



## Safety Procedure

<b>Procedure #</b>	<b>Page No.</b>	<b>Issue Date: Original</b>	<b>Change Level:</b>
	1 of 21	<b>Revision Date: 03/12/2012</b>	<b>Revised</b>
<b>Issued By: EH&amp;S</b>		<b>Review Date: 03/2012</b>	<b>Approved by: Executive Director of EH&amp;S</b>
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### STANDARD OPERATING PROCEDURE

### HAZARD COMMUNICATION PROGRAM

#### Introduction

The Hazard Communication Standard is designed to apprise the worker of chemical hazards in the non-laboratory workplace. The laboratory counterpart is the Laboratory Standard, which addresses chemical hazards in the laboratory. Both standards perform the same function on different parts of the workplace. The Hazard Communication Standard must reference and acknowledge the laboratory standard in order to address issues when both standards apply. This will allow a worker who is regulated by hazard communication to enter and perform work in a laboratory setting. It will also allow the laboratory worker to recognize hazards outside of the laboratory.

#### Mission Statement

Case Western Reserve University is committed to providing a safe environment for our faculty, staff, students and visitors and contractors. In light of this commitment, the University has developed a Hazard Communication Program in compliance with the requirements of the Occupational Safety & Health Administrations (OSHA) regulation 29 CFR 1910.1200.

Consistent with this policy, the Hazard Communication Program detailed herein will address the following areas:

- Hazard Determination
- Labeling
- Material Safety Data Sheets (MSDS)
- Employee Information and Training
- Informing Contractors

Every attempt has been made to address the intent of the above referenced law. Program implementation and coordination is the responsibility of the CWRU EHS Department.

The following references were used in compiling the program documents:

City of Cleveland, Right-To-Know (1987)  
Codified Federal Register Part 29, Section 1910.1200  
NACUBO “Hazardous Waste Management” (1987)  
Kellers Hazardous Communication Manual (1985)  
University Hospitals of Cleveland Right-To-Know

## **1.0 Purpose**

Hazardous chemical exposure may cause or contribute to serious health effects. Hazardous chemicals may also pose physical hazards. Because of the seriousness of these health and physical issues, OSHA promulgated a standard entitled Hazard Communication Standard (29 CFR 1910.1200).

“Hazardous chemicals’ refer to commercial products that have chemical hazards as well as laboratory chemicals.

“Physical hazards” include chemicals, which are combustible liquids, compressed gases, explosive, flammable, organic peroxides, oxidizers, pyrophorics, unstable (reactive), or water-reactive.

“Health hazards” include chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system and agents which damage the lungs, skin, eyes or mucous membranes (see Appendix A of the Standard).

The procedures used for determining hazards are described in Appendix B of the Standard.

## **2.0 Implementation Overview**

- 2.1 Employees will be informed of the existence of the CWRU University's Hazard Communication Program via a campus mailing of the University Right-To-Know brochure to each employee.
- 2.2 All new employees will be given a copy of the Right-To-Know brochure at Staff Orientation or in their Faculty Appointment Package.
- 2.3 The Department Supervisor for each affected department will be the Safety Coordinator for that area. The Coordinator will be responsible for identifying hazards in the area and training employees affected by these hazards. Preferably, the Coordinators should be individuals who are involved in or are aware of the Department's purchases made on a day-to-day basis.

## **3.0 Responsibilities**

### 3.1 Department Information & Training

The CWRU EHS Department shall provide general training to Safety Coordinators.

### 3.2 Hazard Communication

The Hazard Communication Standard applies to non-laboratory workers only.

### 3.3 Labeling

All labeling (per Section 5.0) shall be conducted at the department level with guidance from the Office of Safety Services.

### 3.4 Material Safety Data Sheets (MSDS)

The Department and CWRU EHS Department shall establish a filing system of Material Safety Data Sheets. An online system of MSDS will be available to all personnel on campus. Access will be through any computer terminal connected to the World Wide Web. The user's e-mail and password will be used to restrict access. This electronic database stores over 70,000 MSDS. The chemicals describe on the database are common generic chemicals. Chemicals normally found only in a research lab or with limited uses may not be found on the database as well. Each department is to establish a file of hardcopy MSDS of chemicals found in that area to ensure that MSDS for all chemicals are available to employees.

