LINFIELD COLLEGE

New Employee

Safety Training Manual

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Linfield College - Office of Environment, Health & Safety

ASBESTOS AWARENESS TRAINING

REGULATORY AGENCIES
Environmental Concerns
EPA - Environmental Protection Agency (Federal)
DEQ - Department of Environmental Quality (State)

These environmental agencies are primarily concerned with protecting the public by controlling the releases of asbestos into the environment. The federal EPA rules are enforced by DEQ on the state level. EPA retains some authority in public and private schools (K through 12) under a federal standard known as AHERA (Asbestos Hazard Emergency Response Act - 1986). The State DEQ requires the following:

- Notification of removal projects both large and small scale. If for any reason the information submitted to DEQ changes, you must inform them of the change.
- Proper waste disposal.
- Wetting of material to meet the "no visible emission standard".
- Removal of friable asbestos prior to demolition.
- DEQ regulates certification and licensing for contractors, supervisors, workers (full scale and small scale) and training providers.

Safety and Health Concerns:
OSHA - Occupational Safety and Health Administration (Federal)
OR-OSHA - Oregon Occupational Safety and Health Division (State)
Many of the recommended work practices and legal requirements for handling asbestos are designed to protect the health and safety of workers. The actual asbestos rules are enforced by federal or state OSHA programs. Oregon has a number of *specific* rules in the following areas:

- Establishing regulated areas
- Air monitoring and exposure standards
- Respiratory protection and protective clothing
- Medical monitoring
- Work practices
- Warning signs and labels

ASBESTOS FACTS

What is Asbestos?

Asbestos is a generic term applied to naturally occurring fibrous hydrated mineral silicates. These minerals are regarded as hydrated because they are formed by their affinity for water. Asbestos is primarily mined in Canada and South Africa. The forms that are specifically covered by new regulations are:

Amosite	Tremolite
Chrysotile	Anthophyllite
Crocidolite	Actinolite

Asbestos has been used widely in building materials and in products that needed to be fireproof. In fact EPA, in 1985 estimated that 31,000 schools and some 733,000 commercial buildings had asbestos products in them. Asbestos was and is used because the mineral is:

- Fire resistant, it cannot be destroyed by fire.
- May be woven or used to provide strength and consistency to a product.
- Resistant to chemicals.

Asbestos is a naturally occurring mineral. Asbestos minerals are divided into two groups: serpentines and amphiboles. Chrysotile is the most commonly used type of asbestos and the only mineral in the serpentine group. The chrysotile form of asbestos is found in 95% of materials which contain asbestos. Amosite is the second most common type of asbestos in the amphibole group: crocidolite, anthophyllite, tremolite, and actinolite.

The amphiboles are hydrophobic, they do not like water. In most cases, fiber counts will be significantly higher when a removal project involves an amphibole. Wet methods must still be used even though it will not be as effective on amphiboles in controlling fiber release. OR-OSHA regulates all six types of asbestos listed above. An asbestos fiber is defined by OR-OSHA as particulate form of asbestos, 5 microns or longer, with a length-to-diameter ratio of at least 3 to 1.

Asbestos is present in over 3,000 products. Asbestos containing material, or ACM is generally categorized as friable or nonfriable. Friable material can be easily crumbled by hand pressure. Nonfriable asbestos is more durable and will not easily break down unless some force is applied to the material. Any product which contains one percent (1%) asbestos requires the use of safe handling practices.

It is important to remember that the **small asbestos fibers that are the most harmful** are not visible to the eye. In addition, once fibers are released into the air they can take many hours to settle onto horizontal surfaces. If air movement is present fibers may never settle out and remain airborne almost indefinitely, posing a constant and invisible health hazard.

In the United States two primary forms of asbestos were widely used:

Amosite

- Resistance to heat and chemicals, and found extensively in pipe insulation, friction materials, roofing and flooring materials.
- Characteristically a rigid, brittle fiber which cannot be woven.
- Now banned in the US due to the higher cancer health risk associated with amosite **(For new applications).**

Chrysotile

- A long, wavy, hair-like fiber that is easily woven. Chrysotile is used in asbestos clothing products, and extensively in many forms of insulation.
- The shorter mill-end material is now being substituted for amosite applications.

Where is Asbestos Material Found?

Asbestos has been used in a host of commercial materials and is found in concrete building materials, paper products, roofing felts, pipe and boiler insulation, paints and coatings. The usage goes back to around the turn of the century.

Asbestos surveys were made in all areas of Linfield College and asbestos was abated in all areas where persons could be expected to go in the course of routine business (classes, lectures, events, etc.) at the College. Records of the surveys are kept on file in the Facilities Services building and are available upon request.

Any removal projects at the College requires State licensed workers who are required by law to wear special respirators and protective clothing during removal operations.

Asbestos and Health Effects:

The primary effects from exposure to asbestos are to the respiratory system. Asbestos exposure is also linked to effects on the gastrointestinal system.

Asbestos is made up of fibers which are made up of bundles of smaller and smaller fibers called fibrils. When asbestos material is disturbed countless numbers of very small fibrils, microns in size **(millionths of a meter),** are released. Fibers larger than 75 microns will be trapped in the nose and fibers less than 15 microns are trapped in the bronchioles and lungs.

The actual particle size of the asbestos that is released is important because:

- Once a small particle becomes airborne it can remain suspended almost indefinitely, even in a very still environment.
- Particles of this size are carried into the deepest part of the lungs past the protective mechanisms in the nose, sinuses, and larynx.

The asbestos fibers are crystalline minerals and are very persistent which means that the fibers do not degrade in biological tissue. Once breathed deep into the lungs the fibers may remain there indefinitely.

The mechanism of damage to tissue appears to be associated with the mechanical irritation caused by the sharp ends of the fibers.

The Most Common Diseases Associated With Asbestos Exposures:

- **Asbestos of the lung -** a fibrotic degeneration of the lung, usually associated with chronic exposure to asbestos. The disease restricts the ability of the lungs to expand and causes scarring of the lung tissue. This causes progressive shortness of breath, respiratory failure, and cardiac decompensation, which is the heart's inability to maintain circulation because of reduced oxygen levels. The disease is progressive even in the absence of continued exposure to asbestos.
- **Lung Cancer -** cancers of the lung are seen at higher incidence rates in individuals who have been exposed to asbestos. *The incidence rate is 90 times greater for workers who smoked tobacco and were exposed to asbestos than workers only exposed to asbestos.*
- **Mesothelioma of the lung pleura -** this is a rare form of cancer which is almost entirely related to asbestos exposure. *The disease is not curable and individuals with mesothelioma rarely live more than one year after diagnosis.* Mesothelioma is not associated with smoking and may occur following exposure to low levels of asbestos and a level of dust exposure defined as a "safe" level for lung cancer risks.
- **Gastrointestinal Cancers -** asbestos workers exhibit higher rates of cancers of the stomach, intestines, bowel, and rectum.
- **Pleural Plaques -** plaques are seen on the X-Rays of asbestos workers. These are dense strands of collagen (connective tissue proteins) showing as opaque patches on the X-Rays. These plaques can be seen with no disease and do not reflect severity of disease tissue but indicate asbestos exposure.
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There are those who contend that there is no safe limit for exposure to asbestos. The current epidemiologic studies, however, so suggest a typical dose-response relationship for most of the asbestos related diseases. Thus, the higher the exposure, the higher the incidence of disease is seen. Studies have also indicated a higher incidence of disease associated with amosite-type asbestos.

