program.

- **APF = 10**: Any air purifying particulate respirator equipped with an N95, R95, or P95 filter (including N95, R95, and P95 filtering facepieces) except quarter- mask respirators. The following filters may also be used: N99, R99, P99, N100, R100, P100.

- **APF = 25**: Any loose-fitting powered air-purifying respirator with a high-efficiency particulate filter.

- **HEPA**: (High Efficiency Particulate Air) a HEPA filter is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH particulate filters are the N100, R100, and P100 filters.

- **PAPR: (**Powered Air Purifying Respirator) a loose-fitting, positive pressure, battery-powered respirator which does not require a fit test.

- **SPP 1926.1153**: NCDOT's internal Safety Policy and Procedure on Silica in Construction, based on OSHA standard 29 CFR 1926.1153.

- **SPP 1910.134**: NCDOT's internal Safety Policy and Procedure on Respiratory Protection, based on OSHA standard 29 CFR 1910.134.

- **Table I**: OSHA-provided guidance for specific task engineering controls necessary for compliance with the silica standard. *Table I is provided as an attachment to this plan.*

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Abrasive blasting of concrete bridge deck joints during bridge maintenance operations. ®

Engineering and Work Practice Controls:

- *Table I in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction does not include this task.*
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task. Employees will be informed of the hazards associated with the operation and controls to be utilized to eliminate or reduce the risk of silica exposure. A competent person will be designated to monitor the operation and perform re-assessments when necessary.

Respiratory Protection:

- Respiratory protection will be required at all times, regardless of the duration of the operation.
- Respiratory protection is to consist of a supplied air respirator with helmet and protective apron.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.
- The supplied breathing (compressed) air shall be tested periodically (Grade D air testing).

Other PPE:

- Employees may consider the use of other protective clothing (e.g. disposable protective coveralls).

Housekeeping:

- When possible, the work area should be wet cleaned; dry sweeping is not permitted.

Procedures for Restricting Access to Work Areas:

- Other employees working near the operation should maintain an adequate distance from the operation to avoid exposure to airborne silica. Restricted access may be necessary.
- Public access restrictions (traffic cones, drums, or tape) are to be utilized.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Materials and Testing (M&T) quality assurance testing of concrete materials (includes sifting/transferring of aggregate, operation of Gilson/Silent Sifter machinery, and drilling of concrete cores).

Engineering and Work Practice Controls:

- *This activity falls under the General Industry (29 CFR 1910.1053) regulation.*
- Aggregate sifting is only to be performed in a designated "shaker room," which will maintain properly shut doors.
- The employee will only be in the shaker room when necessary, i.e. during filling and emptying/weighing of aggregate. The shaker room will be vacated while the machines are in operation.
- The shaker room must be equipped with local exhaust ventilation (LEV) suitable for the size of the room. Outdoor exhaust is the preferred method, but properly implemented recycling systems equipped with a filter are acceptable.
- The LEV system must be used in accordance with the manufacturer's specification and must be rated to handle dust.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required for this activity.
- If employees decide to voluntarily wear a respirator, they must comply with the requirements of the voluntary respirator usage (NCDOT SPP# 1910.134 Appendix D).

Other PPE:

- Employees should consider the use of other protective clothing (e.g. disposable protective coveralls, hearing protection).

Housekeeping:

- The shaker room and nearby areas should be cleaned regularly to prevent the buildup of dust.
- Cleaning should be performed with a HEPA vacuum, sweeping compound, or comparable system.
- Compressed air is not to be used to clean surfaces or clothing.

Procedures for Restricting Access to Work Areas:

- There should not be other employees working regularly in the vicinity of the shaking/sifting activities.
- Designated shaker rooms should have access limited to the pertinent employee(s) and are to have warning signs posted at all entrances.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Hand-mixing pre-packaged, bagged grout, quikrete or concrete (all cementitious, silica-containing material) for outdoor road and bridge maintenance and repair operations. ®

Engineering and Work Practice Controls:

- *Table I in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction does not include this task.*
- A reference to this type of task is noted in the OSHA 2017 publication, Small Entity Compliance Guide for the Respirable Crystalline Silica for Construction, which reads, "Employee exposures can reasonably be anticipated to remain below 25 micrograms per cubic meter of air (mg/m^3) as an 8-hour TWA (time weighted average) when performing certain tasks that involve only minimal exposure to respirable crystalline silica. Such tasks include: Mixing concrete for post holes; pouring concrete footers, slab foundations and foundation walls; and removing concrete formwork. When these tasks are performed in isolation from tasks that generate silica, the standard does not apply."
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review the material's Safety Data Sheet (SDS). Employees will be informed of the hazards associated with the material and controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and perform re-assessments when necessary.
- Water or vacuum systems for dust suppression are not an option during outdoor hand-mixing of bagged cementitious material, therefore alternative exposure control methods will be utilized to determine employee exposure.
- The use of ready-mixed products is the preferred method of using cementitious silica-containing products/materials, however the amount of material needed (2 yards is typically the minimum order requirement) and the accessibility of the work site (amount of space needed to maneuver a large concrete delivery truck) may be prohibitive to using ready-mixed materials.
- For grouting operation, only those employees *on* the grouting unit (performing the opening/emptying and mixing) are considered to be exposed. Other employees, including those applying the wet grout mixture, are to remain clear (>20 feet) from the emptying process and potential dust exposure.
- Employees engaged in the opening/emptying of material bags are not to perform that task for a duration greater than 4 hours.

Respiratory Protection:

- Unless an exposure determination has been completed, all employees engaged in the opening/emptying or mixing of bagged cementitious, silica -

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

containing materials are **required to use respiratory protection at all times**, regardless of the duration of the operation.

- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.
    - Individuals are not to share their respirator with other employees.

Other PPE:

- Employees may consider the use of other protective clothing (e.g. disposable protective coveralls).

Housekeeping:

- The work area around the hand-mixing operation should be wet cleaned when possible after the task has been completed.
- Compressed air is not to be utilized to clean employee clothing or surfaces.

Procedures for Restricting Access to Work Areas:

- Other employees working near the operation should maintain an adequate distance (>20 feet) and remain up-wind of visible airborne dust.
- Public access restrictions (traffic cones, drums or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Using a **rotary or hammer drill** to drill holes in asphalt or concrete (includes installation of sign posts and flexible delineators, drilling holes for anchor bolts required for mounting traffic signal cabinets, and drilling anchor bolt holes and during concrete form work construction during bridge maintenance operations). †

Engineering and Work Practice Controls:

- Table I (vii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- The dust suppression system for the drill shall include a commercially available collection system which shall be operated and maintained in accordance with the manufacturer's instructions to minimize dust emissions.
- The dust collector must provide 25 cubic feet per minute of airflow or greater as recommended by the tool manufacturer and have a filter with 99% or greater efficiency and cyclonic pre-separator or filter-cleaning mechanism. The shroud or cowling must be intact and installed and the hose connecting the tool to the vacuum must be intake and without kinks or tight bends. The filters must be cleaned or changed in accordance with the manufacturer's instructions. Dust collection bags must be emptied to avoid overfilling.
- A HEPA-filtered vacuum must be used when cleaning holes. Compressed air can be used to clean holes when used in conjunction with a HEPA-filtered vacuum to capture the dust or a hole-cleaning kit designed for use with compressed air.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using the drill indoors or outdoors.

Housekeeping:

- When using the drill indoors or in an enclosed area, additional exhaust must be provided to minimize the accumulation of visible airborne dust.

Procedures for Restricting Access to Work Areas:

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Using a **rotary or hammer drill** to drill holes in asphalt or concrete *without the use of a dust suppression system.* ®

Engineering and Work Practice Controls:

- This activity should only be performed when the Table 1 controls (dust suppression system) cannot be feasibly implemented fully.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- The use of applied water for dust suppression should be considered.
- A HEPA-filtered vacuum must be used when cleaning holes. Compressed air can be used to clean holes when used in conjunction with a HEPA-filtered vacuum to capture the dust or a hole-cleaning kit designed for use with compressed air.

Respiratory Protection:

- Respiratory protection (APF10 or better) should be implemented for the duration of this activity by all employees in the vicinity.

Housekeeping:

- When using the drill indoors or in an enclosed area, additional exhaust must be provided to minimize the accumulation of visible airborne dust.

Procedures for Restricting Access to Work Areas:

- Activity access will be limited to those necessary to perform the task.
- The work area will be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Using a **dowel drill** to drill holes in asphalt or concrete (i.e. gang drilling). † ®

Engineering and Work Practice Controls:

- Table I (viii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- Dowel drilling rigs are not permitted to be used indoors.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- The dust suppression system for the drill shall include a commercially available shroud and collection system which shall be operated and maintained in accordance with the manufacturer's instructions to minimize dust emissions.
- The dust collector must provide airflow equal or greater to that recommended by the tool manufacturer and have a filter with 99% or greater efficiency and cyclonic pre-separator or filter-cleaning mechanism. The shroud or cowling must be intact and installed and the hose connecting the tool to the vacuum must be intake and without kinks or tight bends. The filters must be cleaned or changed in accordance with the manufacturer's instructions. Dust collection bags must be emptied to avoid overfilling.
- A HEPA-filtered vacuum must be used when cleaning holes. Compressed air can be used to clean holes when used in conjunction with a HEPA-filtered vacuum to capture the dust or a hole-cleaning kit designed for use with compressed air.

Respiratory Protection:

- Respiratory protection is required at all times for this activity.
- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Housekeeping:

- The work area around the drilling operation should be wet cleaned when possible after the task has been completed.
- Compressed air is not to be utilized to clean employee clothing or surfaces.

Procedures for Restricting Access to Work Areas:

- Access should be limited to those employees engaged in the activity.
- Public access restrictions (traffic cones, drums or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Manually clearing bridge shoulders with shovels and blowers.

Engineering and Work Practice Controls:

- Periodic bridge maintenance includes the clearing of dirt and debris buildup on the bridge shoulders. Material is manually removed with brooms and shovels and then cleared away with a blower (typically a backpack blower). Each bridge takes ~15 minutes to clear. For safety and convenience reasons a sweeper machine nor wet methods are practical options to perform this activity.
- Employees manually clearing the shoulders must remain appropriately distanced from the employee blowing the shoulders clean (>35 feet).
- Each employee can operate the blower for a maximum of 3 bridges and then must switch roles with another employee.
- Be mindful of wind direction and, if possible, keep employees upwind of the blowing operation.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required.
- Respiratory protection is required when the blower is operated by a specific employee for 4 or more hours or on 4 or more bridges.
- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation.

Housekeeping:

- Keep equipment and employees properly distanced from the blowing operation.
- Removed dirt and debris should be deposited a safe distance from the roadways before or after the bridge, not strewn over the side.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Using **handheld grinders** for scoring, grinding and shaping concrete (e.g. bridge substructure repair). †

Engineering and Work Practice Controls:

- Table I (xii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- A dust suppression system for the grinder may include either (1) a commercially developed integrated water delivery system that continuously feeds water to the blade or (2) a commercially available dust collection system. For use of either system, operate and maintain the grinder in accordance with the manufacturer's instructions to minimize dust emissions.
- If using an integrated water delivery system, the system can be a free-flowing water system designed for blade cooling as well as manufacturers' systems designed for dust suppression alone. This option applies only when grinders are used outdoors.
- When the use of water is not feasible for the operation/task, a grinder equipped with a commercially available dust collection system will be utilized. The dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism. The shroud or cowling must be intact and installed and the hose connecting the tool to the vacuum must be intact and without kinks or tight bends. The filters must be cleaned or changed in accordance with the manufacturer's instructions. Dust collection bags must be emptied to avoid overfilling.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using the grinder outdoors. No respiratory protection is required when the grinder is used indoors or in an enclosed area if the work-shift is less than 4 hours.
- Respiratory protection is required when the grinder is used indoors or in an enclosed area when the work-shift exceeds 4 hours.
- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25)

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

may be used as well.

- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.

Housekeeping:

- When working indoors or in an enclosed area, slurry generated during the use of water suppression systems will be cleaned up using a wet vacuum and the slurry transferred into a closed container for disposal.
- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate air-borne dust.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Spray application of aggregate-pitch mixture for spot patching (e.g. *Durapatching*).

Engineering Controls:

- The exposure assessment for this activity showed that there is no exposure at or above the action level of 25 µg/m3, and therefore no engineering controls are required.

Work Practice Controls:

- Aggregate must be washed prior to use to limit amount of dust.
- Employees must remain behind the application hose during use so that no stone or pitch is blown into their breathing zone.
- This activity must be performed outdoors.
- If a large visible plume of dust results from the task, the competent person may want to reevaluate the task and consider rewashing the aggregate or performing the task on a windier day.
- Employees should limit handling or shoveling aggregate whenever possible (e.g. shoveling aggregate into hopper from dump truck).

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required for this activity.

Housekeeping:

- Dry sweeping of dust covered areas is not permitted.
- Avoid opening vehicle doors or windows to prevent interior dust accumulation.

Procedures for Restricting Access to Work Areas:

- The work area will be restricted to other employees not directly involved in the task by the supervisor or crew lead.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Using **handheld grinders** for mortar removal (i.e. tuckpointing). † ®

Engineering and Work Practice Controls:

- Table I (xi) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- The dust suppression system for the grinder must include a commercially available dust collection system that is operated and maintained in accordance with the manufacturer' s instructions to minimize dust emissions.
- The dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism. The shroud or cowling must be intact and installed and the hose connecting the tool to the vacuum must be intact and without kinks or tight bends. The filters must be cleaned or changed in accordance with the manufacturer's instructions. Dust collection bags must be emptied to avoid overfilling.
- If a visible plume of dust results from the task, all activity must be stopped by the competent person and the engineering controls must be re-evaluated.

Respiratory Protection:

- Respiratory protection is required at all times for this activity.
- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation if the activity duration is less than 4 hours per shift.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) must be used if the activity duration exceeds 4 hours per shift.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.

Housekeeping:

- Dry sweeping of dust covered areas is not permitted; wet the area before

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

cleaning to eliminate air-borne dust.

Procedures for Restricting Access to Work Areas:

- The work area will be restricted to other employees not directly involved in the task by the supervisor or crew lead.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Sawing/cutting concrete or asphalt slabs, pavement, sidewalks or curb using a **handheld power saw** during road and bridge maintenance operations or maintenance of signal loops (wet methods). †

Engineering and Work Practice Controls:

- Table I (ii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- A dust suppression system for the saw will consist of a commercially developed integrated water delivery system that continuously feeds water to the blade that will be operated and maintained in accordance with the manufacturer's instructions to minimize dust emissions.
- When using the integrated water system, ensure the water spray nozzle is working properly to apply water at the point of dust generation, the spray nozzle is not clogged or damaged and all hoses and connections are intact.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using the saw outdoors for less than 4 hours per shift.
- Respiratory protection is required at all times when using the saw indoors or in an enclosed area, or when used indoors for 4 or more hours per shift.
- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.
    - Individuals are not to share their respirator with other employees.

Housekeeping:

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

- When working indoors or in an enclosed area, slurry generated during the use of water suppression systems will be cleaned up using a wet vacuum and the slurry transferred into a closed container for disposal.
- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate air-borne dust.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Sawing/cutting concrete, brick, or asphalt using a **handheld power saw** where neither water integration nor vacuum system is feasible. ®

Engineering and Work Practice Controls:

- *Table I in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction does not include this task.*
- **Dry sawing without a dust collection system or water suppression is a *last resort* activity and must not exceed 15 minutes.**
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- All employees not integral to the activity are to stay a suitable distance away and upwind from the activity to prevent exposure.

Respiratory Protection:

- Respiratory protection is required at all times during this activity.
- A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees engaged in this operation.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) is recommended.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory Protection SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.
    - Tight fitting respirators are not to be shared among employees.

Housekeeping:

- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate air-borne dust or use a sweeping compound.

Procedures for Restricting Access to Work Areas:

- Work access are should be restricted to those employees directly involved in the task.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Sawing/cutting concrete, brick, or asphalt using a **handheld power saw** with vacuum system and blade diameter <8 inches. †

Engineering and Work Practice Controls:

- Table I (iii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- In some Division Bridge Maintenance operations use of water is not feasible (e.g. patching bridge decks) due to the type of materials utilized for filling the sawed-out area. In those cases, a saw equipped with a commercially available dust collection system will be utilized. The dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with a 99% or greater efficiency. The shroud or cowling must be intact and installed. The hose connecting the saw to the vacuum must be intact and without kinks or tight bends. The filter(s) on the vacuum must be cleaned or changed to prevent clogging and the collection bags regularly emptied to avoid clogging or over-filling.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- A dust suppression system for the saw will consist of a commercially available dust collection system operated in accordance with the manufacturer's instructions to minimize dust emissions.
- *The operation is not to exceed four hours.*

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required for equipment operators or others who assist during the operation.

Housekeeping:

- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate air-borne dust.
- Minimize or prevent dust buildup on tools and equipment.

Procedures for Restricting Access to Work Areas:

- Work access are should be restricted to those employees directly involved in the task.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Sawing/cutting concrete, brick, or asphalt using a **handheld power saw** with integrated vacuum system and blade diameter >8 inches.

Engineering and Work Practice Controls:

- *Table I in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction does not include this task.*
- Although OSHA's Table I does not list dust vacuum collection systems for handheld saws with a blade diameter larger than 8 inches, commercially developed systems are available. In those cases, a saw equipped with a commercially available dust collection system will be utilized. The dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with a 99% or greater efficiency. The shroud or cowling must be intact and installed. The hose connecting the saw to the vacuum must be intact and without kinks or tight bends. The filter(s) on the vacuum must be cleaned or changed to prevent clogging and the collection bags regularly emptied to avoid clogging or over-filling.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- A dust suppression system for the saw will consist of a commercially available dust collection system operated in accordance with the manufacturer's instructions to minimize dust emissions. Specific questions may need to be answered by the manufacturer's customer service department.
- Homemade or makeshift vacuum systems are not to be utilized.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required for equipment operators or others who assist during the operation ***if the operation duration is less than 1 hour.***
- Respiratory protection is required if the duration exceeds 1 hour for this activity.
    - A respirator with an assigned protection factor (APF) of at least 10 will be utilized by employees.
    - A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
    - If used, the respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
        - Only employees that have been medically cleared are permitted to use a respirator.
        - The respirator shall be inspected prior to use and

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

cleaned after each use.

Housekeeping:

- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate air-borne dust or use a sweeping compound.
- Minimize or prevent dust buildup on tools and equipment.

Procedures for Restricting Access to Work Areas:

- Work access are should be restricted to those employees directly involved in the task.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Using heavy equipment and utility vehicles (dozers, track hoes, backhoes, sweepers) for **grading and excavating during road and bridge maintenance and construction operations.** This includes the operation of a motor grader for blading gravel roads. †

Engineering and Work Practice Controls :

- Table I (xviii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- If the only employee engaged in the task, the equipment operator must be in an enclosed, filtered cab that is maintained as free as practicable from settled dust, has door seals and closing mechanisms that work properly, has gaskets and seals that are in good conditions and work properly, is under positive pressure maintained through continuous delivery of filtered air, has intake air that is filtered through a pre-filter that is at least 95% efficient (e.g. MERV-16 or better), and has heating and cooling capabilities.
- If the equipment cab is not enclosed, or when employees outside the equipment cab are engaged in the operation, apply water and/or dust suppressants as necessary to minimize dust emissions (e.g. use of water truck and spray hose).

Housekeeping:

- Equipment cabs must be maintained as free as possible from air-borne dust; wet cleaning methods should be utilized (e.g. wet-sponge/cloth, water hose, etc.).
- The use of a HEPA vacuum system is also an acceptable method for interior cleaning of the equipment cab.
- Dry sweeping the cab is not permitted.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required for equipment operators or others who assist during the operation.

Procedures for Restricting Access to Work Areas:

- The use of heavy equipment will inherently require restricted access to other employees.
- Public access restrictions (cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Using **heavy equipment and utility vehicles (e.g. hoe-ram, rock-ripper)** for the fracturing or abrading of rock and soil, demolishing concrete masonry structures, or loading, dumping, and removing demolition debris during road and bridge maintenance and construction operations. †

Engineering and Work Practice Controls:

- Table I (xvii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessment s when necessary.
- Equipment operators must be in an enclosed, filtered cab that is maintained as free as practicable from settled dust, has door seals and closing mechanisms that work properly, has gaskets and seals that are in good conditions and work properly, is under positive pressure maintained through continuous delivery of filtered air, has intake air that is filtered through a pre-filter that is at least 95% efficient (e.g. MERV-16 or better), and has heating and cooling capabilities.
- When employees outside the equipment cab are engaged in the operation, apply water and/or dust suppressants as necessary to minimize dust emissions (e.g. use of water truck and spray hose).

Housekeeping:

- Equipment cabs must be maintained as free as possible from airborne dust; wet cleaning methods should be utilized (e.g. water hose)
- Dry sweeping the cab is not permitted.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required for equipment operators or others who assist during the operation.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Inspection of contract operations which generate silica dust as outlined in OSHA' s 1926.1153, Respirable Crystalline Silica Standard for Construction.

Engineering and Work Practice Controls:

- *Table I in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction does not include this task.*
- The NCDOT technician will conduct a tailgate safety meeting prior to the beginning of the operation in order to identify silica exposure hazards associated with the contractor's operation.
- Visible dust is an indication of a failed or non-existent dust suppression system. The technician should maintain adequate distance from airborne dust to avoid inhalation and notify the contractor's competent person of the requirement for dust suppression during operations that generate airborne silica dust.
- If the contractor is unable to comply with the requirements of OSHA's Table I, the technician shall consider the use of a respirator based upon the tasks and tools and respiratory requirements listed in Table I.
- The technician should be trained as a NCDOT competent person for respirable crystalline silica.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required.

Housekeeping:

- Vehicles must be maintained as free from silica dust as possible; vacuum or wet cleaning methods (e.g. wet sponge/cloth) should be utilized.
- Dry sweeping of vehicle cabs is not permitted.
- The NCDOT technician should communicate any housekeeping issues or concerns to the contractor.

Procedures for Restricting Access to Work Areas:

- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.
- The NCDOT technician should communicate any access issues or concerns to the contractor.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Using **jackhammers and/or handheld powered chipping tools** for road, bridge and traffic services maintenance, repair, and installation operations (including bridge repair and maintenance: decks, barrier rails, parapet, beams, approach slabs and piers, median barrier rails, roadway repairs and maintenance: sidewalks, curb and gutter, minor drainage structures or manholes, islands, median and shoulder drainage ditches, and traffic services: traffic sign installation) with an integrated water suppression or dust collection system. †

Engineering and Work Practice Controls:

- Table I (x) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- A dust suppression system for the jackhammer or handheld powered chipping tool may include either (1) a commercially developed integrated water delivery system that continuously feeds water to the blade or (2) a commercially available shroud and dust collection system. For use of either system, operate and maintain the tool in accordance with the manufacturer's instructions to minimize dust emissions.
- If using an integrated water system, ensure the water spray nozzle is working properly to apply water at the point of dust generation, the spray nozzle is not clogged or damaged, and all hoses and connections are intact.
- If using a shroud and dust collection system, the collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with a 99% or greater efficiency. The shroud or cowling must be intact and installed, the hose connecting the jackhammer or tool to the vacuum must be intact and without kinks or tight bends, and the filter(s) on the vacuum must be cleaned or changed to prevent clogging and the collection bags regularly emptied to avoid clogging or over-filling.
- Makeshift or homemade dust suppression systems are not to be utilized.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using jackhammers or chipping tools outdoors unless the operation/task exceeds a 4-hour shift.
- Respiratory protection is required if the jackhammer or chipping tools are used indoors or in an enclosed area for any duration or used outdoors for over 4 hours per shift.
    - When required, a respirator with an assigned protection factor (APF)

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

of 10 will be utilized by the employee.
- A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
- The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
    - Only employees that have been medically cleared are permitted to use a respirator.
    - The respirator shall be inspected prior to use and cleaned after each use.

Housekeeping:

- When working indoors or in an enclosed area, slurry generated during the use of water suppression systems will be cleaned up using a wet vacuum and the slurry transferred into a closed container for disposal.
- When working outdoors, collection of generated slurry options should be explored.
- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate airborne dust or use a sweeping compound.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Using a **small drivable milling machine** (less than half-lane) with integrated water suppression system for milling asphalt pavement during road and bridge maintenance operations, and for the removal of pavement marking paint or thermoplastic during traffic services operations. This includes the use of a skid steer with millingattachment. †

Engineering and Work Practice Controls:

- Table I (xiv) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- The machine must be operated and maintained in accordance with the manufacturer's instructions to minimize dust emissions.
- The machine must be equipped with supplemental water sprays designed to suppress dust. Water should be combined with a surfactant (cleaning agents/soaps/detergents).
- An adequate supply of water for dust suppression must be used, the spray nozzles must be working properly and produce a pattern that applies water at the point of dust generation, the spray nozzles must not be clogged or damaged, and all hoses and connections must be intact.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using the machine.

Housekeeping:

- When using the machine indoors or in enclosed areas, additional exhaust must be provided to prevent the accumulation of visible airborne dust.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Description of Task: Grinding to remove pavement marking paint or thermo-plastic from asphalt or concrete roadways using a **walk-behind milling machine** during traffic services operations with either an integrated water suppression or dust collection system. †

Engineering and Work Practice Control:

- Table I (xiii) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessments when necessary.
- A dust suppression system for the machine may include either (1) a commercially developed integrated water delivery system that continuously feeds water to the cutting surface or (2) a commercially available shroud and dust collection system. For use of either system, operate and maintain the saw in accordance with the manufacturer's instructions to minimize dust emissions.
- If using an integrated water system ensure an adequate supply of water for dust suppression is used, the spray nozzles are working properly and produce a pattern that applies water at the point of dust generation, spray nozzles are not clogged or damaged, and all hoses and connections are intact.
- When the use of water is not feasible for the operation/task, a machine equipped with a commercially available dust collection system will be utilized. The dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow and have a filter with a 99% or greater efficiency and a filter-cleaning mechanism. The hose connecting the machine to the vacuum must be intact and without kinks or tight bends. The filter(s) on the vacuum must be cleaned or changed to prevent clogging and the collection bags regularly emptied to avoid clogging or over-filling.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using the machine outdoors or indoors for less than 4 hours per shift.
- Respiratory protection is required if the milling machine is used indoors or in an enclosed area for over 4 hours per shift.
    - When required, a respirator with an assigned protection factor (APF) of 10 will be utilized by the employee.
    - A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
    - The respirator shall be used in accordance to the

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).

- Only employees that have been medically cleared are permitted to use a respirator.
- The respirator shall be inspected prior to use and cleaned after each use.

Housekeeping:

- When working indoors or in an enclosed area, loose dust must be cleaned with a HEPA-filtered vacuum in between passes of the machine to prevent the loose dust from being re-suspended. Additional ventilation must be provided as needed to minimize the accumulation of visible airborne dust.

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

NCDOT Written Silica Exposure Control Plan

Description of Task: Sawing/cutting concrete or asphalt slabs, pavement, sidewalks, or curbs using a **walk behind saw** with integrated water suppression system during road and bridge maintenance operations. †

Engineering and Work Practice Controls:

- Table I (iv) in OSHA's 1926.1153, Respirable Crystalline Silica Standard for Construction, will be incorporated and implemented into this Plan.
- The NCDOT supervisor or crew leader will conduct a tailgate safety meeting prior to the beginning of the operation/task to review identified silica hazards and instruct employees on the controls to be utilized to eliminate or reduce the risk of exposure. A competent person will be designated to monitor the operation and/or tools/equipment and perform re-assessment s when necessary.
- A dust suppression system for the saw must include a commercially developed integrated water delivery system that continuously feeds water to the blade. The saw will be operated and maintained in accordance with the manufacturer's instructions to minimize dust emissions.
- Ensure the water spray nozzle is working properly to apply water at the point of dust generation, the spray nozzle is not clogged or damaged and all hoses and connections are intact.

Respiratory Protection:

- When engineering and work practice controls are properly implemented, respiratory protection is not required when using the saw outdoors.
- Respiratory protection is required at all times when using the saw indoors or in an enclosed area.
    - A respirator with an assigned protection factor (APF) of 10 will be utilized by the employee.
    - A powered air-purifying respirator (PAPR) with disposable shroud (APF 25) may be used as well.
    - The respirator shall be used in accordance to the manufacturer's instructions and the NCDOT Respiratory SPP (1910.134).
        - Only employees that have been medically cleared are permitted to use a respirator
        - The respirator shall be inspected prior to use and cleaned after each use

Housekeeping:

- When working indoors or in an enclosed area, slurry generated during the use of water suppression systems will be cleaned up using a wet vacuum and the slurry transferred into a closed container for disposal.
- Dry sweeping of dust covered areas is not permitted; wet the area before cleaning to eliminate airborne dust.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

Procedures for Restricting Access to Work Areas:

- If engineering and work practice controls have been properly implemented, others in the work area will not require restricted access.
- The work area may be restricted to other employees if other safety hazards are identified.
- Public access restrictions (traffic cones, drums, or tape) may be utilized if needed.

†: task is listed in Table I
®: task requires respiratory protection at all times
Revision: **3**

TABLE 1:
SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(i) Stationary masonry saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
(ii) Handheld power saws (any blade diameter)	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. – When used outdoors. – When used indoors or in an enclosed area.	None APF 10	APF 10 APF 10
(iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	*For tasks performed outdoors only:* Use saw equipped with commercially available dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	**> 4 hours /shift**
(iv) Walk-behind saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. − When used outdoors. − When used indoors or in an enclosed area.	None APF 10	None APF 10
(v) Drivable saws	*For tasks performed outdoors only:* Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None
(vi) Rig-mounted core saws or drills	Use tool equipped with integrated water delivery system that supplies water to cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)	Use drill equipped with commercially available shroud or cowling with dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes.	None	None
(viii) Dowel drilling rigs for concrete	*For tasks performed outdoors only:* Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes.	APF 10	APF 10
ix) Vehicle-mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector. -**OR-** Operate from within an enclosed cab and use water for dust suppression on drill bit.	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(x) Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. − When used outdoors. − When used indoors or in an enclosed area. **-OR-** Use tool equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. − When used outdoors. − When used indoors or in an enclosed area.	None APF 10 None APF 10	APF 10 APF 10 APF 10 APF 10

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xi) Handheld grinders for mortar removal (i.e., tuck-pointing)	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.	APF 10	APF 25
(xii) Handheld grinders for uses other than mortar removal	*For tasks performed outdoors only:* Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. **-OR-**	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xii) Handheld grinders for uses other than mortar removal (Continued)	Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.		
	− When used outdoors.	None	None
	− When used indoors or in an enclosed area.	None	APF 10

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xiii) Walk-behind milling machines and floor grinders	Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. **-OR-** Use machine equipped with dust collection system recommended by the manufacturer. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes.	None None	None None
(xiv) Small drivable milling machines (less than half-lane)	Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xv) Large drivable milling machines (half-lane and larger)	*For cuts of any depth on asphalt only:* Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions.	None	None
	For cuts of four inches in depth or less on any substrate: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust. Operate and maintain machine to minimize dust emissions.	None	None
	-OR- Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant. Operate and maintain machine to minimize dust emissions.	None	None

Equipment / Task	Engineering and Work Practice Control Methods	Required Respiratory Protection and Minimum Assigned Protection Factor (APF)	
		≤ 4 hours /shift	> 4 hours /shift
(xvi) Crushing machines	Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points). Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions. Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station.	None	None
(xvii) Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	Operate equipment from within an enclosed cab. When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.	None None	None None

(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions. **-OR-** When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None None	None None