### 3.5 Informing Contractors

The Department of Plant Services shall notify CWRU EHS Department to request clearance before permitting outside contractors to enter an area which has a hazardous chemical exposure.

In cases where departments invite contractors who are not working under the auspices of Plant Services, the department shall notify CWRU EH&S Department to request clearance before permitting outside contractors to enter an area which has a hazardous chemical exposure. Contractors may meet with the CWRU Safety Manager in order to obtain clearance in many cases.

### 3.6 Lists of Chemicals

Both the department and CWRU EHS Department shall maintain inventory of non-laboratory chemicals. Periodic updates shall be sent to CWRU EHS Department by the affected department.

### 3.7 Hazard Determination

Hazard determination for non-laboratory chemicals shall be conducted with assistance from CWRU EHS Department and information coordinated with the Safety Coordinator for required training of workers.

## 4.0 **Training of Safety Coordinators**

### 4.1 Department & Administrative Units

Safety Coordinators from departments or units shall be trained in general chemical safety practices by representatives from CWRU EHS Department.

Safety Coordinators will be the area or departmental supervisors.

The Coordinators shall be instructed to coordinate the preparation of a chemical inventory and provide a copy of it to Safety Services.

Subsequent training provided by the CWRU EHS Department, following submission of inventories, will allow Safety Coordinators to train other employees in that group.

## 5.0 **Labeling Requirements**

The chemical manufacturer, importer, or distributor is required to label, tag or mark each container of hazardous chemicals with the following information:

- Identity of the hazardous chemical.

- Appropriate hazard warnings.
- Name and address of the chemical manufacturer.

- 5.1 Safety coordinators shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged, or marked with the above information.
- 5.2 Manufacturer's labels are NOT to be altered in way while the original contents are in the containers.
- 5.3 Chemical Hygiene Officers (CHO) in laboratory areas, with the assistance of Safety Services, shall label exterior doors using a standard national Fire Protection Agency (NFPA) 704 (4") label to identify the most serious hazards in the area.
- 5.4 CHOs in laboratory areas shall ensure that an emergency contact information label provided by Safety Services identifies each laboratory door.

## **HAZARD COMMUNICATION TRAINING PROCEDURE**

- 1.0 INTRODUCTION
- 2.0 CONDUCTING A TRAINING PROGRAM
- 3.0 MATERIAL SAFETY DATA SHEETS
- 4.0 HAZARD DETERMINATION
- 5.0 LABELING
- 6.0 GLOSSARY

## **1.0 TRAINING**

### **1.1 NON-LABORATORY TRAINING**

Safety Coordinators will receive general chemical safety training by The Department of Environmental Health and Safety, (EHS)

Specific training will follow completion and submission of an inventory. EHS will provide the risk assessment (from MSDS to be furnished by the Coordinator).

## **2.0 MATERIAL SAFETY DATA SHEETS**

Explain what an MSDS is and what its purpose is.

Tell where the MSDS are located in the workplace, and how the employees can access them.

Explain the types of information that can be found on the MSDS.

### **2.1 PROTECTIVE EQUIPMENT (PPE)**

Familiarize employees with the major categories of personal protective equipment (head and eye protection, respiratory protection, hand protection, etc.), or PPE.

Be sure the employees know where to obtain the safety equipment when they need it.

Instruct employees in the use of PPE (when & how to use and the limitations of each).

Use positive examples of the benefits of proper use of the equipment; show how one's health, and even life, can be safeguarded. The Safety Coordinator will determine the proper PPE to be used when working with specific chemicals. Safety Services is available for consultation if needed.

### **2.2 FIRST AID AND EMERGENCY PROCEDURES**

Inform workers of first aid and emergency procedures to be commenced during events of contamination, spills and overexposure. Detail the procedures for contacting the hospital and ambulance, and the Departments of Fire and Police.

