



**SOUTHEASTERN**  
LOUISIANA UNIVERSITY

Office of the President  
SLU 10784

**CAMPUS CORRESPONDENCE**

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To: All Faculty and Staff  
From: John L. Crain, President  
Date: January 3, 2012  
Subject: Safety Program

As required by the Office of Risk Management, Southeastern Louisiana University has developed a Safety Program to ensure a safe work and study environment for its students, faculty and staff. This program promotes safe practices by faculty, staff and the student body, and reinforces individual and corporate responsibility for its implementation. Through Quarterly Safety Reports, faculty, staff and students receive educational information which includes, among other things, workplace safety rules and tips, accident prevention guidelines, identification of hazardous materials and chemicals, and infectious disease prevention.

The success of the University's Safety Program is dependent on the cooperation of all members of the University community. It is essential for all faculty, staff and students to be aware of their responsibility in the area of safety and have a thorough knowledge of the University's safety policy.

This Safety Manual is the result of the joint efforts of many University departments and has the approval of the University Safety Committee. The Safety Manual can be accessed online at [http://www.selu.edu/admin/safety/assets/University\\_Safety\\_Ma.pdf](http://www.selu.edu/admin/safety/assets/University_Safety_Ma.pdf).

Any questions relating to the material contained in the Safety Manual should be directed to the Safety Office at 985-549-2157.

# **Southeastern Louisiana University**

## **Online Safety Manual**

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## INTRODUCTION

The Safety Program has been revised to provide a comprehensive and continuing accident prevention effort compatible with the functions and goals of Southeastern Louisiana University. The program, when fully implemented, is designed to provide a safe premise for student study, research, extension, and to promote safe practices by the faculty, staff, and student body.

The procedures established in this Safety Program are intended to be used in applying policies, procedures, and information for planning, organizing, and controlling related programs in each college, school, and administrative division of the University.

The objective of this program is the protection of life and property by the controlling of all types of accidents including fires, occupational diseases, hazards, explosions, exposure to hazardous materials/chemicals, and other accidents resulting from equipment or personal failure.

Safety at any University location is not the exclusive responsibility of any one employee, the Campus Director of Safety, Safety Committee, or its chairman. The University Safety Committee exists to coordinate the comprehensive and continuing accident prevention effort by the departments, colleges, and schools within the University in meeting their responsibilities. Everyone on campus, including students, is responsible for his/her own safety, the safety of those with whom he/she comes in contact or for others whom he/she may be responsible. The safety responsibility of faculty and staff is in direct relationship to their own operational responsibility.

The procedures and standards as set forth in this program have been mandated by the Office of Risk Management, the State of Louisiana, and the Department of Safety.

## RESPONSIBILITIES

**Deans, Directors, Department Heads, Budget Unit Heads and Supervisors** shall designate, appoint or oversee:

- Provide for of periodic self-inspections in their area of responsibility.
- Provide for the immediate investigation of all accidents resulting in personal injury to personnel for whom they are responsible and submit a report of the findings, utilizing the "Employer's Report of Occupational Injury or Exposure" form.
- Cooperate with the University Safety Committee when called upon to do so.

**Building Coordinators** shall designate, appoint or oversee:

- Quarterly building inspections
- Environmental Conditions

**Professors and Other Supervisors**, as the key figures in the safety program shall:

- Have a working knowledge of all safety principles and safety rules applicable to their area of responsibility.
- Conduct periodic self-inspections of their area of responsibility.
- Investigate all accidents or incidents that could have resulted in injury and/or property

- damage to determine cause and prevent recurrence.
- Promote good housekeeping and proper safety performance.
- Insure that students/employees are schooled in the proper utilization and maintenance of supplied safety equipment, including personal protection equipment and are supplied with same.
- Insure that the proper tools and equipment are selected for the job and are used correctly.
- Develop efficient material handling procedures to facilitate safe lifting, carrying, and storage of same.

**All Employees shall:**

- Have working knowledge of all safety principles and safety rules applicable to their area
- (such as OSHA lab standards for all research and teaching labs).
- Conduct periodic self-inspections of their area.
- Promote good house keeping and proper safety performance.
- Insure the proper tool or equipment is selected for the job.
- Develop efficient material handling procedures to facilitate safe lifting, carrying, and storage.
- Have working knowledge of emergency procedures.

## **SAFETY MEETINGS**

Safety meetings can be effective accident prevention tools.

Meetings are appropriate prior to and after the start of a new process/procedure--particularly if such process/procedure deals with hazardous materials and/or equipment. This is particularly important with regard to engineering and/or scientific endeavors.

Safety meetings can be held to discuss accident frequency or a singular, serious, and/or fatal accident/incident.

Ideally, meetings for trades people should be held with a ten-minute presentation on a particular subject followed by a five-minute discussion. It is generally accepted that short, to-the-point meetings are best; it does not preclude that meetings directed toward a complex process/procedure cannot be considerably longer.

Minutes of all safety meetings shall be recorded and sent to the Dean, Director, or Department Head.

## **INSPECTION SCHEDULES AND REPORTS**

Generally speaking, safety inspections fall into one of five categories:

- Those done by Deans, Directors, Department Heads or their designees, such as Building Coordinators or Residence Managers.
- Those done by Director of Safety.
- Those done by Deans, Directors, Department Heads or their designees, and by Director of Safety upon request.
- Those done by an individual laboratory/shop supervisor (instructor, researcher,

- engineer, etc.).
- Those done by Physical Plant personnel.

Inspections performed by Director of Safety include accompanying the state fire marshal inspector during annual inspections, asbestos inspections as necessary, mold testing, and other inspections as ordered by higher authority.

Inspections of some shops, laboratories, and buildings may be made by Deans, Directors, Department Heads or their designee and Campus Safety Director as needed.

Inspections shall be performed by individual laboratory and/or shop instructors, researchers, engineers, or scientists in their specific area of responsibility.

Inspections made by Director of Safety and building coordinators include fire extinguishers, fire alarms, sprinkler systems, smoke/heat detection systems, emergency lights, automatic door closing systems, and fume hoods.

Inspections performed by Deans, Directors, Department Heads or their designees include Academic and Administrative Buildings as well as Residence Halls. Inspections updates for the air flow velocity of fume hoods/ductwork, emergency showers and eyewash stations shall be maintained by the Department Heads.

### **INSPECTION SCHEDULES**

<b>INSPECTORS</b>	<b>TYPE OF FACILITY</b>	<b>INSPECTION FREQUENCY</b>
Building Coordinators	Academic Buildings, Administration Buildings and Maintenance Buildings,	Quarterly
Residence Hall Managers	Residence Halls	At the beginning and end of each semester
Individual Laboratory Supervisors, Instructor, Engineer or Faculty	Laboratory Classrooms	Beginning and end of each semester and as scheduled by Department
Director of Safety or Designee	Hazardous Waste Facility	Weekly
Engineer	Hoods in Laboratory	Monthly
Physical Plant Shop Supervisors	Shops in Physical Plant (mechanic, plumbing, carpenter, paint, key, and electric)	Quarterly or as required by supervisor

### **INSPECTION REPORTS**

An inspection report will be filled out for each type of inspection. The inspection reports shall be signed by the principal investigator/inspector and dated. Copies shall be submitted to the appropriate Deans within fifteen days of the inspection's completion.

Copies of Campus Safety inspection reports shall be sent to the appropriate Deans, Directors, and Department Heads within fifteen days of the inspection's completion.

## **SAFETY INSPECTIONS**

### **A. General**

Safety inspections are used to detect and eliminate accident causes through specific, methodical procedures designed to meet this purpose. Specifically, safety inspections are concerned with conditions of work areas, condition of equipment, personnel practices, and job procedures.

An adequately planned safety inspection will:

- Detect specific unsafe conditions and unsafe practices and determine appropriate remedial actions.
- Encourage individuals to inspect their own work areas and work practices.
- Allow safety personnel to come in closer contact with other employees.
- Detect deficiencies in the management of the safety program.

### **B. Periodic Inspection (Self-Inspections)**

1. The self-inspection is best accomplished at the professor and supervisor level, since this individual is most knowledgeable of his/her area, personnel, and type of operation/activity for which he/she has direct (immediate) responsibility.
2. Deans, directors, and other administrative officers shall provide for the conduct of a formal inspection of his/her area of responsibility as needed.
3. The items to be inspected will depend a great deal on the type of operation involved. Some of the more critical areas are:
  - Atmospheric conditions--dust, gases, spray, fumes, illumination.
  - Buildings and structures--windows, floors, doors, stairs, roofs, and walls.
  - Containers--scrap bins, disposal receptacles, carboys, barrels, gas cylinders, solvent, cans, etc.
  - Electrical equipment--switches, outlets, cables, grounds, connectors, and connections.
  - Firefighting equipment--hydrants, extinguisher hoses, sprinkler systems, and alarms.
  - Hand tools--wrenches, screwdrivers, hammers, and power hand tools.
  - Hazardous supplies and materials--explosives, flammables, acids, caustics, and toxic chemicals.
  - Housekeeping--floors and workplaces free from unnecessary items and debris.
  - Machines--power transmission guarded, point of operation guarded.
4. Each supervisor shall fill out the appropriate safety inspection report designed for his area of responsibility.
5. The inspection report is a permanent record; the name of the inspector, department or area inspected, and date of inspection is necessary. Items carried over from last

inspection shall be preceded by an asterisk followed by the dates of their first detection. It is very important to give the description and location of each hazard.

## **CORRECTING UNSAFE CONDITIONS**

There are three things to keep in mind regarding remedial action:

1. If the supervisor has the authority, he/she will take corrective action at once.
2. Always correct the basic or real cause of an unsafe condition if it can be determined. Do not make the mistake of simply correcting the result and leaving the basic cause free to operate again. If the supervisor does not have the authority to correct the real cause, it is his/her responsibility to bring it to the attention of higher management and give suggested solutions.
3. When permanent correction takes time, the hazard shall not be ignored by the supervisor. The supervisor shall take any temporary measures possible to reduce the risk. This may involve roping off an area, tagging out equipment or machines, or simply posting warning signs. These measures may not be ideal, but they are much better than no effort at all. The goal of the inspection program is to eliminate unsafe conditions, not merely to detect them.

## **STANDARDS**

Presently, political subdivisions are not included in the Occupational Safety and Health Act of 1970. Consequently, Southeastern Louisiana University does not labor under the Act's requirements (with the possible exception of federally funded research or grant programs). OSHA standards incorporate by reference other standards adopted by standards-producing organizations. It is, therefore, reasonable for SOUTHEASTERN LOUISIANA UNIVERSITY to endorse those standards applicable to its operations. Some standards producing organizations that are of considerable importance to us include:

- 1) American Chemical Society (ACS)
- 2) American Conference of Governmental Industrial Hygienists (ACGIH)
- 3) American National Standards Institute (ANSI)
- 4) American Society of Agriculture Engineers (ASAE)
- 5) American Society of Safety Engineers (ASSE)
- 6) American Society of Mechanical Engineers (ASME)
- 7) American Welding Society (AWS)
- 8) Compressed Gas Association (CGA)
- 9) Environmental Protection Agency (EPA)
- 10) National Fire Protection Association (NFPA)
- 11) National Institute for Occupational Safety and Health (NIOSH)
- 12) Southern Building Code (SBC)

However, Southeastern Louisiana University is required to comply with local regulations promulgated and enforced by such agencies as the State Fire Marshal Office and the Department of Environmental Quality (DEQ).