Relationship Of Smoking And Asbestos Exposure:

The 1985 Surgeon General's report on "The Health Consequences of Smoking - Cancer and the Chronic Lung Disease in the Workplace", reports on the research findings about the risk of developing lung cancer and lung diseases among asbestos exposed workers and asbestos exposed workers who smoke. The following conclusions were drawn by the report:

1. Asbestos exposure can increase the risk of developing lung cancer in both cigarette smokers and nonsmokers. The risk in cigarette-smoking asbestos workers is greater than the sum of the risks of the independent exposure.
2. The risk of developing lung cancer in asbestos workers increases with increasing number of cigarettes smoked per day and increasing cumulative asbestos exposure.
3. The risk of developing lung cancer declines in asbestos workers who stop smoking; however, the risk of developing lung cancer appears to remain significantly elevated even 25 years after cessation of exposure.
4. Cigarette smoking and asbestos exposure appear to have an independent and additive effect on lung function decline. Nonsmoking asbestos workers have decreased total lung capacities (restrictive disease). Cigarette smokers develop both restrictive lung

disease and chronic obstructive lung disease at a rate 90 times greater than non-smokers.

5. Asbestos exposure in the predominant cause of interstitial fibrosis (asbestosis) in populations with substantial asbestos exposure.
6. The promotion of smoking cessation should be an intrinsic part of efforts to control asbestos-related death and disability. For workers whom asbestos exposure has ceased, the single most important intervention that would alter their future disease risk is the cessation of cigarette smoking.

Latency Of Disease To Exposure:

Asbestos related disease- typically develop 30-40 years subsequent to the beginning of the exposure. Workers who have been heavily exposed have shown symptoms within 5-10 years, but this is not typical.

There are locations at Linfield which contain asbestos. Employees will not be asked to work in those areas during the normal course of employment. if there are any questions as to whether or not asbestos is present in any specific area of the College, a copy of the asbestos survey for that area may be obtained upon request to the Safety Department . The asbestos surveys are kept in the Physical Plant files.

Linfield College Safety Department

BLOODBORNE PATHOGENS AWARENESS TRAINING

Introduction

Concerns about AIDS can make puncture wounds, slips, and spills alarming. Yet AIDS isn't the only bloodborne threat you face. In fact, you're more likely to be infected in the line of duty by the hepatitis B virus (HBV), which can be just as deadly if not treated.

The Oregon Occupational Safety and Health Division (OR-OSHA) has issued a standard that, if followed, is designed to protect you. It details ways that you and Linfield College can work together to substantially reduce your risk of contracting a bloodborne disease on the job. You are covered by the standard if it is reasonably anticipated that you could be exposed to bloodborne pathogens regularly as a result of performing your daily job tasks. Student workers are not required to be, nor shall they be asked, to work in areas or perform tasks which would expose them to bloodborne pathogens.

If an untrained employee observed the need for removal of any bloodborne products they should call the custodial department. The custodial department is the one charged with the normal cleanup activities where bodily fluids are present. Employees such as custodians are "covered" employees. They are trained and receive a free three-injection vaccination series for Hepatitis B prior to being involved in cleanup activities.

Bloodborne Diseases

HBV

Hepatitis means "inflammation of the liver." Hepatitis B virus (HBV) is the major infectious bloodborne hazard you may face on the job. It infects approximately 8,700 workers a year, resulting in more than 400 hospitalizations and 200 deaths. If you become infected with HBV;

- You may suffer from flu-like symptoms becoming so severe that you may require hospitalization.
- You may have no symptoms at all, being unaware that you are infected.
- Your blood, saliva and other body fluids may be infectious.
- You may spread the virus to sexual partners, family members, and even unborn infants
- Left untreated, HBV may severely damage your liver, leading to cirrhosis.

HIV

The human immunodeficiency virus (HIV) attacks the body's immune system, causing the disease known as AIDS, or Acquired Immune Deficiency Syndrome. Currently, there is no vaccine to prevent infection. A person infected with HIV:

- May carry the virus without developing symptoms for several years.
- Will eventually develop AIDS.
- May suffer from flu-like symptoms, fever, diarrhea and fatigue.
- May develop AIDS-related illnesses including neurological problems. cancer and other opportunistic infections.

HIV is transmitted primarily through sexual contact, but may also be transmitted through contact

with blood and some body fluids. HIV is not transmitted by touching or working around people who carry the disease.

Workplace Transmission

In the workplace, bloodborne pathogens are transmitted in the same ways. HBV, HIV and other pathogens may be present in:

- Body fluids such as saliva, semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, amniotic fluid, and any other body fluids visibly contaminated with blood.
- Unfixed tissue or organs other than intact skin from living or dead humans.

Means of Transmission

Bloodborne pathogens may enter your body and infect you through a variety of means including:

- An accidental injury with a sharp object contaminated with infectious material. Sharps include needles, broken glass, or anything that can pierce, puncture or cut your skin.
- Open cuts, nicks and skin abrasions, even dermatitis and acne, as well as the mucous membranes of your mouth, eyes or nose.
- Indirect transmission, such as touching a contaminated object or surface and transferring the infectious material to your mouth, eyes, nose or open skin.

Contaminated Surfaces

HBV can survive on environmental surfaces dried and at room temperatures for at least one week. Make sure after an accident that the area is thoroughly cleaned and disinfected.

Exposure Control Plan

The risks of bloodborne diseases in the workplace can be serious if ignored. However, you can learn effective ways of minimizing the risks. A good place to begin would he to consult the Linfield College Exposure Control Plan. A copy is available from the Safety Department. It covers:

- Identification of employees covered by the standard.
- Specific measures taken to minimize the risk of exposure.
- Procedures to follow if there is an exposure incident.

Universal Precautions

You may not be able to tell for sure which people carry bloodborne pathogens by taking a medical history or by examination. Both HIV and HBV infect people of all ages and of all socioeconomic classes.

- Many people carry bloodborne infections without visible symptoms.
- Many people carry bloodborne infections without even knowing it.

Using Universal Precautions resolves this uncertainty by requiring you to treat all human blood and certain human body fluids as if they were known to be infected with HIV, HBV or other bloodborne pathogens. You can't identify every person who may transmit infection. Yet

you can't afford not to since it takes just one exposure to become infected.

Reducing Your Risk

Three major tactics reduce your risk of exposure to bloodborne pathogens on the job:

- Engineering controls.
- Employee work practices.
- Hepatitis B vaccine.

Alone, none of these approaches is 100 percent effective. They must be used together, like three protective barriers against infection.

Engineering Controls

Engineering controls are physical or mechanical systems your employer provides to eliminate hazards at their source. Their effectiveness usually depends on your acceptance and working within the controls guidelines.

For example, specially marked bags for contaminated biohazard materials will provide no protection unless the persons working with the biohazard materials remember to put all the materials into the bag, plus all the items used to clean up the area.

Work Practice Controls

These are specific procedures you must follow on the job if your job has been determined to be within the at-risk categories.

Handwashing

If infectious material gets on your hands, the sooner you wash it off, the less chance you have of becoming infected.

- Handwashing keeps you from transferring contamination from your hands to other areas of your body or other surfaces you may contact later. Handwashing is the most important and simplistic basic precaution for bloodborne pathogen infections
- If you have been working with infectious materials you must wear gloves. Every time you remove your gloves you must wash your hands with non-abrasive soap and running water as soon as you possibly can.
- If skin or mucous membranes come in direct contact with blood, wash or flush with water as soon as possible.
- Where handwashing facilities are not available, use hand cleaners or towelettes as a temporary measure. You must still wash your hands with soap and running water as soon as you can.
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Personal Hygiene

Additional self-protective controls should be followed to protect you:

- When performing procedures involving blood or other potentially infectious materials, minimize splashing, spraying, spattering and generation of droplets.
- Do not eat, drink, smoke, apply cosmetics or lip balms, or handle contact lenses where you may be exposed to blood or other infectious materials.
- Avoid petroleum-based lubricants that may eat through gloves. Applying hand creams is OK if you thoroughly wash your hands first.

- Don't keep food and drinks in refrigerators, freezers, cabinets or on shelves, countertops or where blood or other potential infectious materials may be present.

HBV Vaccination

If your work tasks exposes you on a regular basis to blood or other infectious materials, Linfield College will provide bloodborne pathogen training and make the hepatitis B vaccination available to you at no cost. Administration of the vaccine will be completed by three injections over a six-month period. Today's vaccines are safe and effective.

Exposure, Post-Exposure Evaluation and Follow-up

An **"exposure incident"** is defined in OR-OSHA regulations as "A specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that result from the performance of an employee's duties."

If you are exposed, as defined above, it is important that you contact your supervisor immediately. Your supervisor will do an evaluation of the incident. Students will be sent to the Student Health Center (ext. 2535) and other employees will be sent to the Willamette Valley Medical Center, Occupational Medicine Clinic (503.435.6556). The health professional will provide you with a confidential medical evaluation, including blood tests, any available post-exposure preventive treatment and follow-up counseling.

Rising to the Challenge

It is possible to protect yourself from bloodborne pathogens on the job by knowing the facts and taking proper precautions. Your well-being at Linfield College will be enhanced by utilizing common sense, professional work ethics, and ensuring, that for those requiring it, training is updated on a regular basis.

NOTICE

This booklet has been prepared for employees, staff and students for information purposes only. It is for information on bloodborne pathogens they may encounter in the workplace and preventative measures they may use to avoid infection. It is in no way intended to replace or supersede the Linfield College bloodborne pathogen exposure control plan or policies.

Linfield College Office of Environment, Health & Safety

HAZARD COMMUNICATION PROGRAM

1. The Hazard Communication Rule, Oregon Administrative Rule (OAR) Chapter 437, Hazard Communication (1910.1200)

A. The Purpose of the Rule:

Chemicals are a part of our lives. Modern life would be impossible without chemicals. Plastics, drugs, and miracle fibers are just a few of the things that use chemicals in their manufacture. But chemicals have to be treated with respect, too. Many can cause injury or illness if not handled properly. That is why the federal government and the State of Oregon decided to set a uniform hazard communication standard.

The purpose of the Linfield College Hazard Communication program is to inform workers of the hazards of the chemical materials they work with so they can make intelligent decisions about the *Procedures, Practices,* and *Personal Protective Equipment* they can use to protect themselves.

B. What it Requires.

The OR-OSHA Section 1910.1200(h) on "Employee information and training" reads as follows:

(h) "Employee information and training."

(1) Employers shall provide employees with effective information and training on hazardous chemicals in their work area at the time of their initial assignment, and whenever a new physical or health hazard the employees have not previously been trained about is introduced into their work area. Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and material safety data sheets.

(2) "Information." Employees shall be informed of:

{ i } The requirements of this section;

{ii} Any operations in their work area where hazardous chemicals are present; and,

{iii} The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and material safety data sheets required by this section.

(3) "Training." Employee training shall include at least:

{i} Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by

the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

{ii} The physical and health hazards of the chemicals in the work area;

{iii} The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,

{iv} The details of the hazard communication program developed by the employer, including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.

2. Written Hazard Communication Program.

A. Location.

A copy of the program is in the Office of Evironment, Health and Safety on the McMinnville Campus and ZZZZ on the Portland Campus.

B. Availability.

A copy of the program is readily available upon request from the director.

C. Required Lists of Hazardous Chemicals.

A list is available on request from the director.

D. Material Safety Data Sheets (MSDS).

The Director will be responsible for obtaining and maintaining the data sheet system for Linfield College, McMinnville Campus. He will review incoming data sheets for new and significant health/safety information and will see that any new information is passed on to the affected employees.

Copies of MSDSs for all hazardous chemicals to which employees of that department and section may be exposed will be kept in a location within the department.

MSDSs will be available to all employees for review during each work shift. Copies will be available upon request to the department head.

Training. Employee training shall include at least:

(a) Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);

(b) The physical and health hazards of the chemicals in the work area including the likely physical symptoms or effects of overexposure;

(c) The measures employees can take to protect themselves from these hazards, including specific procedures the employer has implemented to protect employees from exposure to hazardous chemicals, such as appropriate work practices, emergency procedures, and personal protective equipment to be used; and,

(d) The details of the hazard communication program developed by the employer,

including an explanation of the labeling system and the material safety data sheet, and how employees can obtain and use the appropriate hazard information.

Information. Prior to a new hazardous chemical being introduced into any department and section of Linfield College, each employee of that department and section will be given information as outlined in this program above with regard to that chemical. The department and section is responsible for ensuring that MSDSs for the new chemical(s) are available.

Safety meetings held by each department and section will include information relative to Hazardous Materials used in the department and section. Attendance at safety meeting is mandatory, in accordance with Linfield College policy.

Notices providing an explanation of the department and section container labeling system and the locations of this written Hazard Communication Program shall be posted on all employee bulletin boards.

G. Hazardous Non-routine Tasks

Periodically, employees are required to perform hazardous non-routine tasks. Prior to starting work on such projects, each affected employee will be given information by the supervisor about hazards involving hazardous chemicals to which they may be exposed during such activity.

This information will include:

- Specific chemical hazards
- Protective/Safety measures the employee can take to protect themselves
- Measures the department has taken to lessen the hazards including ventilation, respirators, the presence of another employee, and emergency procedures.

E. Labeling System.

All employees will verify that all original containers received for use by Linfield College will:

- Be clearly labeled as to the contents.
- Note the appropriate hazard warning and consult with the safety engineer if there are any questions.
- List the name and address of the manufacturer.

The supervisor in each area will ensure that all secondary containers with chemicals not dispensed and used by the same person are clearly labeled with either an extra copy of the original manufacturer's label or with hand lettered cardboard wire tie labels which have been marked with

1. Label name from the primary container.
2. Hazard warning.

For help in labeling, see the safety engineer. The safety director will review the labeling system every year and update as required.

F. Employee Training and Information

The Hazard Communication Rule, Oregon Administrative Rule (OAR) Chapter 437, Hazard Communication (1910.1200) covers the requirements for all phases of hazard communication, including training.

Training Required

The Linfield College Office of Environment, Health and Safety shall provide employees with information and training on hazardous chemicals in their work area at the time of their

initial assignment, and whenever a new hazard is introduced into their work area. Such information and training shall be tailored to the types of hazards to which the employees will be exposed.

Information. Employees shall be informed of:

(a) The requirements of the OR-OSHA Hazard Communication Information and Training section.
(b) Any operation in their work area where hazardous chemicals are present; and,
(c) The location and availability of the written hazard communication program, including the required list(s) of hazardous chemicals, and material safety data sheets required by OR-OSHA regulations.
(d) Chemicals present in their workplaces and the hazards associated with each chemical.

3. How to obtain and use appropriate hazard information.

Information is the heart of the Hazard Communication Program. Much useful information about chemicals in our workplace is available. This data has been researched by the companies that make or import these chemicals and this information is available on two useful tools; A) Container labels, and B) Material Safety Data Sheets.

A. Container Labels.

Check each container entering your workplace for appropriate labeling. Chemical manufacturers, importers, and distributors must be sure that each container of hazardous chemicals they ship or sell is labeled, tagged or marked with the identity of the hazardous chemical(s); the appropriate hazard warnings; and the name and address of the chemical manufacturer, importer or other responsible party.

The actual format will differ from company to company but the labels must contain similar types of information. That makes it easy to find out at a glance about the chemical's possible hazards, and the basic steps you can take to protect yourself against those risks.

Before you move, handle or open a chemical container, read the label and follow the instruction. If you are not sure about something, ask your supervisor, before you act.

In the workplace, containers into which hazardous chemicals are transferred must be labeled, tagged, or marked with the identity of the hazardous chemical(s) and appropriate hazard warnings.

The identity may be any chemical or common name which is indicated on the MSDS and will permit cross-references to be made among the list of hazardous chemicals, the label, and the MSDS.

The label may use words or symbols to tell you;

- The name of the chemical.
- The name, address, and emergency phone number of the company that made or imported the chemical.
- The physical hazards (will it explode, catch fire, etc.).
- Any important storing or handling instructions.
- The health hazards. (Is it toxic, does it cause cancer, is it an irritant, etc.)
- The basic protective clothing, equipment, and procedures that are recommended when working with this chemical.

The hazard warning must convey the hazard of the chemical. This is intended to be

specific information regarding the hazard; the specific hazards indicated in the Rule's definitions for "physical" and "health" hazards would be appropriate. Phrases such as "caution", "danger", or "harmful if inhaled", generally do not meet the intent of the Rule by themselves. The definition of "hazard warning" states that the warning must convey the hazard of the chemical. If, when inhaled, the chemical causes lung damage, then that is the appropriated warning.

Lung damage is the hazard, not inhalation. There are some situations where the specific target organ effect is not known. Where this is the case, the more general warning statement would be permitted.

There are some instances when alternatives to in-house container labeling are acceptable:

- You may post signs that convey the hazard information if there are stationary containers with similar contents and hazards in the same work area.
- Various written standard operating procedures, process sheets, batch tickets, blend tickets and similar materials may be substituted for labels on stationary process equipment if they contain the same information as a label and are readily available to employees in the work area.
- You are not required to label portable containers into which hazardous chemicals are transferred from labeled containers and which are intended only for immediate use by the employee who makes the transfer. This is what the Rule means when it refers to "immediate use".
- You are not required to label pipes or piping systems.

B. Material Safety Data Sheets (MSDS)

This basic hazard communication tool gives details on chemical and physical dangers, safety procedures, and emergency response techniques. Everything that is known about the chemical is in the MSDS.

Check each MSDS you receive. The Hazard Communication Rule specifies the minimum information that an MSDS must contain. There should not be any blank information items on the MSDS. If information is not available or if particular lines of information do not apply to the chemical, that must be indicated on the lines.

An MSDS provided by OSHA is used as an example on the following pages. Use this form with MSDS checklist to familiarize yourself with this MSDS. The circled numbers on the form refer to items on the checklist.

Note that items on the checklist do not always match the headings on the MSDS. Since there is no standard or uniform format, you will receive many different types of data sheets. No matter what format is used, every MSDS musty contain the items of information on this checklist, and it must be presented clearly. If you receive an incomplete MSDS, request a complete one from the manufacturer or supplier.

Material Safety Data Sheet Checklist

MSDS Content: Hazard communication rules require that 12 different information items be included on an MSDS. All 12 must be addressed in some manner, since no omissions are allowed. If some information is unknown or not applicable, it must be stated. All MSDSs must be provided in English, while the use of other languages is optional. Mandatory items are:

1. **Identity** of chemicals presenting physical or chemical hazards. This identification may be exempted depending on trade secret provisions. The chemical name is required on the MSDS, and the MSDS and label must be referencable.
   Note: This includes all hazardous ingredients which comprise 1 percent or greater of the composition, except for chemicals identified as carcinogens, which must be listed if the concentrations are 0.1 % or greater. Any chemical ingredient, even if less than 1 % of a mixture (or less than 0.1% for a carcinogen), must be listed in the MSDS if there is evidence that the ingredient(s) could be released, from the mixture in concentrations which would exceed established "acceptable" exposure limits or if the ingredients(s) could present a health hazard to employees.
2. **Physical and chemical characteristics,** such as vapor pressure, flash-point, and chemical solubility.
3. **Physical hazards,** such as reactivity, explosibility, and fire potential.
4. **Health hazards,** including signs and symptoms of illness, and medical conditions which might be aggravated by exposure.
5. **Primary routes of chemical entry** into the body.
6. **Permissible exposure limits** published and/or recommended for the chemical. OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit value (TLV) and other applicable limits.
7. Whether the chemical is listed as a **carcinogen.**
8. **Precautions necessary for safe use.**
9. Known **control measures,** including engineering, work practices, and personal protective equipment necessary to protect against the hazards.
10. **Emergency and first aid** procedures.
11. **Date of MSDS preparation** or the date of last change in contents.
12. **Name, address, and phone number** of the person responsible for the MSDS.

4. Detecting Chemical Hazards.

In spite of all the precautions taken, there is a potential for release or spill of a hazardous chemical in the work area.

It is imperative that all workers be familiar with the chemicals they work with. If any questions exist as to the recognition of the chemical they are working with or its odor, this information is given in the "Physical/Chemical Characteristics" section, (Section 3), of the MSDS.

Signs and symptoms of exposure to specific chemicals are also included in the MSDS under "Health Hazard Data", (Section 6).

If at any time, while working with or around chemicals, you observe vapors, mists, puddlings of liquids, or dusts or fumes from unknown origin you should use caution and avoid contact until the origin of the substance is determined to be safe.

Odors of chemicals are sometimes easily recognizable but cannot always be depended upon. Cyanide gas, for instance, has the pleasant smell of almonds, yet is quite deadly. Other toxic gases have no odor. However, if you detect any odor that is not standard for the area you are working in, or is unrecognizable, you should leave the area until it is determined to be safe.

Exposure to hazardous or toxic substances can result in a multiplicity of symptoms, such as: eye irritation, nausea, dizziness, headaches, or skin rashes. If any unusual physical symptoms occur during work around any chemical, the worker should immediately leave the area and notify his/her supervisor. The work area should remain clear until it is determined to be safe.

In all the above cases (seeing, smelling, or being affected by chemicals) workers should first leave the area and then contact their supervisor.

Recognition of Chemicals

Chemical materials occur as *Solids, Liquids,* or *Gases.* The form they occur in, has a lot to do with the possibility for exposure, the way they enter the body and the type of damage they may do.

The main type of chemical contaminants are as follows:

Vapors are airborne solvents that result from the evaporation of solvent based products. The main route of exposure is inhalation. Skin contact is the main route of exposure for solvents in their liquid form.

Dusts are small particles of solids that are usually make from some form of cutting, grinding, sawing, chipping or sanding that reduces the solid to small sized particles. Dusts are an inhalation hazard.

Mists are chemicals suspended in water droplets. Spraying of materials that have a water base atomize the product and produce a fine mist. Inhalation is the main route of exposure for mists, although they can also be involved with skin contact.

Fumes are the small particulates of metals that result from welding or torch cutting. The visible "smoke" from these operations does include smoke but is made up largely of metals that have evaporated. The main route of exposure for fumes is inhalation. Because they are so small, they can go deep in the lungs and therefore, are more dangerous than dusts of the same metals.

Gases are materials that occur in their normal state as a gas. Gases come compressed in cylinders and also occur from a large number of industrial operations. The main route of exposure is inhalation.

There are many ways to recognize hazards in the work place. Some are well known, such as Asbestos, Benzene, Lead, and Chlorinated Solvents. Other hazards are recognizable to the average worker by the reaction they get to their own senses. Chemicals that irritate the eyes, nose and throat are easy to recognize in the work place. Chemicals that cause workers to become dizzy or nauseous are also an indicator of problems.

5. Hazards of the Chemicals.

The true purpose of Hazard Communication is to relate to workers, hazards of the materials they work with, so they can make informed choices about how to use those materials.

The hazards may include both *Physical* and *Health* hazards.

PHARMCO PRODUCTS INC-ISOPROPYL RUBBING ALCOHOL- 6810-00-822-7637

========== Product Identification ==========

Product ID:ISOPROPYL RUBBING ALCOHOL
MSDS Date:11/01/1994
FSC:6810
NIIN:00-822-7637
MSDS Number: BWDYL
=== Responsible Party ===
Company Name:PHARMCO PRODUCTS INC
Address:58 VALE RD
City:BROOKFIELD
State:CT
ZIP:06804
Country:US
Info Phone Num:203-740-3471
Emergency Phone Num:203-740-3471 800-424-9300(CHEMTREC)
CAGE:69267
=== Contractor Identification ===
Company Name:PHARMCO PRODUCTS INC.
Address:58 VALE ROAD
Box:City:BROOKFIELD
State:CT
ZIP:06804-3967
Country:US
Phone:203-740-3471
CAGE:69267

========== Composition/Information on Ingredients ==========

Ingred Name:ISOPROPYL ALCOHOL (SARA III)
CAS:67-63-0
RTECS #:NT8050000
Fraction by Wt: 70%
Other REC Limits:NONE RECOMMENDED
OSHA PEL:400 PPM
ACGIH TLV:400 PPM/500STEL;9394

Ingred Name:WATER
CAS:7732-18-5
RTECS #:ZC0110000
Fraction by Wt: 30%
Other REC Limits:NONE RECOMMENDED

========== Hazards Identification ==========

LD50 LC50 Mixture:ORAL LD50 (RAT) = 5840 MG/KG
Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:EYES:MAY CAUSE IRRITATION.SKIN:MAY CAUSE IRRITATION.INGEST:MAY CAUSE GI TRACT IRRITATION AND CNS DEPRESSION.INHAL: MAY CAUSE RESPIRATORY IRRITATION.
Explanation of Carcinogenicity:THERE ARE NO INGREDIENTS ABOVE 0.1% WHICH ARE IDENTIFIED AS CARCINOGENS BY NTP,IARC OR OSHA.

Effects of Overexposure:INGEST:HEADACHE,NAUSEA,VOMITING, DIZZINESSNARCOSIS,UNCONSCIOUSNESS.INHAL:CHEST PAIN,COUGHING.EYES:STINGING, REDNESS.
Medical Cond Aggravated by Exposure:PERSONS WITH SKIN, HEART, RESPIRATORY, OR ANY OTHER MEDICAL CONDITION SHOULD USE CAUTION WHEN HANDLING OR USING THIS PRODUCT.

========== First Aid Measures ==========

First Aid:SKIN:REMOVE CONTAMINATED CLOTHING;WASH WITH SOAP AND WATER. EYES:IMMEDIATELY FLUSH WITH WATER FOR 15 MINUTES.INHAL: REMOVE TO FRESH AIR.GIVE OXYGEN OR ARTIFICIAL RESPIRATION IF NEEDED.INGEST: DO NOT IN DUCE VOMITING. GET PROMPT QUALIFIED MEDICAL ATTENTION.

========== Fire Fighting Measures ==========

Flash Point Method:TCC
Flash Point:51.8F,11.0C
Autoignition Temp:Autoignition Temp Text:750F
Lower Limits:2.0
Upper Limits:12
Extinguishing Media:USE CARBON DIOXIDE, FOAM, OR DRY CHEMICAL.
Fire Fighting Procedures:WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT AND A FULL FACED SELF CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY.
Unusual Fire/Explosion Hazard:COMBUSTION OR HEAT OF FIRE MAY PRODUCE HAZARDOUS DECOMPOSITION PRODUCTS AND VAPORS. VAPORS HEAVIER THAN AIR, CAN TRAVEL ALONG GROUND AND FLASHBACK.

========== Accidental Release Measures ==========

Spill Release Procedures:SMALL SPILLS CAN BE FLUSHED AWAY WITH WATER. VENTILATE. ELIMINATE IGNITION SOURCES. ABSORB MATERIAL WITH CLAY, VERMICULITE, OR SIMILAR ABSORBENT MATERIAL. PLACE IN DISPOSAL CONTAINERS. FLUSH AREA WITH WATER.

========== Handling and Storage ==========

Handling and Storage Precautions:USE ONLY IN WELL VENTILATED WORK AREA. KEEP CONTAINERS CLOSED WHEN NOT IN USE. FLAMMABLE LIQUID. DO NOT STORE ABOVE 100F.
Other Precautions:GROUND OR BOND CONTAINERS WHEN TRANSFERRING LIQUIDS. EMPTY CONTAINERS MAY BE HAZARDOUS;DISPOSE OF PROPERLY.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:WHERE ENVIRONMENTAL CONTROLS ARE LACKING OR IN ENCLOSED SPACES USE A SELF-CONTAINED BREATHING APPARATUS.
Ventilation:USE LOCAL EXHAUST. AVOID OPEN ELECTRICAL SOURCES NEAR PRODUCT VAPOR AREAS.
Protective Gloves:NEOPRENE, NITRILE, OR POLYVINYL ALCOHOL
Eye Protection:USE CHEMICAL SAFETY GOGGLES & FACESHIELD
Other Protective Equipment:PROVIDE A LOCAL EYE WASH STATION AND SAFETY SHOWER.
Work Hygienic Practices:DO NOT TAKE INTERNALLY. AVOID SKIN CONTACT. WASH SKIN AFTER USING PRODUCT. DO NOT EAT, DRINK OR SMOKE IN WORK AREA.
Supplemental Safety and Health
THIS ITEM IS NOT ACS GRADE ISOPROPANOL,WHICH WOULD BE >99% IPA, AS SPECIFIED ON THE TIR.

========== Physical/Chemical Properties ==========

HCC:F3
Boiling Pt:B.P. Text:130F,54C
Vapor Pres:33
Vapor Density:2.1
Spec Gravity:.87
Evaporation Rate & Reference:2.5 (BUTYL ACETATE = 1)
Solubility in Water:COMPLETE
Appearance and Odor:CLEAR LIQUID,ALCOHOL ODOR.
Percent Volatiles by Volume:100

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SPACES USE A SELF-CONTAINED BREATHING APPARATUS.
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Evaporation Rate & Reference:2.5 (BUTYL ACETATE = 1)
Solubility in Water:COMPLETE
Appearance and Odor:CLEAR LIQUID,ALCOHOL ODOR.
Percent Volatiles by Volume:100

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
STRONG OXIDIZING AGENTS, REACTIVE ALKALI METALS.
Stability Condition to Avoid:HIGH HEAT, OPEN FLAMES AND OTHER SOURCES OF IGNITION
Hazardous Decomposition Products:CARBON MONOXIDE, CARBON DIOXIDE, INCOMPLETELY BURNED CARBON PRODUCTS.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSE OF ALL WASTE IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS. INCINERATION IS RECOMMENDED.

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Chemical Hazards

Chemical compounds in the form of liquids, gases, vapors, mists, dusts, and fumes may cause problems by inhalation (breathing), by absorption (through direct contact with skin), or by ingestion (eating on drinking).

Inhalation of Particles and Fibers

Inhalation of dusts, fumes, or mists can result in occupational illnesses ranging from minor irritation to conditions such as silicosis, severe irritation, systemic poisoning, and metal fume fever.

Inert particles such as ordinary dust, oil and ink mists, or concrete dust may cause discomfort and minor irritation at nominal concentrations (<10 mg /M^3) generally without permanent injury. The inhalation of particles and fibers from materials such as welding fumes and silica may lead to serious conditions such as cancer and silicosis. Asbestos is a restricted material and asbestos-free insulating material should be utilized when insulation is being replaced or installed.

Inhalation of Gases and Vapors

Many gases and vapors, when inhaled, may cause serious acute or chronic effects. Gases and vapors of industrial hygiene concern are described below:

Asphyxiants

Asphyxiants are physiologically inert gases that act by diluting the oxygen in the air to less than 19.5%. Oxygen levels less than 19.5% require evacuation of the area or use of air-supplied respirators. Some common asphyxiants that may be encountered are:

- Helium
- Hydrogen
- Argon
- Natural gas
- Nitrogen
- Acetylene
- Methane
- Carbon Dioxide

Chemical asphyxiants are those that combine with the hemoglobin of the blood to prevent sufficient blood oxygenation. A common example of a chemical asphyxiant is carbon monoxide which has a Threshold Limit Value (TLV) for an 8-hour time weighted average (TWA) of 35 ppm.

Respiratory System Irritants, Anesthetics, and Systemic Poisons

Respiratory system irritants have a corrosive effect on the lining of the respiratory system, and influence the mucous surfaces. The concentration of the fume, vapor, or gas is of greater significance than the length of exposure. Irritants also affect the skin and eyes. Respiratory system anesthetics cause loss of the sense of smell, with unconsciousness and death possible, due to the false sense of security resulting from the lack of any noticeable odor. Some anesthetics injure body organs such as the liver and kidney. Systemic poisons in the respiratory system injure the visceral organs such as the liver, spleen, and kidney. The nervous system may also be damaged.

To assist the first line supervisor in recognizing potentially dangerous concentration of toxic vapors and gases, approximate odor thresholds of common chemicals in air versus TWAs are

specified in the following table.
* = These chemicals are highlighted because odor thresholds are equal to or greater than applicable TLVs., meaning the chemical has a "poor warning property".
Chemical irritation, inflammation, ulceration, etc., in the upper respiratory tract may result from exposure to acid mists, alkali mists, and other irritating chemical dusts. Sodium chloride dust may be considered an irritant.
Fumes from welding, brazing, or burning may cause health problems ranging from minor irritation to metal fume fever and systemic poisoning.
Systemic poisoning may result from improperly controlled cadmium fume inhalation from silver soldering. Metal fume fever may result from welding or burning zinc or copper bearing materials.

Health Hazards

Health hazards are those which cause cancer, are toxic or highly toxic (they affect body organs or systems), they affect reproduction, they are irritants, corrosives (chemicals that can destroy tissue) and materials which can damage the eyes, nose, throat and lungs, mucous membranes and/or the skin. Almost every chemical typically used in industry has the *Potential* to be a health hazard.
"Health Hazard" is defined by the State of Oregon as: A chemical for which there is statistically significant evidence that acute or chronic health effects may occur in exposed employees. The term `health hazard' includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatoxins, nephrotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes.
Health hazards include, but are not limited to, any chemicals which meet any of the following definitions:

1) Hazardous Chemicals.
   a. Substances regulated by OR-OSHA or OSHA.
   b. Substances listed by the American Conference of Governmental Industrial Hygienists (Threshold Limit Values, TLV).
2) Carcinogen.
   A chemical or material that is categorized as being a confirmed or suspected as a cancer causing agent.
3) Irritant.
   A material which causes reversible inflammatory effects on living tissue. Thus the exposed skin heals following exposure.
4) Corrosive.
   A Material that causes visible destruction or irreversible damage on living tissue. That is, the exposed skin does not completely heal following exposure.
5) Sensitizer.
   A material that causes a substantial proportion of humans to develop an allergic reaction in normal tissue after repeated exposure to the chemical.
6) Target Organ Effects.
   The workplace can have a large range of potential hazards that the employer must consider. Examples of chemical toxicities include effects on the liver, nerves, kidney, blood/hematopoietic and reproductive systems, lungs, skin, and eyes. Target organ

effects may be used to indicate whether a material is hazardous.

The biggest problem with average workers understanding health hazards is the "immediacy of the hazard".

A fire or explosion has immediate damage. An unguarded piece of machinery is easily recognized as being dangerous. Daily chemical exposures do damage a little bit at a time. It is difficult, at best, for most people to realize the hazards of the chemicals they are working with today will not appear for 10 to 20 years from now.

The situation is similar to smoking. Most people that start smoking when they are 20 years old do not think or worry about the consequences of 40 years worth of smoking damage by the time they are 60.

The real goal of an effective Hazard Communication Program is to get people to realize the hazards so they can work safely and help to protect themselves over a working lifetime.

Effects of Exposure

There are two types of effects from chemical exposure; *Short Term or Acute,* and, *Long Term or Chronic.*

Acute effects of exposure are those that happen quickly and normally right after exposure to the hazard. *Inhalation* of high concentrations of a solvent may make one dizzy, or, splashing a chemical in the eye can burn the eye. These are *acute effects;* they happen as soon as the exposure does.

Chronic effects are those that occur over time from continuous or ongoing high exposure. Daily skin contact with solvents will result in drying and defatting of the skin. *Chronic dermatitis* is the skin disorder that results from continuous exposure. Daily or routine *inhalation* of organic vapors from hydrocarbon based chemicals above safe limits, may result in *chronic* liver and kidney damage.

There are four ways that chemicals can usually get into the body. These are called *routes of exposure.* They are *skin contact, eye contact,* breathing chemicals in, or *inhalation,* and swallowing the chemical, or *ingestion.*

Eye contact usually results in some irritation or stinging of the eye. More concentrated chemicals can burn the eye and some acids can cause blurred vision or even loss of sight from *eye contact.*

Skin Contact is the most likely form of exposure for many chemicals. Solvents, treatment chemicals, and many other harmful chemicals can easily contact the skin if proper gloves are not worn. The contact can do damage by itself in terms of drying out the skin. Some chemicals will cause an allergic type of rash called *sensitization.* This type of reaction is like that for poison ivy. Some people do not react and then they suddenly do. They will usually react from that point forward, each time that they contact this material.

A more potentially dangerous result of *skin contact is skin absorption.* Some chemicals will penetrate the skin and be absorbed into the blood. Others will enter the body through cuts or damage done to the skin by repeated contact with chemicals. This is a very important form of exposure that can lead to serious effects.

Electra-Clean is. a good example of a *skin contact* agent. It not only dries and defats the skin, but chemical agents in it are absorbed through the skin and into the bloodstream and can affect target organs.

Inhalation is the most likely way that chemicals enter the body. Chemicals in the air are easily

breathed into the lungs. They may damage the lung or enter the blood and travel through the body, where they damage a particular organ like the liver or kidneys. These damage "sites" for chemicals are called *target organs.*

Ingestion is normally an unlikely form of exposure. It is very difficult to swallow chemicals based on most industrial operations. When ingestion occurs, it is normally the result of an accident, such as siphoning gas from a vehicle to a piece of power equipment. This type of ingestion is an acute hazard. Ingestion of lead, which may occur from bronze dust or solder particles is more of a chronic hazard.

Physical Hazards

Physical hazards are assessed by determining whether there is scientifically valid evidence that the material is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable, or water reactive, as defined below:

1) Combustible liquid.
   Any liquid having a flashpoint at or above 100°F but below 200°F.
2) Compressed Gas.
   a. A gas or mixture of gases in a container having an absolute pressure exceeding 40 psi at 70° F.
   b. A gas or mixture of gases having in a container an absolute pressure exceeding 104 psi at 130°F, regardless of the pressure at 70°F.
   c. A liquid having a vapor pressure exceeding 40 psi at 100°F.
3) Explosive.
   A chemical that causes a sudden, almost instantaneous, release of pressure, gas, and heat when subjected to sudden shock, pressure or high temperature.
4) Flammable.
   A chemical that falls into one of the following categories:
   a. "Aerosol, flammable" means an aerosol that yields a flame projection exceeding 18 inches at full valve opening when ignited.
   b. "Gas, flammable" means:
      - A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of 13 percent by volume or less.
      - A gas the; at ambient temperature and pressure, forms a range of flammable mixtures with air wider than 12 percent by volume, regardless of the lower limit.
   c. "Liquid, flammable" means any liquid having a flashpoint below 100°F,
   d. "Solid, flammable" means 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 an when ignited, burns so vigorously as to create a serious hazard.
5) Organic Peroxide.
   An organic compound that contains the bivalent 0-0 structure derivative of hydrogen peroxide.
6) 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.

7) Pyrophoric.
   A chemical that will ignite spontaneously in air at a temperature of 130°F or below.
8) 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 shock, pressure, or temperature.
9) Water Reactive.
   A chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

6. Protective Measures.

A. Work Practices.

Various approaches can be taken to prevent or reduce your exposure to chemical materials. Isolation from the exposure is the preferred method. Engineering controls which contain the hazard, ventilate it, or otherwise prevent it from reaching you are to be used whenever possible.

If the hazard cannot be adequately reduced through engineering controls, personal protective equipment can be used. If protective equipment is inadequate, administrative controls can be used to ensure that no one is overexposed.

Ventilation: Ventilation is the method of control most often used to reduce worker exposure to hazardous materials. This includes dilution ventilation (provided by the room fan systems), which may be used for relatively harmless materials in low concentration. Local exhaust ventilation, designed to capture vapors and gases as they are released, is the most common form of industrial ventilation. Specially designed systems are sometimes used to capture some highly toxic dusts; total containment glove boxes are used to maintain control over all detectable asbestos materials.

Administrative controls: Administrative controls are ways of scheduling workers so that no one person is over-exposed to hazardous materials. By reducing the length of exposure, an individual gets only a small dose of a hazardous material. In some cases (nuclear reactors, for example), administrative controls are the only safe way to schedule work in areas where it is impossible to reduce the hazards.

B. Emergency Procedures.

If there is a spill or release of hazardous or toxic substances, or it is suspected or questioned, Linfield College employees should clear the area in question and ensure that other employees are also clear of, and kept clear of, the area. The employee should then notify his/her supervisor for further instructions.

If the employee suspects that a physical hazard exists or there could be imminent danger to others who may come into the area, he/she should notify the dispatcher and request appropriate fire and police assistance, or request his/her supervisor to do so.

The Safety Director should be notified to respond to the location to evaluate and analyze the affected area for proper decontamination and safety.

C Personal Protective Equipment (PPE)

Where engineering controls are not feasible, or do not fully protect the worker, personal protective devices (such as gloves, safety glasses, and respirators) are used. Respirators must be carefully chosen. Special fit testing procedures are needed to assure full protection. Linfield College has a Respiratory Protection Program. Employees should

check with the Linfield College Safety Director for information regarding the most appropriate PPE needed.

In order to provide protection, gloves must resist penetration by the appropriate hazardous material. Some gloves are good for one class of hazard but not effective against another. Gloves and other protective clothing must not have worn spots, tears, or cuts that may actually trap the hazardous material next to the skin. You are the best judge of whether or not the protective equipment assigned is doing the job.

MATERIAL SAFETY DATA SHEET (MSDS)

HOW TO USE A MATERIAL SAFETY DATA SHEET

The format and quality of material safety data sheets may vary greatly from one manufacturer to another, but all of the following material will be covered on every MSDS.

Section I - Material Identification The first section identifies the material and the supplier. The material name on the MSDS must match the name on the container. If the material has more than one name, each will be listed. The chemical formula may also be given. The supplier's name, address, and an emergency telephone number are also listed in this section.

Section II - Ingredients and Hazards Section 2 lists the individual hazardous chemicals in the product and their relative percentage of concentration. If exposure limits have been established, they will be shown for each chemical.

Section III - Physical Data Physical data typically includes a material's boiling point, solubility in water, viscosity, specific gravity, melting point, evaporation rate, molecular weight, etc., as well as the appearance and odor of the material.

Section IV - Fire and Explosion Data Section 4 of the MSDS will indicate what protective clothing or respiratory equipment should be used by fire fighters and what type of extinguishing materials are best for use when fighting a fire involving the material.

Section V - First aid Procedures The information found in Section 5 will vary greatly from one MSDS to another because of the many different ways that a person can be affected. The information presented should focus on the materials and circumstances.

Section VI - Health Hazard Information Section 6 of the MSDS must describe all known routes of entry of the chemical into the body, including eye contact, skin contact, inhalation, and ingestion. Acute (immediate) and chronic (long-term) effects must be stated. If the material is carcinogenic, that fact must be stated. Medical and first-aid treatments for accidental exposure will be described.

Section V11 - Reactivity Data The information found in Section 3 will vary greatly from one MSDS to another because of the many different ways that materials may react with one another. The information presented should focus on the materials and circumstances that could be most hazardous when combined with the material covered by the MSDS.

Section VIII - Spill, Leak, and Disposal Procedures Safe work practices to be followed in the event of an accident with a particular material are described. Methods and procedures for proper handling of spills, leaks, and disposal of wastes are covered.

Section IX - Ventilation and Personal Protective Equipment for reducing exposure to a particular hazardous material are described. The methods may include ventilation requirements, breathing apparatus, as well as protective clothing such as gloves, aprons, and safety glasses.

Section IX - Special Precautions, including storage and handling of the material are described. The types of labels or markings for containers are described, and particular Department of Transportation (DOT) policies for handling the material are listed.

Linfield College - Office of Environment, Health & Safety

The Control of Hazardous Energy (Lockout/Tagout)

Training Guide

Introduction and purpose of program

When it is time for maintenance, repairs or retooling of a machine, simply turning the machine off or unplugging it while it is being worked on does *not* give enough protection for workers. Many serious accidents happen when someone thought the machine or all of the electricity was safely turned off.

Oregon State has adopted the OSHA Standard 29 CFR 1910.147 for Hazardous Energy Control and the Lockout and Tagout of equipment. Linfield College has in place a policy for compliance with the OSHA standards which presents a performance standard for the control of energy.

The Lockout/Tagout standard covers situations where the energization, start-up, or release of stored energy from machines or equipment could cause injury to employees. The standard further establishes minimum requirements to control this hazardous energy and then describes the exact steps that must be taken whenever Lockout/Tagout is to be performed. This particular Lockout/Tagout standard applies to all industries.

These guidelines have taken each major section of the standard and describes what must be done in order to have an acceptable Lockout/Tagout procedure.

Lockout/Tagout rules cannot stop serious accidents by themselves. It is the employer and the employee who are committed to safety and health in the workplace, and who follow strict procedures that will prevent these serious accidents.

Linfield College Policy Objectives for Lockout/Tagout are:

- Elimination of injuries caused by sudden, unexpected start-up of plant, departmental, or research equipment during maintenance or production activities.
- Assurance of a positive method to eliminate existing energy available to plant, departmental or research equipment during maintenance and production activities.
- Establishment as standard procedures for the application of the department's lockout/tagout system.

When to use Lockout/Tagout

Identifying which of these machines could release unexpected energy or start-up and cause injury to workers if the machines were not locked or tagged out is the first step. To determine which machines may need maintenance or repair and are hazardous under those conditions, should be identified by the College maintenance staff or the people who operate the equipment. The following is a partial list of typical conditions which require the lockout procedures:

1. Anytime repair or work is being done on electrical circuits.

2. Whenever moving parts of machinery or equipment must be cleaned or oiled, or wherever accidental contact with moveable parts is possible.
3. When it becomes necessary to remove jammed parts or to clear blocked mechanisms.
4. When working on pipes which contain hazardous substances or high pressure lines.
5. Any situation that would require maintenance staff, electricians, millwrights or pipefitters to work on potentially hazardous equipment.
6. Locking out power to equipment in order to prevent use by unauthorized persons.

Definitions

Affected employee.
An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

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

Capable of being locked out.
An energy isolating device will be considered to be capable of being locked out either if it is designed with a hasp or other attachment or integral part to which, or through which, a lock can be affixed, or if it has a locking mechanism built into it.
Other energy isolating devices will also be considered to be capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.

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

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, in addition, no pole can be operated independently; a slide gate; ;a slip blind; a line valve; a block; and any similar device used to block or isolate energy. The term does not include a push button, selector switch, and other control circuit type devices.

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

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

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

Normal production operation.
The utilization of a machine or equipment to perform its intended production function.

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 lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

Setting up.
Any work performed to prepare a machine or equipment to perform its normal production operation.

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

Tagout device.
A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

Program Responsibilities

To ensure that adequate safeguards are complied with, Linfield College has established responsibility guidelines in policy for supervisors and employees. Those responsibilities are as follows:

Supervision- College managers, supervisors and lead workers are to comply with and enforce all aspects of this policy. Supervisors are to require rigid compliance with lockout/tagout procedures. If a violation occurs, the responsible supervisor is to initiate appropriate disciplinary action.

Life threatening violations- The responsible supervisor is to forward information concerning a potentially life threatening violation to the Safety Office.

Training- Supervisors are responsible for ensuring that employees using lockout devices receive lockout/tagout training from a safety professional. Completion of training is to be recorded in the employee's personnel file.

Employees - Each employee is to comply with all aspects of this policy., Employees are to understand that violations of the lockout/tagout procedure constitute a serious safety threat to themselves and others., such violations result in disciplinary action.

Protective Material and Hardware

A lockout device, by definition, utilizes a positive means such as a lock or chain, either key or combination type, to hold an energy isolating device in the safe position. It prevents energizing a machine or equipment. These locks or tags are provided to all authorized employees. They must be uniquely and singularly identified and can only be used for controlling energy and for no other use.

The locks and tags must be durable enough to withstand all types of environmental conditions, including corrosive atmospheres or exposure to weather. All the locks and tags must be standardized within a particular worksite. This means that they can be either a particular size, shape or color.

Hazard Recognition and Preparation for Lockout/Tagout

There are many types of energy used at Linfield College, often in the same facility and often in the same equipment. Any type of energy can become hazardous if it is released in sufficient force and unexpectedly. If each type of energy is not blocked and locked before equipment is serviced, it can easily become deadly.

Energy sources may be:

- Electrical
- Hydraulic or Pneumatic
- Mechanical
- Potential
- Thermal
- Chemical

Make a survey to locate and identify all energy sources and isolating devices. Be certain which switch(s), valve(s), or other energy isolating devices apply to the machine or equipment to be locked/tagged out. More than one energy source may be involved.

Electrical energy is isolated by locking electrical disconnects in the off position. Stored electrical energy in electrical circuits, capacitors, and static electricity shall be discharged using ground wires, Batteries are isolated by disconnecting them from the circuit,.

Hydraulic and pneumatic energy is isolated by blocking-in valves and locking the valves by using chains or cables, by breaking lines, and/or by installing rated blinds. After isolation has been completed, hydraulic or pneumatic pressure must be checked to ensure it is bled down to atmospheric pressure. If isolation is accomplished using valves, double block and bleed is to be used when possible. Pressure below atmospheric (vacuum system) is isolated in the same manner as hydraulic or pneumatic pressure. NOTE: Double block and bleed is not an acceptable means of isolation for entry into confined spaces.

Kinetic or mechanical energy (of motion) must be eliminated before work begins. This is accomplished by allowing all motion to stop and come to a zero energy state.

Potential energy (stored energy) is ideally isolated by elimination. Springs brought to a relaxed state and suspended weight moved to its' lowest point of rest are examples of eliminating potential energy, Blocking or chaining of potential energy sources may sometimes be required, but is not the preferred method. Compressed or extended springs

may be controlled by clamps, brackets, or pins specifically designed for this purpose.
Thermal energy is ideally removed by eliminating the heat source. Thermal energy may be isolated by using insulating material, but elimination of the thermal energy source is preferred. This oftentimes requires a cool-down period to allow the heat to be dissipated.
Chemical energy must also be controlled by elimination or isolation. Identify harmful chemicals and refer to their MSDS for specific information. Ideally, harmful chemicals are removed and tanks/lines are cleaned. Controls used in isolation of hydraulic and pneumatic energy are also acceptable.

Energy Isolation (Lockout/Tagout) Procedures

Sequence of Lockout or Tagout System Procedure

The lockout procedure must be conducted in the following manner.

1. The authorized employee shall notify the affected employees that our lockout/tagout system is going to be utilized.
2. If a particular piece of equipment is operating it must be shut down by normal stopping procedure (by depressing the stop button or opening the appropriate switch or valve).
3. The authorized employee must operate the switch, valve or other energy isolating device to make sure the equipment is isolated from its energy source. Stored such as the energy found in springs, rotating fly wheels, hydraulic systems or compressed air or gas lines must be dissipated or restrained by either repositioning, blocking or bleeding down.
4. The authorized person shall lock out and tag out the energy isolating device of the equipment or machines with their individually assigned lock.
5. After ensuring that no personnel are exposed, the authorized person shall complete another check to make sure that all of the energy sources have been disconnected. He should then operate once again the push button or other operating controls to make certain the equipment will not operate. Caution; return operating controls to neutral or "off' position after test.

Linfield College lock issuing policy for lockout/tagout.

- Each member of each maintenance craft is to be issued a personal lock for use during lockout procedures.
- Each employee must have access to locks as necessary.
- Selected employees who continually work around plant, departmental or research equipment are issued personal locks.
- Each personal lock is to have only one key and is to be issued in accordance with the procedures in the lockout tagout section.
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Equipment Testing Under Lockout/ Tagout

At times, some of our equipment must be tested while we are doing maintenance or repair. The following procedure must be followed under those conditions:

1. Clear the machine or equipment of non-essential tools and materials.
2. Make sure that all of the employees are clear of the machine or equipment and notify them that the machine will be energized.
3. The authorized employee shall remove the lock.

4. Energize and proceed with the testing or positioning.
5. De-energize all systems and complete the shut-down procedures before continuing any maintenance or service.

Removal of Lockout and Tagout Devices.

When the authorized employee has completed their work, then the lockout device and tag can be removed. The following procedure will be followed during that process:

- The authorized person shall inspect the work area to make sure that all of their tools have been removed from the equipment or machine. Notify all of the affected employees that the equipment is to be restarted.
- The authorized employee is the only person who shall remove the lockout device and tag.

Lock not removed by employee no longer at facility.

If an employee leaves the plant site without removing their lock from a lockout device, the following steps are to be taken:

- The supervisor discovering the lock contacts a supervisor of the corresponding craft and the manager. Together they make every effort to contact the employee. If the employee is contacted, the lock may be cut off the device after the protected area is determined to be clear.
- If the employee cannot be contacted, the supervisors completely the area affected by the locked device. After the search is conducted and all members of the search are satisfied the employee is not in the area, a copy of the Notification of Lock Removal form is completed and sent to the Safety Office. Once the form is completed, the lock may be cut off.
- Locks left on devices are not to be cut off without using one of the above procedures.