Designated first aid responders must comply with the requirements of the Blood-borne Pathogen Standard.

### **2.3 LABELS**

Outline the information found on labels, placards, and posters in the workplace. Make sure it is understood.

Provide details on any hazard warning system used on labels: NFPA, HMIS, or other; hand out written interpretations or post them throughout the workplace.

## 2.4 WHO GETS TRAINED?

Certify that all employees have attended training by using a dated sign-off sheet. A copy of the sheet will be forwarded to CWRU EHS Department.

Set up a system so that new employees receive this training as part of their new employee indoctrination.

The introduction of new chemicals posing a health hazard should trigger additional training.

## 2.5 GUIDLEINES FOR USING MATERIAL SAFETY DATA SHEETS

The federal standard requires the use of Material Safety Data Sheets (MSDS). Chemical manufacturers must develop an MSDS for each hazardous chemical product they produce. Employers shall have an MSDS for each hazardous chemical they use.

No specific form is required according to the federal law. However, certain information must be included on each MSDS:

- The identity used on the label--both chemical and common name[s].
- Physical and chemical characteristics of the hazardous chemical (vapor pressure, flash point, etc.)
- The physical hazards of the chemical itself (potential for fire, explosion, reactivity, etc.)
- The health hazards of the chemical, including signs and symptoms of exposure, and any medical condition generally recognized as being aggravated by exposure to the chemical.
- The primary route(s) of entry
- The OSHA permissible exposure limit, American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Value, and any other exposure limit used or recommended by the manufacturer,
- Whether the chemical is listed as a potential carcinogen
- Precautions for safe handling and use.
- Recommended engineering controls, work practices, PPE and the like.
- Emergency first aid procedures
- Date of preparation of MSMS
- Name, address & telephone number of the chemical manufacturer.

## 2.6 SPECIAL PRECAUTIIONS

- Precautions shall include proper hygienic practices.
- Protective measures must be taken during repair and maintenance of contaminated equipment.



### 3.0 **HAZARD DETERMINATION**

Chemical manufacturers and importers are required to determine if the chemicals that they produce are hazardous. Universities are not required to evaluate chemicals unless they decide not to rely on the hazard determination performed by the chemical manufacturer or importer.

Chemical hazards may be divided into two categories:

- Physical hazard
- Health hazard

### 3.1 CHARACTERISTICS: PHYSICAL

Physical hazards are those chemicals which are known to be”

- Combustible liquid
- A compresses gas
- Explosive
- Flammable
- An organic peroxide
- Pyrophorics
- Unstable (reactive)
- Water-reactive

### 3.2 CHARACTERISTICS: HEALTH

Health hazards are chemicals 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. The term “health hazard” includes:

- Irritants
- Carcinogens
- Toxic or highly toxic agents
- Reproductive toxins
- Corrosives
- Sensitizers
- Hepatoxins
- Nephrotoxins
- Neurotoxins
- Agents which act on the hematopoietic system
- Agents which damage the lungs, skin, eyes, or mucous membranes

“Acute” effects usually occur rapidly as a result of short-term exposures, and are of short duration. The acute effects referred to most frequently are those defined by the American National Standards Institute (ANSI) for precautionary Labeling of Hazardous Industrial Chemicals (Z129.1-1982) and include irritants, sensitizers and lethal dose. These do not include all acute health effects such as narcosis. Chronic health effects include:

- Carcinogenicity
- Teratogenicity
- Mutagenicity

Other chronic health effects may include blood dysfunctions like anemia, chronic bronchitis, and liver atrophy.

Chemicals that are listed in one of the following sources are considered hazardous. This is only a minimum list. Any other material with hazardous properties must also be considered hazardous,

- 29 CFR 1910, Sub-Part Z, Toxic and Hazardous Substances, Occupational Safety & Health Administration (OSHA)
- Threshold Limit Values for Chemical & Physical Agents in the Work Environment, American Conference of Governmental Industrial Hygienists (ACGIH).

Additionally, chemicals which have been evaluated and found to be a suspect or confirmed carcinogen in the following sources are to be reported as carcinogens:

- National Toxicology Program (NTP), Annual Report on Carcinogens
- International Agency for Research on Cancer (IARC) Monographs
- 29 CFR 1910, Sub-Part Z, Toxic and Hazardous Substances, OSHA

## **5.0 LABEL & SIGN REQUIREMENTS**

### **5.1 Labels**

Labeling is required by the Federal standard. The purpose of the labels on hazardous chemicals, or on products containing them, is to warn about potential danger of significant risk. Labels were not intended to be either the sole or the most common source of information regarding the nature or identity of hazardous chemicals in the workplace. Containers of chemicals and chemical products must have labels that identify the contents of the containers. The labels must be easy to read and understand. Chemical formula or acronyms to describe chemicals are unacceptable. Commercial product brand names may be used to identify the contents of a container.

OSHA's stated purpose for the labels is that they serve as an immediate warning and as a reminder of the more detailed information provided in other formats (posters, MSDS, and notices). The identity on the label must be matched to the MSDS for the chemical that will be provided with extensive information on each chemical through the integrated elements of the comprehensive Hazard Communication Program.

### **5.2 Sign Requirements**

Signs will be posted on all areas that contain hazardous chemicals. Signs must be visible before and employee enters the hazardous area. NFPA 704 signs will be used to designate non-laboratory work areas and chemical storage. The University Laboratory Sign System will be used to designate laboratory areas on campus. These signs may also be used to indicate laboratory storage areas.

All signs will have space to list the names and work & telephone numbers of the area supervisor and primary subordinates. NFPA 704 signs will be posted with appropriate NFPA 704 information.

The Case Western Reserve University Sign System was developed to portray an accurate picture of the chemical hazards presented in a research laboratory. Laboratory workers are regulated under the Laboratory Standard. Employees regulated under hazard communication will be instructed in the signs and their meaning. Space is provided for up to three standardized labels depicting chemical and physical hazards that could be found in a laboratory.

### 5.3 Federal Labeling Requirements

The Federal Labeling Requirements are broad, performance-oriented standards. As long as certain information is conveyed, the specific format is optional. Two primary systems in use are the Hazardous Material Information System (HMIS), and the National Fire Prevention Association (NFPA).

## GLOSSARY

<b>ACGIH</b>	The American Conference of Governmental Industrial Hygienists is a voluntary membership organization of professional industrial hygiene personnel in governmental or educational institutions. The ACGIH develops and publishes recommended occupational exposure limits each year called Threshold Limit Values (TLVs) for hundreds of chemical, physical agents, and biological exposure indices.
<b>Acute</b>	Severe, often-dangerous conditions in which relatively rapid changes occur.
<b>Acute Exposure</b>	Defined as an intense exposure over a relatively short period of time.
<b>ANSI</b>	The American National Standards Institute is a voluntary membership organization (operating with private funding) that develops consensus standards nationally for a wide variety of devices and procedures.
<b>Asphyxiant</b>	Defined as a chemical (gas or vapor) that can cause death or unconsciousness by suffocation. Simple asphyxiants, such as nitrogen, either use up or displace oxygen in the air. They are especially dangerous in confined or enclosed spaces. Chemical asphyxiants like carbon monoxide and hydrogen sulfide interfere with the body's ability to absorb or transport oxygen to the tissues.
<b>Boiling Point</b>	The temperature at which the vapor pressure of a liquid equals atmospheric pressure or at which the liquid changes to a vapor. The boiling point is usually expressed in degrees Fahrenheit. If a flammable material has a low boiling point, it indicates a special fire hazard.
<b>“C” or Ceiling</b>	A description usually seen in connection with a published exposure limit. It refers to the concentration that should not be exceeded, even for an instant. It may be written as TLV-C (see also THRESHOLD LIMIT VALUE).
<b>Carcinogen</b>	Defined as a substance or physical agent that may cause cancer in animals.
<b>C.A.S. Number</b>	Identifies a particular chemical by the Chemical Abstracts Service, a service of the American Chemical Society that identifies and compiles abstracts of worldwide chemical literature called “Chemical Abstracts.”
<b>Chemical</b>	As broadly applied to the chemical industry, an element or a compound produced by chemical reactions on a large scale of either direct industrial and consumer use or for reaction with other chemicals.