A good case could probably be made of the over-regulation of society generally, and academia specifically; however, in view of the never-ending stream of new products, processes, and procedures placed before us, what is the alternative to assuring a safe and healthy environment in which to live, work, and study?

With that in mind, we have judiciously tried to apply generally accepted safety standards as set forth in our safety program.

## **SAFETY OFFICE**

### **SCOPE:**

The Director of Safety reports directly to the Assistant Vice President for Administration and Finance.

The Safety Office approaches safety problems through investigations, preparation of recommendations to enhance safety procedures, development of safety protocols, and preparation and presentation of safety educational and training programs.

In short, the Safety Office is involved in all aspects of safety on campus except law enforcement, parking, traffic, and transportation.

### **DUTIES:**

The Safety Director is a manager. Duties of this position include but are not restricted to the following:

- Coordinates and provides for the implementation of all aspects of the University Occupational and Environmental Safety Program including: fire safety, accident investigation, the Hazardous Waste Program, occupational and environmental safety procedures.
- Develops monitoring programs for environmental problems and formulates solutions through engineering or administrative means.
- Develops and/or makes recommendations for safety policies as needed.
- Acts as member of the University Safety Committee.
- Serves as the coordinator for federal, state, and local agencies regarding occupational and environmental safety matters.
- Discharges other duties such as budget preparation and controls office management of staff activity.
- Prepares and participates in presentations of in-house safety training programs.
- Makes safety inspections when deemed necessary by virtue of accident frequency and/or obvious hazards.
- Makes recommendations for reducing hazards to students, employees, and the general public on campus.
- Develops environmental testing and monitoring programs for environmentally hazardous areas.
- Directs the Hazardous Waste Disposal Program.

- Assists any school, department, or division in safety committee activities.
- Oversees the accumulation and cataloging of Material Safety Data Sheets (MSDS) as an assist to the Hazard Communication Program.

### **Services Available Through Safety Office:**

- Consultation—Director of Safety will consult with any recognized entity or person officially part of the University community regarding occupational and environmental safety on campus. The consultation can be initiated by calling or writing the Office of Safety.
- Safety Training—Director of Safety will present or assist in the presentation of various safety training including: fire protection and the use of fire extinguishers, flammable liquid fire demonstrations, hazard communication, use of personal protective equipment, asbestos awareness. In addition, Director of Safety can tailor a training program for special subjects provided given appropriate lead-time.
- Special Investigations/Inspections-- Safety will make accident investigations or inspections on its own or upon request.
- Environmental Monitoring--Office of Safety will, on its own or upon request, perform certain industrial hygiene tests.
- Operates University's Hazardous Waste Program

## **ACCIDENT PREVENTION**

An accident is "an undesired event that results in personal injury and/or property damage." The smart supervisor will make every effort to prevent the accident from happening in the first place. The following are some proven methods of accident prevention:

### **1. Proper Job Instruction.**

- Proper job instruction must be given with each task. This instruction must include all phases to insure safety, quality, productivity, and delivery.
- Proper job instruction need not be complicated nor take a lot of extra time or talk. Give the instructions at the right time--before the employee starts the task, not after he/she has started and has been exposed to injury.
- Two basic steps are involved in proper job instruction. Tell the employee clearly how to do the job safely; when certain jobs are assigned, it is necessary to show the employee how to do the job safely.

NOTE: The above is particularly important when dealing with new/transferred employees or summer help.

### **2. Safety Meetings. Supervisors will be responsible for holding safety meetings with employees under their supervision.**

- Safety meetings should be held on a quarterly basis (especially for trades, landscaping, residence halls, maintenance, etc.) The meeting should be no longer than a ten-minute presentation of a particular subject followed by a short discussion period.
- The best time to hold safety meetings is at the start of the week or when a new job is to be started.
- Minutes (may be handwritten) shall be taken on what was discussed at the meeting and must be filed with the next highest supervisor.

3. Personal Protective Equipment. Make sure employees have the right equipment to protect them from the hazards of the job. Some important items are hard hats, gloves, face shields, aprons, respirators, welding hoods, etc.

4. Safety Inspections. The Safety Office is available to assist in safety meetings or safety committee meetings. The office will supply topics for discussion, technical information on personal protective equipment, etc., upon request. Such information or assistance can be obtained by calling the Safety Office.

## **REQUIRED ACCIDENT REPORTS**

1. Employee Accident Report is to be used as the basic form for reporting the accidents of employees. This report is mandatory; it is required by the State and serves as the link between SOUTHEASTERN LOUISIANA UNIVERSITY and Risk Management. The Employee Accident Report shall be sent to Office of Personnel Services. The Department Head shall also keep a file copy.
2. Automobile Accident or Loss Notice is to be used when a University-owned vehicle is involved. A copy of the report must be sent to the Director of Campus Safety within 24 hours of the accident.

## **ACCIDENT INVESTIGATION**

### **Who Investigates Accidents?**

All levels of administrators and supervisors investigate accidents. The most important investigator is the first-line supervisor because he/she has several unique qualities such as:

- Knows most about the situation.
- Has a personal interest in identifying accident causes.
- Can communicate more effectively with the workers.
- Can take immediate action to prevent an accident from recurring.

### **What is an accident investigation?**

Basically, a supervisor's analysis and account of an accident based on factual information gathered in a conscientious manner--it is not a recounting of the employee's explanation of the accident.

### **When is the best time for an accident investigation?**

As soon as possible. The less time between accident and investigation, the better the information obtained.

### **Why are accidents investigated?**

It is not to assign blame or to satisfy the supervisor, but to prevent recurrence.

## **Conducting the Accident Investigation**

- Put the employee at ease--your only interest is to prevent recurrence. Assure the employee you are concerned for him/her.
- Conduct the interview at the scene of the accident--this reduces the possibility of mistakes and avoids embarrassment.
- Ask for the employee's version of the accident--be sure it is understood that you want his/her version. No need to dress it up. Do not make judgmental remarks or you will put the employee on the defensive.
- Ask any questions necessary--the key word is necessary. Limit your questions as much as possible to facts.
- Repeat the employee's story as you understand it. It assures complete understanding between yourself and the employee as to what actually took place.
- Close the interview on a positive note: Prevention.

## **UNIVERSITY SAFETY COMMITTEE**

### **RESPONSIBILITIES:**

The University Safety Committee is an advisory committee reporting directly to the Assistant Vice President for Administration and Finance on matters concerning implementation of effective means to eliminate the principle accident-producing conditions throughout the campus. In carrying out its advisory function, the Committee shall work in such a manner as to enlist cooperation of members of the University community in the safety program at every level of management within the University. The Campus Director of Safety serves as a member of the Committee.

### **PURPOSE:**

The Campus Safety Committee shall have but one primary function, notwithstanding the fact that many items may be included legitimately on the agenda. This function may be stated as follows: A safety committee meets for the purpose of discussing and taking effective action on the principle cause(s) of accident-producing conditions.

### **DUTIES OF THE UNIVERSITY SAFETY COMMITTEE**

The University Safety Committee shall serve the University in an advisory capacity in reviewing safety problems, developing means and methods for resolving the problems and in developing the necessary procedures for placing acceptable means into effect. Specifically, the Safety Committee shall:

1. Assist in developing safety education/training programs designed to create and maintain an interest in job safety.
2. Assist in coordinating the efforts of the safety committees organized within the various colleges, schools, and in coordinating major activities of the University.
3. Review reports of serious accidents or fires with the Human Resource office.
4. Provide the suggestions and recommendations to correct hazardous conditions and/or unsafe work practices.

5. Recommend those changes to existing policies or new policies to minimize unsafe acts or conditions on Campus.
6. Recommend physical or structural alterations required to eliminate or control hazards.
7. Analyze reported incidents to aide in easy detection of potential safety problems.
8. Assist in the review of a University wide Safety manual.

## THE HAZARDOUS WASTE PROGRAM

Southeastern Louisiana University is covered by the State of Louisiana Department of Environmental Quality Hazardous Waste Regulations mandated by ACT 449 of the 1979 Legislature. The Federal Act also serves as the State's response to the Resource Conservation and Recovery Act (RCRA).

The rules and regulations of the Act apply to owners or operators of all facilities that generate, transport, treat, and store or dispose of hazardous waste.

As a generator, Southeastern Louisiana University has exercised an available option to dispose of hazardous waste through the use of an approved certified hazardous waste disposal agent, as opposed to constructing facilities that would enable it to store, treat, landfill, or incinerate hazardous waste.

Even though the University has opted to use an approved certified disposal agent, the liability belongs to the University under the "cradle to grave" concept. It is, therefore, imperative that the University Hazardous Waste Program be followed as closely as possible to avoid future liabilities, as others might share such liabilities.

Under the Act there are two categories of hazardous waste:

### Category I--Hazardous Waste

- Hazardous waste from non-specific sources
- Hazardous waste from specific sources
- Discarded commercial chemical products, off specification Species, containers, and spill residues

### Category II--Hazardous Waste

- Ignitable waste
- Corrosive waste
- Reactive waste
- Toxic waste

In any case, a chemical/material at Southeastern Louisiana University is not a hazardous waste until the individual in charge, i.e., instructor, researcher, engineer, technician, etc., declares it as such.

Once declared a hazardous waste, the chemical/material then enters the University Hazardous Waste Program.

The essence of the program is to safely containerize, label, and move the waste to the Hazardous Waste Building where it is received, separated, packed, manifested, and shipped by the transporter/disposer of the licensed disposal site.

1. **CONTAINERIZATION:** All hazardous waste shall be placed in appropriate glass containers, acid bottles, or 5, 35, or 55 gallon drums in such condition as to be safely moved by mechanical means. Chemicals may be delivered in the original container as long as the container is in good condition. Needles and other sharps shall be put in appropriate containers. All containers shall have strong, properly

fitting tops/lids in good condition. If the need for over packing of 35 or 55-gallon drums is suspected (rusted, bent, gashed drums, etc.), contact the Safety Office in advance of the announced collection date.

2. **COMPATIBLE LIQUID WASTES:** Usually upon determination of the instructor, supervisor, researcher, technician, engineer, etc., in charge, those wastes can be safely mixed/blended; the number of bottles/other containers can be reduced, thereby making disposal more efficient and economical.
3. **LABELING:** All hazardous waste containers shall be properly labeled. The label shall have the name of the chemical/waste written out in block letters. If waste is mixed/blended, each component and approximate percentage must be indicated. The amount of waste in the container shall be shown in terms of grams, pounds, ounces, milliliters, pints, liters, gallons, feet, etc. Further, it shall be indicated whether the waste is a liquid, solid, or gas, and whether it is toxic, flammable, corrosive, reactive, or any combination thereof. It is to be labeled **HAZARDOUS WASTE**. It is to be dated.
4. **UNKNOWN CHEMICAL WASTE:** The Safety Office cannot accept chemicals, liquids, or mixtures of chemicals unless all components are known. The same is true for experimental compounds/chemicals, even though such materials have been assigned an experimental number by the manufacturer. Experimental components/chemicals must be returned to the manufacturer or owner. Analytical test for unknowns are quite expensive and the cost must be borne by the user.
5. **SPECIAL PROBLEMS:** Federal regulations prohibit burning or land filling mercury unless it is properly treated. Mercury shall only be accepted either as a liquid (properly containerized) or amalgamated with sulfur or an acceptable commercial product. Mercury-contaminated material such as thermometers, manometers, etc., shall be as free of mercury as possible. Presently, dioxin in any form (including 2,4,5,T) cannot be disposed of, nor can picric acid. In the event either of the above is discovered, contact the Safety Office.
6. **COMPRESSED GAS CYLINDERS:** Cylinders to be disposed of shall be returned to the vendor.

### **SOME TYPES OF CONTAINERS**

(Illustrations not included here)

55 Gallon Drum: Open Head for Solids, and Closed Head for liquids. Flask: with appropriate stopper for bench work Jar or Bottle: Plastic or Glass Box for small containers filled with Homogeneous chemicals/compounds.

### **HAZARDOUS MATERIAL INFORMATION**

Development, Preparedness, and Response Rules (Act 435 of the 1985 Louisiana Legislative Regular Session)

The purpose of the Act is to insure that the hazards of all chemicals produced, imported,

consumed, applied, transported, stored, or emitted in Louisiana are communicated to appropriate emergency response organizations, local information repositories, and to the general public upon request.

This communication system shall be intended to provide information to medical personnel for emergency medical diagnoses, to develop a database which will facilitate research into possible chronic health risks which may appear as the result of the presence of hazardous materials, and to allow the State Police to coordinate hazardous material emergency response.

This program as set forth does not conflict with the U.S. Department of Labor's Hazard Communication Standard 29 CFR 1910.1200.

Inasmuch as SOUTHEASTERN LOUISIANA UNIVERSITY is included as an entity required to report under the ACT, the Safety Office is the local agency chosen to report to the State Police those hazardous materials located on campus by waste stream number/generic description, physical state, and weight.

To this end, Campus Safety prepares an annual report for submission to the State Police.

To provide further protection for SOUTHEASTERN LOUISIANA UNIVERSITY in the event of large hazardous material spills, releases, or emissions, Campus Safety has submitted emergency plans and has participated in emergency planning with the City/Parish Department of Emergency Management.

## **HAZARD COMMUNICATION PROGRAM**

### **RESPONSIBILITY**

The Director of Safety is responsible for developing the program, which includes:

- A list of hazardous chemicals in the work area.
- Establishment of an MSDS library.
- Establishment of an employee-training program consisting of:
  - Notification of the Hazard Communication Program
  - Location of hazard communication information (MSDS, lists, etc.)
  - Program implementation
  - Instruction on reading labels and MSDS
  - Hazards in each work area
  - Procedures for providing personal protective equipment
  - Methods used to monitor areas
  - Methods for observation by employees of potential exposures
  - How employees are to obtain information
- Procedures for informing employees of hazards of non-routine tasks.
- Procedures for informing contractors of hazards which might be encountered during contract jobs.

## **DELEGATED RESPONSIBILITIES**

The Director of Safety shall insure that appropriate MSDS are received/obtained for chemicals used on campus.

The Director of Safety shall maintain a current set of MSDS applicable to SOUTHEASTERN LOUISIANA UNIVERSITY and will make same available to employees and authorized local, state, or federal officials upon request.

An MSDS library shall be housed in the Safety Office.

Director of Safety shall periodically monitor areas for selected chemicals or agents and will insure that supervisors are aware of such monitoring.

Department Heads/Supervisors shall insure that necessary physical or toxic warning signs are posted in those areas where special notices are required.

Department Heads/Supervisors shall insure that each work area requiring specific personal protective equipment is posted with appropriate warning signs. Department Heads/Supervisors shall make appropriate personal protective equipment available as needed.

Department Heads/Supervisors shall inform any contractor working on campus in writing of chemicals used in their work areas--a copy of which will be sent to the Safety Office. Supervisors shall inform their employees about the chemicals in the workplace, the location and operation of controls, procedures used to protect themselves and other workers, emergency plans and location of MSDS or information related to chemicals in the workplace, and they shall inform the department head or supervisor of any change in the process that may affect the health and safety of the employee. (Note: Much of the above can be handled in safety meetings.)

Employees shall become informed about the chemical and physical hazards of their workplace and how to protect themselves and other employees from these hazards. Employees shall become aware of where SOUTHEASTERN LOUISIANA UNIVERSITY's Hazard Communication Program, the Act, applicable MSDS and list of chemicals and information are located for their review. Employees shall inform their supervisors of changes in operations that could affect the safety and health of the job site or work area.

## **INFORMATION PROGRAM**

At periodic safety meetings, Department Heads/Supervisors shall pass on any major changes in operations involving chemicals at periodic safety meetings.

Posters shall be located at various points, i.e., conference rooms, lunchrooms, etc., indicating the location of copies of Hazard Communication Standard, the Hazard Communication Program, lists of chemicals, and where additional information may be obtained.

## **TRAINING PROGRAM**

The program shall be presented annually by Safety Office and/or Department Heads/Supervisors to affected employees, or when changes in operations warrant. The program shall include the following points:

- Methods that may be used to detect the presence of a chemical or material by visual appearance, odor, irritation (skin, headaches, coughing).
- Physical and health hazards of the chemicals or materials in the workplace and all information on the MSDS that may affect employees.
- Measures used to protect the employee (engineering design, barriers, ventilation, operating procedures, special training, etc).
- Measures employees can take to protect themselves from exposure (work practices, respiratory equipment, eye protection, other personal protective equipment, special training, etc).
- Details of the Hazard Communication Program.

# **HAZARD COMMUNICATION--TEACHING OUTLINE INTRODUCTION TO SUBJECT MATTER**

## **Objectives:**

- To assure that the employee is made aware of the danger of hazardous material/chemicals in the workplace.
- To assure that the employee is made aware of how such materials/chemicals affect his/her body.
- To assure that the employee learns how to recognize through labeling the hazard categories of materials/chemicals.
- To assure that the employee learns to interpret the Material Safety Data Sheet (MSDS).
- To assure that the employee learns how to protect himself/herself from hazardous materials/chemicals.

## **Modes of Entry Into the Body:**

- A. Inhalation—Breathing
- B. Ingestion--Entering through the mouth
- C. Absorption--Contact with exposed body areas
- D. Contact--As above (corrosives)
  - Once in the body, many materials/chemicals attack vital organs
  - Attack can be long or short term, but the results can be the same

## **Effects:**

- A. Carcinogenic--Cancer
- B. Toxic--Poison the organs
- C. Flammable--Burns
- D. Reactive--Explosion, burns, or toxic fumes leading to injury or death
- E. Cryogenic--Freezing or frostbite of body parts
- F. Corrosive--Destruction of human tissue
- G. Mutagenic--Damage to reproductive processes and fetus

## **Recognizing the Hazard:**

- A. The NFPA Hazard Identification System
  - Health—Blue
  - Flammability—Red
  - Reactivity—Yellow
  - Others—Colorless
  - The numerical rating system
- B. Product labeling by manufacturer
  - Display of labels
  - Display of signs

## **Material Safety Data Sheets:**

- A. Section I--The name, address, phone number, etc., of the Manufacturer
- B. Section II--Hazardous ingredients identity information
- C. Section III--Physical/chemical characteristics
- D. Section IV--Fire and explosion hazard data
- E. Section V--Reactivity data
- F. Section VI--Health hazard data
- G. Section VII--Precautions for safe handling and use
- H. Section VIII--Control measures

## **HAZARDOUS MATERIALS**

### **FLAMMABLE SOLVENTS (LIQUID)**

A flammable solvent is an organic liquid whose vapor can form an ignitable mixture with air. The solvent vapor is the fuel. The oxidizer is the surrounding atmosphere. For the mixture to burn, an ignition source must be present.

### **REACTIVE CHEMICALS**

Reactive chemicals are substances which, under certain ambient or induced conditions, enter into violent reactions with spontaneous generation of large quantities of heat, light, gases, or toxins that can be destructive to life and property.

### **RADIOACTIVE CHEMICALS**

Radioactive chemicals are those which possess one or more constituent atoms capable of spontaneously emitting alpha, beta, or gamma rays by disintegration of the corresponding atomic nuclei (when removed from shielding, the body can be bombarded by the rays).

### **CORROSIVE CHEMICALS**

Corrosive chemicals are those substances that by direct chemical action are injurious to body tissue. Corrosive injury may be of a minor degree (irritation) or of actual physical disruption of body tissues.

### **TOXIC CHEMICALS**

A toxic substance has the potential of injury by direct chemical action with body systems. Almost any substance is toxic when taken in excess. Toxic substances interfere with the function of cells in body tissues, i.e., direct physicochemical corrosion or subtle chemical reaction disrupting biological processes.

### **BIOHAZARDS**

Biological hazards include insects, molds, fungi, and bacterial contamination stemming from items such as water, sewage, and food.

### **COMPRESSED GASES**

A compressed gas is any material in a container under pressure. Compressed gas cylinders contain a large amount of energy which, if released improperly, can result in serious injury. These gases can be toxic, flammable, or corrosive.

### **CRYOGENIC LIQUIDS**

Cryogenic liquids and compressed gases have many properties in common, hence many common hazards. Freezing or frostbite of tissue is a common hazard related to the use of cryogens.

## THE NFPA HAZARD IDENTIFICATION SYSTEM

Numerical rating from 0-4 with the hazards becoming more extreme they are upscaled.

### HEALTH--BLUE

- 4 A few whiffs of the gas or vapor could cause death; liquid penetration could be fatal.
- 3 Material is extremely dangerous, but area may be entered if fully protected.
- 2 Material hazardous to health, but area may be entered freely if SCBA is used.
- 1 Material is only slightly hazardous to your health.
- 0 Material offers no health hazard.

### FLAMMABILITY--RED

- 4 Very flammable gases and very volatile flammable liquids and materials in the form of dusts or mists readily form explosive mixtures when dispersed into the air.
- 3 Liquids which can be ignited under almost all normal temperatures (low flashpoint); solids which form dusts, solids in shredded or fibrous form; solids that burn rapidly because they create their own oxygen; any material that ignites spontaneously at normal temperature.
- 2 Liquids which must be moderately heated before ignition will occur and solids that readily give off flammable vapors. (Usually, water can cool them off.)
- 1 Materials that must be preheated before ignition can occur.
- 0 Materials that will not burn.

### REACTIVITY--YELLOW

- 4 Materials which, in themselves, are readily capable of detonation or explosive decomposition at normal temperatures. This includes materials sensitive to mechanical or thermal shock.
- 3 Materials which, in themselves, are capable of detonation or explosive decomposition, but require a strong initiation source or must be heated before initiation under confinement. Includes materials that are shock sensitive at elevated temperatures or pressures. (May react with water.)
- 2 Materials which, in themselves, are normally unstable and readily undergo violent chemical change but do not detonate. Includes materials that can undergo chemical change with rapid release of energy at normal temperatures or pressures. (May react with water.)
- 1 Materials which, in themselves, are normally stable, but may become unstable at elevated pressures and temperatures. May react with water but not violently.
- 0 Materials that are stable even under fire conditions and are not reactive with water.

COLORLESS Special reactive materials such as:

Oxidizers: OXY

Radiation: (Symbol goes here)

Water Reactive: -W

## **PERSONAL PROTECTION PROGRAM**

This section applies to employees, students, or visitors on campus construed to be in need of personal protective equipment by virtue of their exposure to hazards in the working, teaching, or research environment.

Protective equipment, including personal protective equipment for eyes, face, hands and extremities; protective clothing; respirator devices; and protective shields and barriers, shall be used and maintained in sanitary and reliable condition whenever it is necessary by reason of hazards of process or environment, chemical hazards, radiological hazards, biological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation, or physical contact. (1 OSHA 1910.132(A).)

Under no circumstances shall a person knowingly be subjected to a hazardous condition without appropriate personal protective equipment.

Persons who are exposed to hazards requiring personal protective equipment shall be properly instructed in the use of such equipment by the individual in charge of the activity or his/her designee.

It is the responsibility of the individual in charge of an activity to assure that safety practices are adhered to.

If those individuals required to wear personal protective equipment fail to do so, they will be subject to disciplinary action.

### **EYE PROTECTION**

#### General

Persons working in or studying occupations such as painting, carpentry, construction, labor, landscape, general maintenance, metal trades, chemistry, other sciences and engineering, or any work/study activity which involves hazards such as flying objects, dust and/or vapors, hot metals, chemicals, or light radiation shall be required to wear approved safety air/goggles at all times while exposed.

Food service personnel must wear approved goggles when there is a possibility of eye injury from caustic materials, hot fat splatters, or associated hazards.

Management level employees, students, or visitors, who make occasional visits to machine, welding, and carpentry shops, boiler rooms, equipment rooms, power houses, construction areas, chemistry labs, or other areas in which eye injury is a possibility shall wear approved eyewear.

#### Prescription Lens Wearers

If required to wear eye protection, such persons shall wear an approved face shield, goggles that fit over glasses, prescription glasses with protective optical lenses fitted with side shields, or goggles that incorporate prescription lenses.

#### Contact Lens Wearers

Contact lenses shall never be considered as a substitute for eye protection; eye protection shall be worn over them. "Contact lens, of themselves, do not provide eye protection in the industrial sense and shall not be worn in a hazardous environment without appropriate covering safety eyewear." (ANSI A87.1-1989)

#### Approval and Selection:

Eye protection shall meet the ANSI Z87.1-1989 standard and the eyewear shall indicate such on the lens or the frame.

Visitors shall be provided protective eyewear meeting ANSI Z87.1 protection factors for visitor's eyewear. Employees shall not substitute ANSI Z87.1 visitors eyewear for other approved eyewear while on duty.

#### Fitting

Fitting shall be done by a department member knowledgeable of the procedure, or in case of prescription lenses, by any ophthalmic specialist.

#### Purchases

Purchase of eye protection shall be made through an authorized department representative to assure compliance.

#### Inspection and Maintenance

All eye and face protection shall be kept clean and inspected daily before each use. Badly scratched or damaged items are to be replaced immediately.

#### Other

It is recommended that all employees required to wear eye and face protection shall have their own and be required to inspect and maintain them in accordance with this section.

### **FALL PROTECTION**

Fall protection shall be utilized by those employees/students for the specific purpose of securing, suspending, or retrieving the employee/student in or from a hazardous work area, and/or when work exposes them to the risk of falling more than 15' whether outdoors or inside buildings.

#### Approval and Selection

Fall protection and devices and equipment shall meet ANSI A10.14, and employees/students shall only be allowed to purchase or receive them through an authorized department representative to insure compliance.

#### Fitting

The appropriate safety belt shall be chosen for the hazard. It shall be securely buckled and worn tightly enough to prevent any possibility of the wearer slipping out.

#### Inspection and Maintenance

Safety belts and associated equipment shall be inspected before each use. Cut, worn, or

damaged belts, lifelines, lanyards, etc., shall be discarded and replaced.

NOTE: After an accidental freefall, the safety belt and lanyard shall be discarded.

## **FOOT PROTECTION**

For all non-office personnel, "Footwear such as sandals, open-toed shoes, platforms, high heels, cloth-bodied tennis shoes, or sneakers is not considered safe and is prohibited for use as a good work shoe. Well-built safety shoes, leather-bodied shoes, or boots in good condition with low heels and hard soles are to be used."

### Approval and Selection

Foot protection used shall meet ANSI Z41.1 "Men's Safety-Toe Footwear."

Employees/students shall only be allowed to purchase or receive them through an authorized department representative to insure compliance.

### Inspection and Maintenance

All foot protection shall be kept reasonably clean and in good repair. Shoes shall be repaired or replaced periodically.

## **HAND PROTECTION**

Hand protection shall be worn by employees when handling hot work, chemicals, electrical, material handling of rough and/or sharp items, doing landscaping work, welding, and "wherever it is necessary by reason of hazards of processes of environmental, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment." (OSHA 1910 Standards)

Hand protection shall not be worn while working on moving machinery such as drill saws, grinders, or other rotating and moving equipment that might catch the hand protection and pull the worker's hand into a hazardous area.

### Approval and Selection

Fitting shall be done by hazard and size of employee's hand.

### Inspection and Maintenance

All hand protection shall be kept clean and inspected daily before each use. Badly worn or damaged items are to be replaced.

## **HEAD PROTECTION**

Employees/students in areas such as painting, carpentry, construction, plumbing, labor, landscape, maintenance, metal trade, and any occupations that involve hazards from falling objects and/or overhead shall be covered.

### Approval and Selection

Head protection used shall bear the ANSI Z89.1 or Z89.2 approval, manufacturer's name, ANSI class designation (A,B,C, or D).

#### Fitting

Each employee shall be individually fitted. The hard hat shall fit firmly but comfortably on the employee's head.

#### Inspection and Maintenance

Painting: If the hard hat is to be painted, the manufacturer shall be contacted to see if the paint will affect the properties of the hat.

Cleaning: Hard hats shall be washed every thirty days. If worn by more than one employee, it shall be washed daily.

Inspection: Before each wearing of the hard hat, it shall be checked for wear and damages, especially the suspension system.

#### Other

Hard hats shall not be stored or carried on the rear window shelf of a vehicle. Sunlight and extreme heat can affect the degree of protection offered. Also, the hard hat can become a projectile in an accident.

## HEARING PROTECTION

Hearing protection shall be worn by employees/students when noise exposure is above that of the 85dB (action level) when measured on the A-scale of the standard sound level meter at slow response.

Personal hearing protection devices shall meet ANSI 53.19 and employees/students shall only be allowed to purchase or receive them through an authorized representative to insure compliance.

Selection of hearing protection shall take into consideration durability, ease of fit, noise calculations in area, and length of time to be worn.

There are many types of disposable and permanent hearing protection. Listed below are three:

1. Earmuffs: fluid or foam-filled cushions connected by a plastic or metal band that fits over the head. They reduce noise levels by 35-40dB depending on type and fit. In order for them to be effective, a perfect seal must be formed. Glasses, long side burns, and facial movements can reduce protection.
2. Ear Plugs: the most commonly used ear protection device. They come in many different shapes, sizes, and materials. Ear plugs can be purchased as disposables, preformed, or molded (professionally fitted). They reduce noise levels by 25-30dB depending on type and fit. Cotton is ineffective as ear plugs.
3. Ear Caps: a cross between earmuffs and earplugs--earplugs connected to a plastic (usually) band which can be worn under the chin, over the top of the head, or behind the neck. They reduce noise levels by 25-35dB depending on type and fit.

NOTE: Combinations of earplugs and earmuffs can reduce noise level by an additional 3-5dB depending on type and fit.

### Inspection and Maintenance

All ear protection, if not disposable, shall be inspected and cleaned before each use. All damaged ear protection shall be discarded and replaced. No unauthorized modifications shall be allowed.

## **PROTECTIVE CLOTHING**

Protective clothing shall be worn by employees/students when the potential of an employee/student being exposed or coming in contact with harmful substance is evident. i.e., chemicals, high heat (radiant), dust, open flame, etc.

### **Approval and Selection**

There are many different standards for approval of protective clothing (ANSI, ASTM, CAL-OSHA, etc.).

Protective clothing shall be selected for specified hazard, degree of protection, comfort, and ease of use.

Once the specific or multi-hazards have been identified, contact a reputable vendor or Director of Safety for recommendation of proper protective clothing and/or equipment needed.

### **Fitting**

Protective clothing shall fit the wearer comfortably with a minimum of undo play.

### **Inspection and Maintenance**

Protective clothing shall be routinely cleaned unless disposable. Disposable clothing shall be disposed of after use. Damaged, torn, ripped, etc., clothing shall be replaced before use.

## SELECTION CHART FOR EYE AND FACE PROTECTORS FOR USE IN INDUSTRY, SCHOOLS, AND COLLEGES

This selection chart offers general recommendations only. Final selection of eye and face protective devices is the responsibility of management and safety specialists. (For laser protection, refer to American national Standard for Safe Use of Lasers, ANSI Z136.1-1976.)

1. GOGGLES--Flexible fitting, regular ventilation.
2. GOGGLES--Flexible fitting, hooded ventilation.
3. GOGGLES--Cushioned fitting, rigid body.
4. SPECTACLES\*--Without side shields.
5. SPECTACLES--Eyecup type side shields.
6. SPECTACLES--Semi-/Flat-fold side shields.
7. WELDING GOGGLES--Eyecup type, tinted lenses .
8. WELDING GOGGLES--Cover spec type, tinted lenses .  
8A. CHIPPING GOGGLES--Cover spec type, clear safety lenses .
9. WELDING GOGGLES--Cover spec type, tinted plate lens.
10. FACE SHIELD--Plastic or mesh window (See caution note.)
11. WELDING HELMET\*

\*Non-side shield spectacles are available for limited hazard use requiring only frontal protection.

### APPLICATIONS

OPERATION	HAZARDS	PROTECTORS
Acetylene-Burning Acetylene-Cutting Acetylene-Welding Chemical Handling Chipping Electric (Arc) Welding Furnace Operations Grinding-light Grinding- heavy Laboratory Machining Molten Metals Spot Welding	Sparks, harmful rays, molten metal, flying particles 7,8,9 Splash, acid burns, fumes 2 (for severe exposure, add 10) Flying particles 1,3,4,5,6,7A,8A Sparks Intense Rays, molten metal 11 (in combination with 4,5,6 in tinted lenses advisable) Glare, Heat, Molten Metal 7,8,9 (severe exposure, add 10) Flying particles 1,3,5,6 (severe exposure, add 10) Flying particles 1,3,7A,8A (severe exposure, add 10) Chemical Splash, glass breakage 2 (10 when in combination with 5,6) Flying particles 1,3,5,6 (severe exposure add 10 Heat, glare, sparks 7,8 (10 in combination with 5,6 in tinted lenses Flying particles, sparks 1,3,4,5,6 (tinted lenses advisable; for severe exposure, add 10)	

## CAUTION:

- Face shields alone do not provide adequate protection.
- Plastic lenses are advised for protection against molten metal splash.
- Contact lenses, of themselves, do not provide eye protection in the industrial sense and shall not be worn in a hazardous environment without appropriate covering safety eyewear.

## GLOVE MATERIALS

### Features: Benefits:

### Liquid Proof Styles

- **Butyl (cement\*)**: Highest resistance to permeation by most gases and water vapor.
- **Viton (cement\*)**: Exceptional performance when subjected to chlorinated and aromatic solvents, coupled with excellent resistance to permeation by many vapors.
- **Nitrile (latex\*)**: Superior puncture and abrasion resistance. Recommended as a general duty glove. Excellent resistance to the degrading effects of fats, petroleum products, and a wide array of chemicals.
- **Natural Rubber (cement\*)**: Excellent resistance to the degrading effects of alcohols and caustics. Ideal for use in sand blasting.
- **PVC Coated**: Excellent abrasion resistance in a liquid-proof glove. Also provides cushioning.

\*Cement and Latex refer to two basic manufacturing processes of unsupported liquid proof gloves. As a general rule, cement dip gloves exhibit greater resistance to liquid and vapor permeation than do Latex dipped gloves. Therefore, where a permeation barrier is required, a cement dip glove shall be selected.

### General Purpose: Fabrics and Coatings

- **Worknit** Combines the toughness of a nitrile coating with the softness and stretchy comfort of jersey.
- **Worknit HD** Developed and designed to replace leather and/or heavy cotton gloves, the HD fabric has a heavier cotton liner than the regular Worknit. This glove is best used where a tough job requires a product which provides protection, excellent wear, comfort, and value.
- **Coated Machine Knits**
  - A. **Grip-N , Grip-N**: Unique, economical answer to the general-purpose glove. Offers comfort and long wear. Four wearing surfaces instead of two. Superior grip and abrasion resistance. Hot Mill, Double Grip-N (1.) Reversibility (2.) N-tread PVC coating
  - B. **Clean Grip** (1.) Reversible (2.) Large. Soft PVC Dots
- **Impregnated Wovens and Jerseys**
  - A. Newtex Woven cloth for strength. Coating for abrasion resistance.
  - B. PVC Dotted Canton and Jersey: The original coated glove. Cool, Comfortable cotton, permanently "dotted" for longer wear and better grip.

- **Uncoated Knit Fabrics**
- **Machine Knit (string glove):** 100% cotton. They are cool, comfortable, and the lowest-priced glove on the market.

#### **GENERAL PURPOSE: LEATHER**

- **Side Split Leather:** Superior combination of strength, thickness and suppleness in split cowhide leather. A minimum of flaws, scars, and weaknesses, provides longer wear and comfort.
- **Shoulder Split Leather:** Provides cushioning and abrasion resistance in a more economical grade of leather.
- **Grain Leather:** Better flexibility, finger dexterity and fit than split leather. Generally more comfortable, but less durable than split leather.

### **SELECTION CHART FOR HEAD PROTECTION FOR UNIVERSITY**

#### **EMPLOYEES**

1. **HARD HAT:** A rigid head gear of varying materials used to protect the worker's head from impact, penetration, electrical shock, or a combination of these.
2. **Composition:** Special plastics, fiberglass and plastics combination, cloth and resin, and aluminum alloy.
3. **Types:**
  - Type 1: Helmet (hard hat), full brim. Allows for complete protection of head, face, and back of neck..
  - Type 2: Helmet (hard hat), brimless with beak. This type is most commonly used and can accommodate various types of face shields and ear protection.
4. **Classes:** There are four different voltage classes of head protection. University personnel covered under this section shall only be allowed to wear class A and B.
  - Class A: Limited voltage protection. Used by employees or students in general service (nonelectrical) occupations. i.e., construction, landscape, etc.
  - Class B: High voltage protection. Used by employees in electrical occupations, i.e., electricians.
  - Class C: Metal helmets. Under no circumstances shall metal helmets be used by University employees or students.
  - Class D: Firefighters' helmet.
5. **Hair Protection:** All employees/students with long hair or beards who work around chains, belts, or other machines with moving parts shall be required to wear protective hair coverings. Hairnets, bandannas, and turbans shall not be considered satisfactory. Contact local vendors for information on the type of protective hair coverings available. Those who work around sparks, hot metals, flames, etc., shall use flame-resistant protective hair coverings.

## FOOT PROTECTION CLASSIFICATION AND PROTECTION FACTORS

### Classification of Safety Shoes

- a. Safety-toe Shoes: Steel toes and metal reinforced sole. Usage: Areas where heavy, protruding or falling objects presents a threat. .
- b. Conductive Shoes: Reduces the possibility of generating a spark. Usage: Areas where fire and explosive hazards exist.
- c. Foundry Shoes: Contains no fasteners and is easily removed. Usage: Areas where exposure to splashes of molten metal is likely.
- d. Explosive Operation Shoes: A shoe with non-conductive and grounding properties. Usage: Areas where explosive compounds are present when cleaning tanks with volatile hydrocarbons.
- e. Electrical hazard Shoes: A shoe which minimizes the hazard of conducting electricity (no metal in shoes). Usage: Areas where electrical hazards exist.

Listed below are seven types of shoe protection which are available. These shall be considered in determining the type or types of protection needed.

1. Toe Protection from Impact and Compression: Shoes for this type of protection shall meet the rated factors. These factors are rated as Class 30, Class 50, and Class 75. The following table indicates the characteristics of each class:

CLASS COMPRESSION	IMPACT			
	Weight (W) (pounds)	Height (H) (feet)	Impact Energy (E) (feet/pounds)	(pounds)
75	50	105	75	2,500
50	50	1	50	1750
30	50	0.6	30	1,000

\*Impact Energy (E) = Weight (W) x Height (H)

2. Metatarsal Protection: If the top of the foot or ankle is likely to be struck by a heavy object, a metatarsal guard is needed. This type of protection can be added to the shoe or may be built into the shoe. Metatarsal protection is classified MT30, MT50, and MT75 to correspond with the protective potential of toe protection.
3. Puncture Protection: The purpose of puncture resistance is to reduce the hazards of puncture wounds caused by sharp objects which could penetrate the sole of the footwear. Puncture resistant footwear shall have a rating designation of PR.
4. Sole Slip Resistance: The purpose of slip resistant footwear is simply to prevent injury due to failure of footwear to resist slipping on slippery surfaces. Most safety shoe manufacturer's do not provide a slip resistance rating at this time. This rating is referred to as "Dynamic Coefficient of Adherence." For example:
  - 0.0 There is no grip at all between the two surfaces.
  - 0.15 Accepted as a minimum.
  - 0.20 Very good coefficient.
  - 0.30 Indicates an outstanding grip.
5. Electrical Hazard Protection: The purpose of this requirement is to reduce hazards due

to contact with electrically energized parts. Electrical hazard shoes are not intended for use in explosive or hazardous locations in which conductive footwear is required. Footwear with this protection may be rated as EH.

6. **Conductive Protection:** The purpose of this requirement is to protect against the hazards of static electricity buildup or to facilitate the equalization of electrical potential of personnel (lineman) and energized high voltage lines. Footwear with this protection may be rated CD Type 1 or Type 2.
7. **Upper Shoe Protection:** The purpose of this requirement is protection from substances which may be harmful or hazardous penetrating the upper shoe covering and causing discomfort or injury to the foot. The rule of thumb here is that the upper shoe covering shall be able to resist whatever harmful substances the worker may spill or contaminate his/her shoes with.

### **CLASSIFICATION OF SAFETY BELTS AND HARNESSSES**

- **Class I:** Body belt (work belts), used to restrain a person in a hazardous work position and to reduce the probability of falls.
- **Class II:** Chest harness, used where there are only limited fall hazards (no vertical free-fall hazard) and for retrieval purposes, such as removal of a person from a tank, bin, or other enclosed place.
- **Class III:** Body harness, used to arrest the most severe free-falls. This harness is ideal for workers on elevated sites. During a fall, distributes the fall impact over the body.
- **Class IV:** Suspension belts, independent work supports used to suspend or support the worker.
- **Lifeline:** A horizontal line between two fixed anchorages. (Support capacity of 5400 pounds and line diameter 1.2 inch)
- **Personal Lifeline:** This system is usually a rope system that provides flexibility for worker freedom of movement, yet will arrest a fall and help absorb the shock. These systems always have some type of belt or harness that is worn around the waist to which a lanyard or rope-grabbing device is attached.
- **Lanyard:** A short piece of flexible line used to secure wearer of safety belt to a lifeline or drop line, or fixed anchorage. (Support capacity of 5400 pounds)

### **THRESHOLD LIMIT VALUES FOR NOISE**

Duration per day (hrs)	Sound Level (dBA)
16	80
8	85
4	90
2	95
1	100
½	105
¼	110
	115

Sound level in decibels are measure on a sound level meter, conforming as a minimum to the requirements of the American National Standard Specification for Sound Level Meters, S1.4

(1971) Type S2A, and set to use the A-weighted network with slow meter response.

\*No exposure to continuous or intermittent in excess of 115 dBA.

### **Impulsive or Impact**

It is recommended that exposure to impulsive or impact noise shall not exceed the limits listed in the table below. No exposures in excess of 140 decibels peak sound pressure level are permitted. Impulsive or impact noise is considered to be those variations in noise levels that involve maxima at intervals of 1 per second. Where the intervals are 1 second, it should be considered continuous.

#### **THRESHOLD LIMIT VALUES IMPULSIVE OR IMPACT NOISE**

Sound Level (dB\*) Permitted # of Impulses or Impacts per day

140	100
130	1,000
120	10,000

\*Decibels peak sound pressure level; re 20  $\mu$ Pa.

### LEVELS OF SOME COMMON SOUNDS

Sound Pressure, P N/m <sup>2</sup> (Pascal)	Sound Pressure Level, L <sub>p</sub> dB re 20 μN/m <sup>2</sup> (μPascal)	Sound Source
100,000 (1 bar)	194	Saturn Rocket
20,000.0	180	
	170	
2000.0	160	Ram Jet
	150	Turbo Jet
200.0	140	Threshold of pain
	130	Pipe Organ
20.0	120	Riveter, chipper
	110	Punch Press
2.0	100	Passing truck
	90	Factory
0.2	80	Noisy office
	70	
0.02	60	Conversational speech
	50	Private office
0.002	40	Average residence
	30	Recording studio
0.0002	20	whisper
	10	Threshold of good hearing
0.00002	0	Threshold of excellent youthful hearing

## USE OF COLOR

### Color-Coding

Color is used extensively for safety purposes. While never intended as a substitute for good safety measures and the use of mechanical safeguards, standard colors are used to identify specific hazards. Standards have been developed and are given in American National Standard Z53.1, "Safety Color Code for Marking Physical Hazards and the Identification of Certain Equipment."

In summary, they are as follows:

**RED** identifies fire protection equipment, danger, and emergency stops on machines.

**YELLOW** is the standard color for:

1. marking hazards that may result in accidents from slipping, falling, striking against, etc.
2. flammable liquid storage cabinets;
3. a band on red safety cans;
4. materials handling equipment such as lift trucks and gantry cranes
5. radiation hazard areas or containers (with purple). Black stripes or "checkerboard" patterns are often used with yellow.

**GREEN** designates the location of first aid and safety equipment (other than fire fighting equipment). (Also, see "BLUE" below.)

**BLACK AND WHITE** and combinations of these in stripes or checks are used for housekeeping and traffic markings. They are also permitted as contrast colors.

**ORANGE** is the standard color for highlighting dangerous parts of machines or energized equipment such as exposed edges of cutting devices and the inside of

1. movable guards and enclosure doors
2. transmission guards

**BLUE** is used on informational signs and bulletin boards not of a safety nature. (If of a safety nature, use green.) Also has railroad uses.

**REDDISH-PURPLE** identifies radiation hazards; check Nuclear Regulatory Commission (NRC) regulations. The piping in a plant may carry harmless, valuable, or dangerous contents, therefore, it is highly desirable to identify different piping systems. The American National Standard A13.1, "Scheme for Identification of Piping Systems," specifies standard colors for identifying pipelines and describes methods of applying these colors to the lines. The contents of pipelines are classified as such:

- Fire Protection--Red
- Dangerous--Yellow

- Safe--Green
- Protective Materials--Bright **Blue** (i.e., inert gases)

The proper color may be applied to the entire length of the pipe or in bands 8-10" (20-25 cm) wide near valves, pumps and at repeated intervals along the line. The name of the specific material is stenciled in black at readily visible locations such as valves and pumps.

Piping less than 3/4" in diameter is identified by enamel-on-metal tags.

The code also recommends highly resistant colored substances for use where acids and other chemicals may affect paints.

## PLUMBING

Plumbers are subjected to many safety hazards; especially when working in the University environment.

Plumbing involves facing those exposures most trades are subjected to, plus the additional dangers associated with the removal/repair of science laboratory equipment.

Before dismantling such equipment as lab sinks, drains, pipes, fume hoods, glove boxes, etc., the plumber shall exercise great care.

A check with the professor or researcher in charge shall be made to try to ascertain what the equipment has generally been used for. **Example:** If a fume hood which has been used mostly for work involving perchloric acid is to be repaired or removed, a complete wash down, inside and outside, is crucial to doing the job safely. A copious amount of water is the best practical prevention available to combat perchloric acid.

Sinks and pipes might contain residual acids which need neutralizing; again, a check with the professor or researcher in charge is vital to safely completing the job.

Through circumstances beyond his/her control, a plumber is sometimes required to perform a task without benefit of information relative to safety. In the event this happens, The Safety Office shall be contacted. See "Services Available Through Safety Office."

Additionally, plumbers shall consult the following items in the manual for other safety rules that could offer protection:

- SAFE USE OF HAND AND PORTABLE POWER TOOLS
- ELECTRICAL SAFETY EQUIPMENT LOCKOUT PROCEDURES
- SAFETY IN WELDING AND CUTTING OPERATIONS
- HOT WORK CUTTING/WELDING PERMIT
- PROPER USE OF LADDERS
- THE EMERGENCY RESPONSE UNIT
- ASBESTOS MATERIALS HANDLING
- PERSONAL PROTECTION PROGRAM

# SAFETY IN WELDING AND CUTTING OPERATIONS

## Protective Clothing and Equipment

- Protective clothing and equipment shall be suitable for the type of work to be performed, kept in good repair, and kept free of oil and grease.
- Sleeves shall be kept buttoned at the wrist.
- Collars shall be kept buttoned.
- Fire resistant gauntlet gloves, aprons of leather, and leggings shall be used as protection against radiated heat or sparks.
- Front pockets on overalls and aprons, and cuffs on pants shall be eliminated.
- Capes or shoulder covers made of leather or other flame and heat-resistant material shall be worn during overhead welding or cutting operations. Leather skull caps worn under helmet provide protection against head burns.
- When working in a confined space or an overhead location, earplugs shall be worn or the ears covered with wire screen protectors.
- Hard hats or other types of head protectors shall be used where there is exposure to falling objects.
- Low cut shoes shall not be worn unless the ankles are covered with protective leggings.
- Employees required to wear respirators shall keep them clean and sterilized. When not in use, such equipment shall be stored in closed containers.
- The airline to supplied-air respirators shall be provided with a filter which will remove pipe scale, water, oil, mist, and noxious vapors. It shall also be equipped with a pressure-reducing valve to prevent the supplied-air pressure from exceeding 25Psi.
- Shock from electric arc welding can and does kill. Insulating mats of sufficient size shall be used when sitting on the same metal which is being welded. Rubber gloves shall be worn under welding gloves when welding in wet or damp locations, or when the operator is perspiring excessively.
- After a welding job is completed, the material shall be chalk marked "HOT," or a warning sign shall be posted to caution other employees.

## Eye Protection

- Goggles, helmets, hand shields, or other suitable eye protection having the proper lens shade for the work being done shall be worn during all welding or cutting operations.(See attached tables.)
- Goggles, helmets, and hand shields shall be checked frequently. Equipment with light leaks shall not be worn, as radiation burns will result. Cracked, broken, or loose filter plates must be replaced immediately.
- Protective colored flash goggles with side shields shall be worn under a hood for protection against harmful rays, flying chips, and sparks when an arc is struck prematurely before the helmet is lowered. The lenses shall be No. 1 or No. 3 shade. Inert gas metal-arc welding by nearby welders requires goggles under the helmet with lens shade as per table.  

**NOTE:** Momentary observation of an arc without protective lenses can cause a retinal burn, which, in turn, may result in a permanent dark area in the field of vision.
- When arc-welding operations are performed in an area that is not enclosed or isolated, workers or other persons near the welding area (generally within 75' of the arc) shall wear appropriate goggles.
- Flash shields shall be carried on portable welding carts as standard equipment and shall

be used when necessary.

## **Ventilation**

- Mechanical ventilation shall be used as a precaution against breathing welding fumes and dust. When this is not provided, a metal frame respirator or supplied air respirator shall be used.
- When welding on brass, bronze, galvanized iron, or cadmium-plated metals, adequate ventilation shall be provided to carry off vapors. Metals containing or coated with lead, cadmium, zinc, mercury, beryllium, and similar materials produce toxic fumes when welded or cut; the latter evolving into deadly phosgene gas. Chlorinated solvent vapors less than 200' from inert gas metal-arc welding shall be shielded from the arc.
- For local exhaust suction devices to be effective, the exhaust hood entrance shall be within 9 " of the weld or cut.

## **Fire Prevention**

When practicable, the object to be welded shall be moved to a safe location designated for welding. If the object to be welded cannot be moved to a safe location, all movable fire hazards in the vicinity shall be taken to a safe place.

Welding and cutting operations shall not be done in rooms, compartments, or confined places containing flammable vapors or dusts, nor on containers that have held flammable liquids or gases until all fire and explosion hazards have been eliminated. This is in accordance with recommendations of the American Welding Society, "*Standard A6.0--Welding and Cutting Containers Which Have Held Combustibles.*"

Welding and cutting operations shall be performed only in areas that have been freed of fire hazards.

Welding shall not be performed on the outside or inside of tanks that contain flammable liquids until all explosion or fire hazards have been removed.

Before starting welding or cutting operations on tanks or similar surfaces, an inspection shall be made to see that no combustible material is present on either side of the surface.

Approved fire extinguishing equipment in good operating condition shall be kept close to all welding or cutting operations.

Sheet metal guards, or other similar protection shall be used to prevent sparks (which can travel up to 35') from falling on wooden floors, partitions, or on flammable materials that cannot be moved. A firewatcher with fire extinguishing equipment shall be in attendance where combustible materials may be ignited by welding sparks. After the job is done careful inspection of these areas shall be made to ascertain that no sparks are left in flammable materials. The watcher shall be assigned to inspect the area for at least a half hour after work has been completed.

To prevent explosions, welding or other burning torches shall not be taken into confined spaces until pressures have been regulated and unless they are to be used immediately. Remove torches as soon as the work is finished.

When required, welding permits shall be made available for re-view by interested parties.

## **Gas Welding and Cutting**

### **Storage, Handling, and Use of Cylinders:**

- Special care shall be used in the identification and selection of cylinders to insure that the proper type of gas is used. Identification shall be made from the cylinder tag instead of depending on the cylinder color code.
- Cylinders shall be handled carefully. They shall not be dropped or jarred.
- The loading and storage platform shall be used for outdoor storage of cylinders so that they can be transferred between delivery trucks and the platform without being dropped or jarred. Full and empty cylinders of each type of gas shall be stored separately.
- Cylinders shall be stored so that they will not be knocked over or damaged by falling objects, passing vehicles, or persons.
- Cylinders shall not be stored near radiators, stoves, or any other sources of heat.
- O<sub>2</sub> cylinders shall be stored 20' away from fuel gas cylinders and combustible materials, or if closer, separated by a non-combustible barrier (at least 5' high) with a fire resistance rating of one-half hour.
- All cylinder storage rooms shall be well ventilated.
- Unless other suitable provisions have been made to prevent cylinders from upsetting during use, they shall be securely tied to a substantial stationary object.
- Cylinder valves shall be closed and valve protection caps replaced before cylinders are moved or placed into storage.
- Special cylinder carts shall be used for moving cylinders.
- All cylinders shall be placed in an upright position whether in use or in storage. This prevents fuel gas liquids in LP-Gas or MAPP Gas (Methylacetylene-Propadiene) cylinders or acetone liquid in acetylene cylinders from being discharged through the regulator.
- Cylinders shall be used in the order they are received from the supplier. When empty, their valves shall be closed, caps replaced, and the cylinders marked "MT Storage" to indicate that they are empty. Also see Section, "Handling, Using, and Storage of Compressed Gas Cylinders."
- Cylinders shall not be permitted to come in contact with electrical wires.
- Cylinders shall be placed in locations where they will not come in contact with sparks or flames from welding or cutting work.
- When cylinders are to be hoisted or lowered by derrick, they shall be securely placed on a suitably designed carrier or platform and attached to the derrick hook by means of a choker sling. Cylinders shall not be lifted by their valve or caps. Electric magnets shall never be used.
- Oxygen or acetylene cylinders shall be used only when equipped with proper regulators or reducing valves.
- Regulators or automatic reducing valves shall be used only with the gas for which they are intended and at pressures for which they are intended.
- While acetylene cylinders are in use, the valve key wrench shall be kept in place. It shall be removed after closing the valve.
- The fusible safety plug on acetylene cylinders shall not be tampered with.
- Warm water, never a flame or boiling water, shall be used to remove ice from around the outlet valve of an acetylene cylinder.
- Leaking acetylene cylinders shall not be placed in service. When uncontrollable leaks

- are present, the cylinder shall be moved to a well-ventilated open area, and the valve shall be opened slightly to permit the acetylene to escape slowly. Warning signs shall be displayed to keep persons with cigarettes or other sources of ignition at a safe distance.
- The tops of acetylene cylinders shall be kept free of tools or other objects.
  - Fuel gas and acetylene cylinders shall be stored and used valve end up.
  - Fuel gas cylinders shall not be used as a substitute for compressed air, as a source of pressure, nor used for ventilation or dusting operations.
  - Oxygen cylinders shall not be stored near highly combustible material, especially oil and grease, or near reserve stocks of carbide and acetylene or other fuel-gas cylinders, or near any other substance likely to cause or accelerate fire, or in an acetylene generator compartment.
  - Acetylene shall not be used at a pressure greater than 15psi.

### **Hose Lines and Connections**

- Only hose in good condition shall be used. At regular intervals, examine pressurized hose while it is immersed in water to detect leaks
- Only hose designated to be used with a specific gas shall be used. In general, hoses can be identified by their color:
  1. red=fuel gas
  2. green=oxygen
  3. black=inert gas
- Hose shall be protected from damage by trucks, falling objects, sharp edges, sparks, slag, and open flame.
- Hose shall be placed so that it will not create a tripping hazard. Excess hose shall be coiled to prevent kinks and tangles.
- Standard oxygen hose or regulator outlet connections have right-hand threads; fuel gas connections have left-hand threads with a grooved hex on the nut or shank. Connections shall never be forced.
- Oil or grease shall not be used in making up connections.
- Tape shall not be used to repair hose. Hose may be spliced using standard brass fittings (not copper tubing) and ferrules or hose clamps designed for this purpose.
- Welders shall not stand in front of the gauges on the regulator when opening the discharge valve of the tank. Sudden pressure may destroy the gauge, glowing out the glass and parts.

### **Torches**

- Torches shall not be lighted by spark lighters, pilot lights, or matches. Torches shall not be re-lighted from hot work, especially when operating in a small confined space--if gases do not light instantly, ignition could be violent.
- Purge oxygen and fuel gas lines individually to remove air and other contaminants before using each day. Do not purge in a confined space.
- When torches are changed or welding is discontinued for longer than five minutes, all cylinder valves shall be closed.
- A clear, unobstructed space shall be maintained between the work and the cylinders so that pressure-reducing regulators can be reached quickly in an emergency.
- If a flashback occurs because of combustible gas mixtures burning inside the tip, torch or hose, faulty equipment or misuse is generally the cause. In an oxy-fuel torch, when hissing or squealing is heard, flame has passed the mixer and the torch and cylinder

valves shall be shut off and the area vacated for about five minutes. If the torch, regulator, and cylinder are cool, inspect the torch and regulator for inner damage. Discard the hose unless it will pass a pressure test--the greater of either 300psi or twice the operating pressure.

## **Electric Arc Welding**

### **Equipment and Cables:**

- Before starting operations, all electrical connections shall be checked to determine that they are securely made and firmly attached to the work.
- Work leads shall be kept as short as possible.
- Equipment shall be examined frequently to determine that all electrical connections and insulations on holders and cables are in good condition. Loose cable connections may overheat or arc and cause a fire.
- Be careful not to connect the equipment ground lead of single-phase units to the 3rd wire (hot) of a 3phase power source.
- Line cords with 3-prong plugs shall be connected to a grounded switch box or a grounded mating receptacle respectively. Three-prong plugs with a broken ground prong shall not be used.
- Safety devices such as circuit breakers and interlocks shall not be shunted out or disconnected. Power sources or line fuses shall be locked out or removed when equipment is being installed, inspected, or serviced.
- Report any missing enclosures or defects in the motor or generator to your supervisor.
- Terminals of the welding generator shall not contact the frame of the welder. This produces an electrical ground.
- Only electrode holders designed to safely handle the maximum rated current required shall be used.
- Electrode holders that are not fully insulated shall be replaced. Holders with protruding screws shall not be used.
- Electrodes shall be removed from the holder when not in use.
- An arc shall not be stricken on a gas cylinder or any pressure vessel as it may seriously weaken the vessel.
- Only welding cables that are completely insulated, flexible, and of proper size for the maximum current requirements of the work shall be used. Cables shall be regularly inspected for cracks, wear, or damage and repair or replace if necessary.
- Lengths of cable shall be connected by fully insulated lock-type connectors having a capacity equal to that of the cable.
- Cable lugs shall be soldered to the cable and shall be securely fastened to calve full electrical contact.
- The exposed metal parts of lugs shall be completely covered with rubber tape and protected with friction tape. Exposed parts of electrical units shall have insulating covers in place before the power is turned on.
- Proper electrical contact shall exist at all joints when a building structure or pipeline is used temporarily as a ground-return circuit.
- When a structure or pipe is continuously used as a ground for the machine, all joints shall be electrically bonded to establish a good ground.
- Pipe containing gases, flammable liquids, or conduits carrying electrical conductors shall not be used as a ground-return circuit.
- Welders shall make every effort to keep welding cables dry, grease and oil-free, and

protected from sparks or hot metal.

- Cables shall be supported from overhead when practical.
- Cables laid on the floor or ground shall be protected so they will not be damaged or cause a tripping hazard.
- Welding cables shall not be located close to other power supply cables or other high-tension leads.
- When discontinuing work, the power supply switch in the equipment shall be opened and the unit disconnected from the source of power.
- Welding rods shall be stored in the container on the welding machine; not thrown on floors or staging.
- Welding shall never take place in damp areas without insulation to protect workers against electrical shock. Dry duckboard or a mat shall be used if necessary.
- Gas or diesel electric generators shall have the exhaust gases vented to the outside to avoid the toxic effects of carbon monoxide and other gaseous byproducts.

**NOTE:** The hazards connected with atomic hydrogen and heli-arc welding are essentially the same as described herein for arc welding.

### **Spot Welding**

The use of this type of welding presents certain hazards inherent to the nature of spot welding equipment.

- Prior to spot welding, the material is usually cleaned in a caustic or slightly acid bath. Employees performing these wash operations shall be protected from splashing liquid.
- Under no circumstances shall the operator of a spot welding machine adjust the contractors. This shall be done by a trained electrician.
- In hand spot welding installations, eye protection shall be required to protect the operator from the spattering metal.
- Operators shall exercise extreme care when cleaning the tips of the contractors to prevent having their fingers crushed between tips.
- Welding of materials such as stainless and high carbon steels causes excessive spattering of metal. Operators shall be cautioned to protect against the possible penetration of the metal into the tips of the fingers. See Item, "Hot Work Permits."

### **FILTER LENS SHADE NUMBERS FOR PROTECTION AGAINST RADIANT ENERGY**

<b>Gas Welding Operation</b>	<b>Shade Number</b>
Soldering	2
Torch brazing	3 or 4
Light cutting, up to 1"	3 or 4
Medium cutting, 1" to 6"	4 or 5
Heavy cutting, over 6"	5 or 6
Gas welding (light), up to 1/8"	4 or 5
Gas welding (medium) 1/8" to 1/2"	5 or 6
Gas welding (heavy), over 1/2"	6 or 8

  

<b>Electric Arc Welding Operation</b>	<b>Shade Number</b>
Shielded metal-arc welding 1/16, 3/32 1/8, 5/32 in dia electrodes	10
Gas-shielded arc welding (nonferrous) 1/16, 3/32, 1/8, 5/32 in dia electrodes	11

Gas-shielded arc welding (ferrous) 1/16, 3/32, 1/8, 5/32 in dia electrodes	12
Shielded metal-arc welding 3/16, 7/32, 1/4 inch diameter electrodes	12
5/16, 3/8 inch diameter electrodes	14
Atomic hydrogen welding	10-14
Carbon-arc welding	14

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## HANDLING, USING, AND STORING OF COMPRESSED GAS CYLINDERS

NOTE: Also see, [SAFETY IN WELDING AND CUTTING OPERATIONS](#)

### Handling Cylinders

- Only cylinders approved for use in interstate commerce for transportation of compressed gases shall be accepted.
- Numbers or marks stamped on cylinders shall not be removed or changed.
- Because of their shape, smooth surface, and weight, cylinders are difficult to carry by hand. Cylinders may be rolled on their bottom edge but never dragged. Cylinders weighing more than 40 pounds (18.2 kg total) shall be transported on a hand-motorized truck and suitably secured to keep them from falling.
- Cylinders shall be protected from cuts or scratches.
- Compressed gas cylinders shall not be lifted with an electro-magnet. Where cylinders must be handled by a crane or derrick as on construction jobs, they shall be carried in a cradle or suitable platform and extreme care shall be taken to see that they are not dropped or bumped. Slings shall not be used.
- Cylinders shall not be dropped or be allowed to strike each other violently.
- Cylinders shall not be used for rollers, supports, or any purpose other than to contain gas.
- Safety devices in valves or on cylinders shall not be tampered with.
- When in doubt about the proper handling of a compressed gas cylinder or its contents, the supplier of the gas shall be consulted.
- When empty cylinders are to be returned to vendor, they shall be marked EMPTY or MT with chalk. Close the valves and replace the valve protection caps if the cylinders are designed to accept caps.
- Cylinders to be transported shall be loaded to allow as little movement as possible. Secure them to prevent violent contact or upsetting.
- Cylinders shall always be considered full and shall be handled carefully. *Accidents have resulted when containers under partial pressure were thought to be empty.*
- The fusible safety plugs on acetylene cylinders melt at about the boiling point of water. If an outlet becomes frozen or clogged with ice, it shall be thawed with warm (not boiling) water applied to the valve only. A flame shall never be used.

### Using Cylinders

- Cylinders, particularly those containing liquefied gases and acetylene, shall be used in a secured upright position to prevent them from being accidentally knocked over.
- Unless the cylinder valve is protected by a recess in the head, the metal cap shall be kept in place to protect the valve when the cylinder is not connected for use. A blow on

- an unprotected valve might cause high-pressure gas to escape.
- The threads on a regulator or union shall correspond to those on the cylinder valve outlet. Connections that do not fit shall not be forced.
  - Cylinder valves shall be opened slowly. Cylinders without hand wheel valves shall be opened with a spindle key, special wrench, or other tool provided or approved by the gas supplier.
  - Cylinders of compressed gas shall not be used without a pressure-reducing regulator attached to the cylinder valve except where cylinders are attached to a manifold--in which case the regulator shall be attached to the manifold header.
  - Before making connection to a cylinder valve outlet, the valve shall be "cracked" for an instant to clear the opening of particles of dust or dirt. The valve and opening shall always be pointed away from the body and not toward anyone else. Fuel gas cylinder valves shall not be cracked near other welding work, sparks, open flames, or other possible sources of ignition.
  - Regulators and pressure gauges shall be used only with gases for which they are designed and intended. Make no attempt to repair or alter cylinders, valves, or attachments. This shall be done by the manufacturer.
  - Unless the cylinder valve has first been closed tightly, no attempt shall be made to stop a leak between the cylinder and the regulator by tightening the union nut.
  - Fuel gas cylinders in which leaks occur shall be taken out of use immediately and handled as follows:
    - The valve shall be closed and the cylinder taken outdoors well away from any ignition source. The cylinder shall be properly tagged and the supplier notified.  
NOTE: A regulator attached to the valve may be used temporarily to stop a leak through the valve seat.
    - If the leak occurs at a fuse plug or other safety device, the cylinder shall be taken outdoors well away from any ignition source, the cylinder valve opened slightly, and permit the fuel gas permitted to escape slowly. The cylinder shall be plainly tagged. *NO SMOKING* or *IGNITION SOURCE* signs shall be POSTED. A responsible person shall stay in the area until the cylinder is depressurized to make sure that no fire occurs. The supplier shall be promptly notified and follow his instructions for returning the cylinder.
  - Sparks, molten metal, electric currents, excessive heat, or flames shall not be permitted to come in contact with the cylinder or attachments.
  - Oil or grease shall never be used as a lubricant on valves or attachments of oxygen cylinders. Oxygen cylinders and fittings shall be kept away from oil and grease such cylinders or apparatus shall not be handled with oily hands, gloves, or clothing.
  - Never use oxygen as a substitute for compressed air in pneumatic tools, in oil pre-heating burners, to start internal combustion engines, or to dust clothing. It shall be used only for the purpose for which it is intended.
  - Cylinders shall never be brought into tanks or unventilated rooms or other closed quarters.
  - Cylinders shall not be filled except with the consent of the owner and then only in accordance with DOT (or other applicable) regulations. No attempt to mix gases in a compressed gas cylinder or to use it for purposes other than those intended by the supplier shall be made.
  - Before a regulator is removed from a cylinder valve, the cylinder valve shall be closed and the gas released from the regulator.

## Storing Cylinders

- Cylinders shall be stored in a safe, dry, well-ventilated place prepared and reserved for the purpose
- Cylinders shall not be stored near elevators, gangways, stairwells, or other places where they can be knocked down or damaged.
- Oxygen cylinders shall not be stored within 20' (6m) of gas cylinders or highly combustible materials.
- If closer, cylinders shall be separated by a fire-resistive partition at least 5' (1.6 m) having a fire resistive rating of at least 1/2 hour.
- Acetylene and liquefied fuel gas cylinders shall be stored with the valve end up. If storage areas are within 100' (30.5 m) distance of each other and not protected by automatic sprinklers, the total capacity of acetylene cylinders stored and used inside the building shall be limited to 2000 ft<sup>3</sup> (57 m<sup>3</sup>) of gas, exclusive of cylinders in use or connected for use. Quantities exceeding this total shall be stored in a special room built in accordance with the specifications of NFPA 51, "Oxygen-Fuel Gas Systems for Welding and Cutting," either in a separate building or outdoors.
- Acetylene storage rooms and buildings shall be well ventilated. Open flames shall be prohibited. Storage rooms shall have no other occupancy.
- Cylinders shall be stored on a level, fire resistive floor.
- To prevent rusting, cylinders stored in the open shall be protected from contact with the ground and against weather extremes such as ice and snow accumulations in winter and continuous direct rays of the sun in the summer.
- Cylinders are not designed for temperatures in excess of 130°F (54°C). Accordingly, they shall not be stored near sources of heat such as radiators or furnaces, or near highly flammable substances like gasoline, oil or volatile liquids.
- Cylinder storage shall be planned so that cylinders will be used in the order in which they are received from the supplier.
- Empty and full cylinders shall be stored separately with empty cylinders plainly identified as such so as to avoid confusion. Cylinders having held the same contents shall be grouped together.
- A flame or electric arc shall never be permitted to contact any part of a compressed gas cylinder.
- Storage rooms for cylinders containing flammable gases shall be well ventilated to prevent the accumulation of explosive concentrations of gas; no source of ignition shall be permitted; smoking shall be prohibited; wiring shall be in conduit; electric lights shall be in fixed position, enclosed in glass or other transparent material to prevent gas from contacting lighted sockets or lamps, and they shall be equipped with guards to prevent breakage; electric switches shall be located outside the room.

## PAINTING

- Painters are subjected to many safety hazards and exposures including: fire, poisoning, falls, eye injury, strains, and dermatitis.

### I. Fire

After use, cans of paint, thinners, or lacquers shall be closed. This is particularly important when working inside a building or other enclosed area where a heat source or sparks could be present or when moving paints, thinners, or lacquers in a truck or van. All rags or towels

soaked with paint, thinners, or lacquers shall be disposed of in approved containers after each shift. All paints, thinners, or lacquers shall be returned to the shop. Stock shall be kept in appropriate cabinets or bins. The shop shall be kept clean and as free as possible of flammable materials. The shop shall be equipped with at least one 2 C Class B or ABC fire extinguisher. NO SMOKING signs shall be posted in the shop.

## **II. Poisoning**

Employees using a spray painter shall be protected from harmful mists as a result of overspray. Protection shall meet at least NIOSH/MSHA approved dual cartridge respirator requirements. There are a number of disposable facemasks meeting the above requirements. Such protection is vital due to the possible effects of oil and/or lead based or other harmful mists from paints, thinners, and lacquers that could damage the respiratory system. It is also important that a spray paint booth maintain sufficient air velocity to carry overspray and fumes away from the operator's face. Good maintenance and housekeeping of the system is a must for proper operation. (Air ducts shall be kept open, fan belts tight, and paint accumulations removed.) Also see TABLE OF RESPIRATORS.

## **III. Eye Injury**

When introduced into the eye, paints, thinners, lacquers, or other solvents could produce painful and dangerous results. Painters painting overhead shall wear appropriate eye protection to prevent paint or other materials from dropping into the eyes. When surfaces are prepared for painting by wire brushing, sanding, or scraping, eye protection shall be used. Also see EYE AND FACE PROTECTION CHART.

## **IV. Falls**

See LADDERS AND SCAFFOLDS.

NOTE: It is permissible for painters to use metal ladders, provided the work does not involve removing electrical appliances and/or working around energized equipment or lines.

## **V. Strains**

Moving ladders can and has caused back and muscle strains to many painters. Ladders are heavy and odd-shaped; they present quite a challenge to move, lift, or position. Large ladders shall be handled by two persons to prevent possible strain.

## **VI. Dermatitis**

Some individuals are susceptible to dermatitis, an inflammation of the skin (usually the hands, arms, or neck) caused by paints, thinners, or lacquers. To help prevent dermatitis, employees shall wear long sleeves, gloves, and keep the top button of their shirt buttoned while painting. Painters shall give consideration to wearing a hat when working. Also see HAND PROTECTION.

# SAFETY RULES FOR WOODWORKING MACHINES

## General

- All machines shall be constructed and maintained so that they are free of excessive noise and harmful vibration.
- All machines, except portable or mobile ones, shall be level and shall be securely fastened to the floor or other suitable foundation.
- Small units shall be secured to benches or stands of adequate strength and design.
- Tools shall be used only on machines for which they were designed.
- All safety devices shall be regularly checked for proper adjustment.
- Machines shall be securely locked and tagged out before cleaning.
- Loose clothing, long hair, jewelry, and gloves shall not be worn around rotating parts of machinery.
- Adjustments shall not be made while machines are running.
- All metal framework on electrically driven machines shall be grounded and shall comply with the National Electrical Code (NFPA-70) and applicable local codes.
- All machines shall have a cutoff device within reach of the normal operating position.
- Power controls and operating controls shall be located within easy reach and away from a hazardous area. They shall be positioned so the operator can remain at the regular work location.
- Each operating control shall be protected against unexpected or accidental activation.
- There shall be ample marked workspace around each machine.

## Housekeeping

- Good housekeeping shall be maintained to prevent buildup of dust, chips, sawdust, and scraps.
- The working surface of machines shall be kept clear of scrap and waste materials.

## Guards

- All belts, shafts, gears, and other moving parts shall be fully enclosed or be grounded in accordance with American National Standard B15.1, "Safety Standards for Mechanical Power Transmission Apparatus".

**NOTE: See MACHINE SAFEGUARDING REQUIREMENTS for more information.**

## Illumination

- The machines and the adjacent stock areas shall be adequately illuminated. General work areas - 50 foot-candles; Fine work - 100 or more foot-candles. There should be no shadows or reflected glare.

**NOTE: See ILLUMINATION FOR OCCUPATIONAL TASKS for more information.**

## Inspection

- Machines shall be inspected before each use. Areas of inspection include operating controls, safety control, power drives and sharpness of cutting edges, and other parts to be used.
- Cutting edges and tools shall be kept sharp at all times. They shall also be properly

- adjusted and secured.
- All shops and machines shall be inspected on a regular basis. See INSPECTION SCHEDULES AND REPORTS for information on frequencies and inspection forms to use.

### **Personal Protective Equipment**

- Individuals in the work area shall wear eye protection at all times.
- All workers shall wear close-fitting apparel and avoid loose clothing, neckties, gloves, and jewelry.
- Hairnets or caps shall be worn over long hair to keep it away from moving parts. Beards shall be kept trimmed close to the face.
- Safety shoes shall be worn when handling heavy material or when there is potential for foot injury.

**NOTE: See PERSONAL PROTECTIVE EQUIPMENT for more information.**

### **Code References for Woodworking Machines**

- OSHA 1910.213.
- American National Standard 01.1 and 0.1.a, "Safety Requirements for Woodworking Machinery".

## GUIDE TO WOODWORKING

### Table Saw

- Feed with body to side of stock.
- Adjust blade to appropriate height.
- Use guard with splitter and anti-kickback fingers.
- Keep stock firm against fence.
- When crosscutting, remove rip fence.
- Make sure blade is guarded by approved guard.

### Circular Saw

- Make sure blade is guarded by approved guard.
- Make sure stock does not bind.
- Use correct type blade. See "Circular Saw Blade" chart this section.
- Keep blade tight in arbor.
- Make sure work is firmly supported.
- Make sure there are no obstructions to work.
- Use manufacturer's recommended speed for materials being cut.

### Radial Arm Saw

- Rip sawing--direction of (cut) feed and antikick fingers.
- Use blade guards.
- Pull for cross cuts except 3" - 4" thickness.
- Make sure end plates on track-arm tight.
- Clamp handles tight.
- Make sure material tight to fence.
- Return cutter to rear of track.

### Band Saw

- Feed with body to side of stock.
- Guard height shall allow 1/2" clearance of material.
- A band saw should have a tension control device to indicate proper blade tension.
- Release cuts before long curves.
- Stop machine to remove scrap or pull out incomplete cut.

### Jointer/Planer

- Make sure knife projection which extend beyond this body of the head is not more than 1/3".
- Use long length stock.
- Use sharp cutters.
- Do not pass hands over cutters.
- Use push stick for small stock.

- Guard should adjust itself to the moving stock (swinging guard).

## **Wood Shaper**

- The stock should be clamped securely in place.
- Use correct guard.
- Feed into knives--do not back off.
- No feeding between fence and cutter.
- Collar and starting pin work for irregular work--stock of sufficient weight.
- Make sure fence opening is only enough to clear cutters.
- Use stock as guard by shaping the underside of stock.
- Make sure spindle nut is tight.
- Shape only pieces 10" or longer.

## **Sander**

- Keep hand from abrasive surface.
- Adequate exhaust system available.
- Belt or disk in good condition.
- Sand on downward side of disk

## **Lathe**

- Stock without defects; glued joints dry. (When using V-Belt, power should be off when changing speeds.)
- Make sure tool rest is close to stock.
- Hold tools firmly in both hands.
- Remove tool rest when sanding or polishing.

## **CIRCULAR SAW BLADES FOR CUTTING WOOD**

- **HOLLOW GROUND PLANER BLADES** are for precision cross cutting, mitering, and ripping on all woods, plywood, and laminates where the smoothest of cuts are desired.
- **MASTER COMBINATION BLADES** are used for use on all woods, plywood, and wood base materials, such as fiberboard and chip board. This type blade is better for cross cut and mitering than for ripping in solid woods. The teeth are set, and deep gullets are provided for cool and free sawing.
- **RIP BLADES** are primarily intended for rip cuts in solid woods. The teeth are set and deep gullets are provided for cool and free cutting.
- **PLYWOOD BLADES** are fine tooth cross cut type blades intended for cross cutting of all woods, plywood, veneers, and chipboard. It is especially recommended for cutting plywood where minimum of splintering is desired. The teeth are set and sharpened to give a smooth but free-cutting blade.
- **CHISEL TOOTH COMBINATION BLADES** are all purpose blades for fast cutting of all wood where the best of finish is not required. Ideal for use in cutting of heavy rough timbers, in framing of buildings, etc. It cross cuts, rips, and miters equally well.
- **CABINET COMBINATION BLADES** are for general cabinet and trim work in solid wood. It will cross cut, rip, and miter hard and soft wood to give good accurate cuts for moldings, trim, cabinetwork.
- **STANDARD COMBINATION BLADES** are used for all hard and soft wood form cross cut, rip, or miter cut. It is especially recommended for use on power miter box and for accurate molding and framing work.

## **METAL-CUTTING BLADES**

- **NONFERROUS METAL CUTTING BLADES** are for cutting brass, aluminum, copper, zinc, lead, bronze, etc. Blades are taper ground and need no set. Use wax or lubricant on the blades for best results.
- **STEEL SLICER BLADES** are for cutting thin steel and sheet iron up to 3/32 inch (2.4 millimeters) thickness. Not for use on nonferrous metals, wood, or plastic. This blade will give off sparks when cutting steel because it cuts by friction. Always keep sawdust chips free of machine to prevent fires.
- **FLOORING BLADES** are tungsten carbide-tipped blades especially designed for rough cutting where occasional nails, metal lathe, etc. will be cut. It is especially recommended for the professional carpenter or installer of air conditioning or heating ducts where it is necessary to cut through old walls and floors. