

Author:	Michael Heminuk	Revision #:	2
Approved By:	Ronnie Keeter	Date Issued:	February 2022

SAFETY POLICY & PROCEDURE

Air Contaminants

SPP# 1910.1000

Quick Reference

Contents

1.0 Purpose	2
2.0 Scope	2
3.0 Purpose	2
2.0 Scope	2
5.0 General Responsibilities	3
6.0 Definitions	3
7.0 General Provisions	4
7.1 Training	4
7.2 Warning Signs of Exposure	5
7.3 Work Area Evaluation	5
7.4 Exposure Assessment	6
7.5 Controls	6
8.0 Specific Responsibilities	6
8.1 Managers / Unit Heads	6
8.2 Supervisors	6
8.3 Employees	6
8.4 Safety & Risk Management	7
Appendix A: Work Area Evaluation Flow Chart	8
Appendix B: NIOSH Recommended Employee Exposure Determination and Measurement Flow Chart	9

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 introduced into the air and 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 resulting in harmful health effects.

This document establishes guidelines to protect the health of NCDOT employees from 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 Risk Management within NCDOT.

This safety policy and procedure applies to all shop areas, offices, warehouses, work areas, equipment operations, construction sites, repair and maintenance facilities, and water, rail, and air transportation. It also applies primarily to chemical contaminants and harmful particulates. (Biological contaminants are addressed in SPP# 1910.1030, Bloodborne Pathogens.

This safety policy and procedure also affects any employee who, as a 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 controls, administrative controls, safe work practices, personal protective equipment (PPE), and proper training regarding air contaminants will be incorporated. 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 Definitions

ACGIH

American Conference of Governmental Industrial Hygienists.

Administrative Controls

Administrative controls are a type of hazard control. They are used to improve safety within the workplace by putting in place policies and rules that reduce the occupational risk faced by workers via altering the way their work is performed.

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.

$$\text{TWA} = \frac{(C_1 \times T_1) + (C_2 \times T_2) \dots (C_n \times T_n)}{T_1 + T_2 \dots T_n}$$

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.

SDS

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.

Safe 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.

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.

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
- Warning Signs of Exposure
- Work Area Evaluation
- Exposure Assessment
- Control

7.1 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

7.2 Warning Signs of Exposure

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.

7.3 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 SDS
- 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 SDS, 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).

7.4 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.

7.5 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.

8.0 Specific Responsibilities

8.1 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.

8.2 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.

8.3 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.

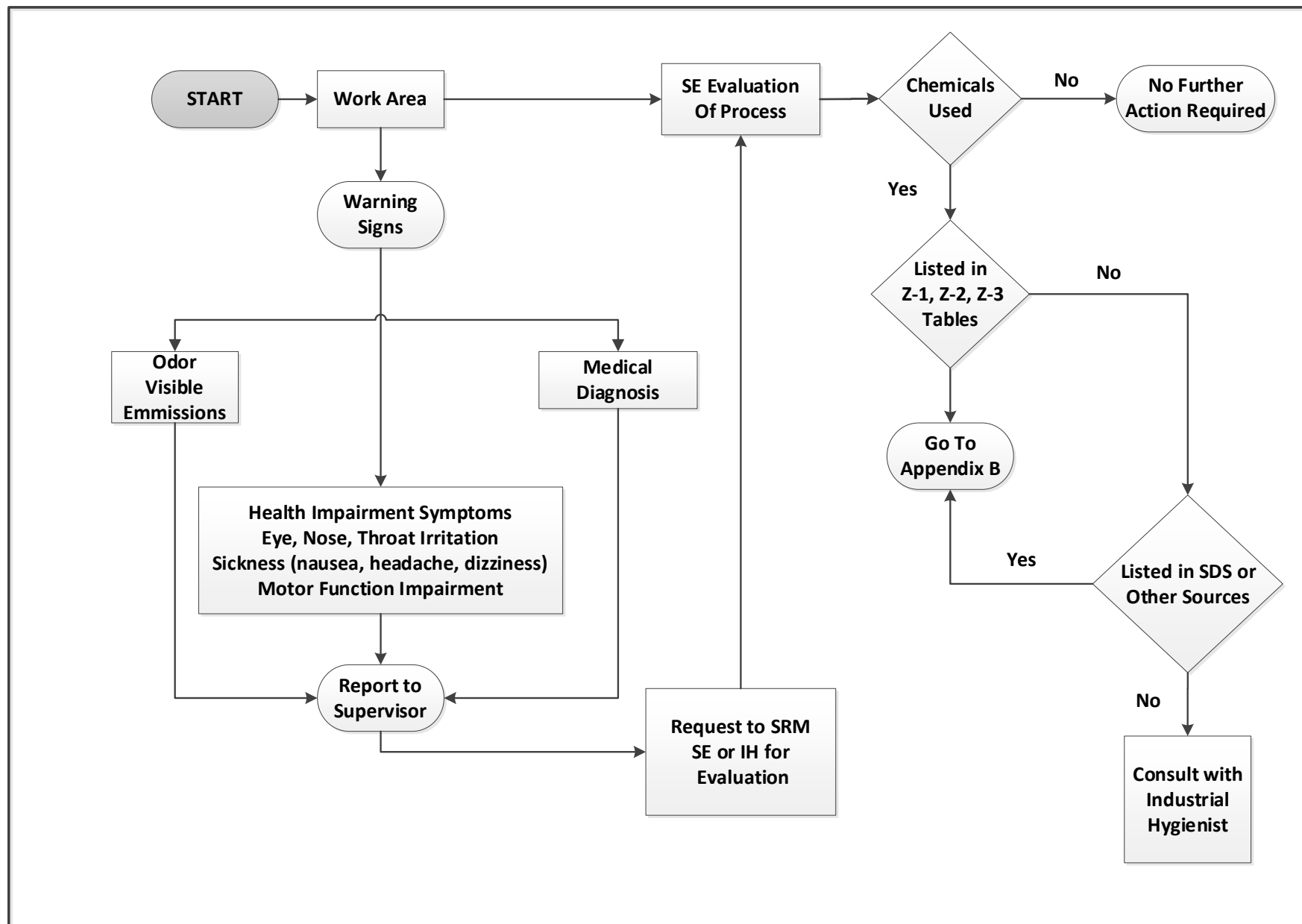
8.4 Safety & Risk Management

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 developing or securing the required training. Additionally, Safety and Risk Management will be responsible for providing qualified persons to assess, evaluate, and control workplace air contamination. Safety and Risk Management 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 will assist with 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 Recommended Employee Exposure Determination and Measurement Strategy