<b>Chemical Reaction</b>	A change in the arrangement of atoms or molecules to yield substances of different composition and properties (see REACTIVITY).
<b>Chronic</b>	Defined as a persistent, prolonged or repeated conditions.
<b>Chronic Exposure</b>	Defined as a prolonged exposure occurring over a period of days, weeks, or years.
<b>Combustible</b>	Any liquid with a flashpoint at or above 100 degrees Fahrenheit (37.8 Celsius), or liquids that will burn, according to the DOT and NFPA. They do not ignite as easily as flammable liquids. However, combustible liquids can be ignited under certain circumstances, and must be handled with caution. Substances such as wood or paper are termed "Ordinary Combustibles."
<b>Concentration</b>	Defined as the relatively amount of a material in combination with another material. For example, 5 parts acetone per million parts of air.
<b>Corrosive</b>	A substance that, according to DOT, causes visible destruction or permanent changes in human skin tissue at the site of contact or is highly corrosive to steel.
<b>Cubic Meter</b>	Defined as a measure of volume in the metric system.
<b>Cutaneous</b>	Pertaining to or affecting the skin.
<b>Decomposition</b>	Defined as the breakdown of a chemical or substance into different parts or simpler compounds. It can occur due to wear & tear, chemical reaction, decay, etc.
<b>Dermatitis</b>	Defined as an inflammation of the skin.
<b>Dilution Ventilation</b>	See GENERAL VENTILATION
<b>D.O.T.</b>	The abbreviation for the United States Department of Transportation, a Cabinet-level Federal agency that regulates the labeling and shipment of all hazardous material.
<b>Dyspnea</b>	Defined as the shortness of breath; difficult or labored breathing.
<b>E.P.A.</b>	The abbreviation for the Environmental Protection Agency. A Federal agency responsible for administration of laws to control and/or reduce pollution of air, water and land systems. The EPA assigns numbers to regulated chemicals, known as the EPA number.

<b>Epidemiology</b>	Defined as the study of disease in human populations.
<b>Erythema</b>	Defined as a reddening of the skin.
<b>Evaporation Rate</b>	The rate at which a material is converted to vapor at a given temperature and pressure when compared to the evaporation rate of a given substance.
<b>Explosive</b>	A chemical that causes a sudden, almost instantaneous release of pressure, gas, or heat when subjected to sudden shock, pressure or high temperature.
<b>Eye Hazard</b>	A chemical which affects the eye or visual capacity. Symptoms include conjunctivitis and cornea! damage.
<b>Flammable</b>	<p><b>A)</b> An aerosol that yields a flame projection exceeding 18 inches at full valve opening when tested by the method described in 16 CFR 1500.45, or a flashback [a flame extending back to the valve] at any degree of valve opening.</p> <p><b>B)</b> A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less, or</p> <p><b>C)</b> A gas that forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of flash point below 100 degrees Fahrenheit, except any mixture having components with flash points of 100 degrees Fahrenheit or higher, the total of which make up 99 percent or more of the total volume of the mixture.</p> <p><b>D)</b> Solid, flammable--a solid, other than a blasting agent or explosive as defined in CFR 1910.109 &lt;a&gt; 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 readily ignited and, when ignited, burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignited and burns with a self-sustained flame at a greater than one-tenth of an inch per second along its major axis.</p>
<b>Flammable Liquid</b>	Any liquid with a flash point below 100 degrees Fahrenheit. ( <i>See also FLASH POINT</i> )
<b>Flash Point</b>	The lowest temperature at which liquid gives off enough vapor to form an ignitable mixture and burn when a source of ignition (sparks, open flames, cigarettes, etc.) is present. Two tests are used to determine the flashpoint: open cup and closed cup. The test method is indicated on the MSDS after the flash point.

**General Ventilation**

Also known as general exhaust ventilation. This is a system of ventilation consisting of either natural or mechanically induced fresh air movements to mix with and dilute contaminants in the workroom air. This is not the recommended type of ventilation to control contaminants that are highly toxic when there may be corrosion problems from the contaminant being generated; and when fire or explosion hazards are generated close to sources of ignition. (See also *LOCAL EXHAUST VENTILATION*)

**Hazardous Material**

Any substance or compound that has the capability of producing adverse effects on the health and safety of humans.

**Hematopoietic System**

Agents like carbon monoxide and cyanides, which act on the blood or hematopoietic system. It decreases hemoglobin function and deprives the body tissues of oxygen. Sign and symptoms include cyanosis, loss of consciousness.

**Hepatotoxins**

Chemicals such as carbon tetrachloride and nitrosamines, which produce liver damage. Signs are jaundice, liver, and enlargement.

**Highly Toxic**

A) A chemical that has a median lethal dose (LD50) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.  
B) A chemical that has a median lethal dose (LD50) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occur within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.  
C) A chemical that has a median lethal concentration (LC50) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

**I.A.R.C.**

International Agency for Research of Concern

**Ignitable**

A solid, liquid or compressed gas waste that has a flashpoint of less than 140 degrees Fahrenheit. Ignitable material may be regulated by the EPA as a hazardous waste as well.

**Incompatible**

A term applied to two substances to indicate that one material cannot be mixed with the other without the possibility of a dangerous reaction.

**Ingestion**

Taking a substance into the body through the mouth as food, drink, medicine, or unknowingly as on contaminated hands or cigarettes, etc.

<b>Inhalation</b>	The breathing in of an airborne substance that may be in the form of gases, fumes, mists, vapors, dust or aerosols.
<b>Inhibitor</b>	Defined as a substance that is added to another to prevent or slow down an unwanted reaction or change.
<b>Irritant</b>	Defined as a substance that produces an irritating effect when it contacts skin, eyes, nose, or the respiratory system.
<b>Kilogram (kg)</b>	A unit of weight in the metric system equal to 2.2 pounds.
<b>Lethal Dose</b>	50 is The dose of a (LD50) substance or chemical that will kill 50 percent of the test animals in a group during a single dosage.
<b>Local Exhaust</b>	A ventilation system that captures and removes the contaminants at the point they are being produced before they escape into the workroom air. The system consists of hoods, ductwork, a fan and an air-cleaning device. A key advantage is that it removes the contaminant rather than diluting it, and requires less airflow--thus making it more economical over the long term, and the system can be used to conserve or reclaim valuable materials. However, the system must be properly designed with the correctly shaped and placed hoods, and correctly sized fans and ductwork. (Also known as <i>EXHAUST VENTILATION</i> .)
<b>Lower Explosive Limit</b>	The lowest concentration of a substance that will produce a fire or flash, when an ignition source (flame, spark, etc.) is present. It is expressed in percent of vapor or gas in the air by volume. Below the LEL, the air/contaminant mixture is theoretically too “lean” to burn. (Also known as <i>lower flammable limit [LFL]</i> ; see also <i>UEL</i> .) <b>Limit (LEL)</b>
<b>Lung Hazards</b>	Signs and symptoms include cough, tightness in chest, shortness of breath sometimes caused by chemicals such as silica or asbestos.
<b>Melting Point</b>	The temperature at which a solid changes to a liquid. A melting range may be given for mixtures.
<b>M.P.P.C.F.</b>	Abbreviation for “millions of particles of participation per cubic foot of air.”
<b>MSHA</b>	The abbreviation for the Mine Safety & Health Administration, a Federal agency charged with the regulation of the mining industry in the area of safety & health.
<b>Mutagen</b>	Defined as anything that can cause a change or mutation in the genetic material of a living cell.



<b>Narcosis</b>	A stupor or unconsciousness caused by exposure to a chemical.
<b>Nephrotoxin</b>	Defined as a chemical, such as uranium or halogenated hydrocarbons, which produces kidney damage. Signs and symptoms include edema and proteinuria.
<b>N.F.P.A.</b>	The abbreviation for the National Fire Prevention Association, a voluntary membership organization, whose aim is to promote and improve fire protection and prevention. NFPA has published 16 volumes of codes known as the National Fire Codes. Within these codes is Standard #704: Identification of the Fire Hazards of Materials.” This is a system that rates the hazards of a material during a fire. These hazards are divided into health, flammability, and reactivity hazards and appear in a well-known diamond system using from zero through four, with zero meaning no special hazard and four meaning severe hazard.
<b>N.I.O.S.H.</b>	The abbreviation for the National Institute for Occupational Safety & Health, a Federal agency whose responsibilities include training occupational health and safety professionals, conducting research on health and safety concerns, and testing & certification of respirators for use in the workplace.
<b>N.I.S.H.</b>	The abbreviation for the National Institute of Health Science.
<b>N.S.F.</b>	The abbreviation for the National Science Foundation.
<b>Odor Threshold</b>	The minimum concentration of a substance at which a majority of test subjects can detect and identify the substance’s characteristic odor.
<b>Organic Peroxide</b>	An organic compound that contains the bivalent-O-O structure, which may be considered to be a structural derivative of hydrogen atoms, has been replaced by an organic radical.
<b>OSHA</b>	The abbreviation for the Occupational Safety & Health Administration, a Federal agency under the Department of Labor that publishes and enforces safety & health regulations for most businesses and industries in the United States.
<b>Oxidation</b>	The process of combining oxygen with some other substances or a chemical change in which an atom loses electrons.
<b>Oxidizer</b>	Defined as a substance that easily gives up oxygen to stimulate oxidation of organic material.

<b>Oxygen Deficiency</b>	An atmosphere having less than the normal percentage of oxygen found in normal air, which itself contains about 20% at sea level.
<b>Permissible Exposure Limit (PEL)</b>	An exposure limit that is published and enforced by OSHA as a legal standard. PEL may be a time-weighted-average (TWA) exposure limit (8-hour), a 15-minute short-term exposure limit (STEL), or a ceiling [C]. The PELs are found in Tables Z-1, Z-2, or Z-3 of OSHA regulations 1910.1000.
<b>PPM</b>	The abbreviation for parts (of vapor or gas) per million (parts of air) by volume.
<b>Personal Protective Equipment (PPE)</b>	Any devices or clothing worn by the worker to protect against hazards in the environment. Examples are respirators, gloves, and chemical splash goggles.
<b>Polymerization</b>	A chemical reaction in which two or more small molecules combine to form larger molecules that contain repeating structural units of the original molecules. A hazardous polymerization is the above reaction with an uncontrolled release of energy.
<b>Pyrophoric</b>	Defined as a chemical that will ignite spontaneously in air at a temperature of 130 degrees Fahrenheit or below.
<b>Reactivity</b>	Defined as a substance's susceptibility to undergoing a chemical reaction or change that may result in dangerous side effects, such as explosions, burning, and corrosive or toxic emissions. The conditions that cause the reaction, such as heat, other chemicals, and dropping will usually be specified as "Conditions to Avoid" when a chemical's reactivity is discussed on a MSDS.
<b>Reproductive Toxins</b>	Chemicals that affect the reproductive capabilities, including chromosomal damage (mutations) and effects on fetuses (teratogenesis). Signs and symptoms include birth defects and sterility.
<b>Respirator</b>	A device designed to protect the wearer from inhaling harmful contaminants.

<b>Hazard</b>	A particular concentration of an airborne contaminant that, when it enters the body by way of the respiratory system or by being inhaled into the lungs, results in some impairment of a bodily function.
<b>Risk Assessment</b>	Evaluation of existing hazards concerned with a procedure or process in the work environment.
<b>Short Term Exposure Limit</b>	Represented as STEL or TLV-STEL. This is maximum concentration to which workers can be exposed for a short period of time (15 minutes) for only four times throughout the day with at least one hour between exposures. Also, the TLV-TWA must NOT be exceeded.
<b>“SKIN”</b>	A designation that sometimes appears alongside a TLV or PEL that refers to the possibility of absorption of the particular chemical through the skin & eyes. Thus, protection of large surface areas of skin should be considered to prevent skin absorption so that the TLV is not invalidated.
<b>Skin Hazards</b>	Chemicals like ketones or chlorinated compounds that affect the dermal layer of the body. Signs and symptoms include irritation, rashes, and depletion of skin fats.
<b>Systemic</b>	Spread throughout the body affecting many or all body systems or organs not located in one spot or area.
<b>Teratogen</b>	Defined as an agent or substance that may cause physical defects in the developing embryo or fetus.
<b>Threshold Limit Value (TLV)</b>	Airborne concentrations of substances devised by the ACIGH that represent conditions under which it is believed that nearly all workers may be exposed day after day with no adverse effects. TLVs are advisory exposure guidelines, not legal standards that are based on evidence from industrial experience, animal studies, or human studies when they exist. They are Time-Weighted Average (TLV-TWA), Short-Term Exposure Limit (TLV-STEL) and ceiling (TLV-C). <i>See also PEL.</i>
<b>TLV-Ceiling</b>	A ceiling value should not be exceeded at any time. By comparison, time-weighted averages allow for excursions above the TLV or PEL as long as there are compensating equivalent dips below the limit during the day.

**TLV-Short Term Exposure Limit**

The STEL is the maximum level of exposure allowed for up to 15 minutes, for no more than four times during each eight-hour period. There must be at least an hour between these excursions and the daily TLV-TWA also must be considered.

**TLV-Time Weighted Average**

Defined as the average time over a given work period (e.g. 8 hour workday), of a person's exposure to a chemical or an agent. The average is determined by sampling for the contaminant throughout the time period.

**Upper Exposure Limit (UEL)**

The highest concentration of a substance that will burn or explode when an ignition source is present, usually expressed in percent of vapor or gas in the air by volume and also known as the UFL, or Upper Flammable Limit. Theoretically, above this limit, the mixture is said to be too "rich" to support combustion. The difference between the LEL and UEL constitutes the flammable range or explosive range of a substance, meaning if the LEL is 1 PPM and the UEL is 5 PPM, then the explosive range of the chemical is 1 PPM to 5 PPM.

**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 temperature.

**Vapor**

The gaseous form of substances that are normally in the liquid or solid state (at normal room temperature and pressure). Vapors evaporate into the air from liquids, such as solvents. Solvents with low boiling points will evaporate rapidly.

**Water-Reactive**

A chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

## **SPECIFIC EDUCATION & TRAINING PROCEDURES** **FOR SAFETY COORDINATORS**

Information necessary for compliance with the Education Policies of the Hazard Communication Standard include:

1. The existence of this Hazard Communication Standard and its requirements.
2. Information must be provided as to the whereabouts of the Program itself.

Information necessary for compliance with the Training Policies of the Hazard Communication Standard include:

1. How the Standard is implemented in the workplace, how to read and interpret information on labels and Material Safety Data Sheets and how employees can obtain and use the available hazards information, and understanding that defacing chemical labels is prohibited.
2. Information on the physical and health hazards of the chemicals used in each workspace or discusses categories of chemicals if large quantities of chemicals are present. Use MSDS and Inventory of Chemicals.
3. The measures workers can take to protect themselves from the hazards in their workplaces.
4. Specific procedures to provide protection, such as work practices and the use of personal protective equipment (PPE).
5. Methods and observations like visual appearance, monitors or smell, that personnel can use to detect the presence of a hazardous chemical they may be exposed to.

### SCHEDULED ASSIGNMENTS

CASE WESTERN RESERVE UNIVERSITY

HAZARD COMMUNICATION STANDARD

Inventory List of Chemicals  
(Reduction of Inventory as Necessary)

Material Safety Data Sheets  
For Entire Chemical Inventory

Education & Training Certification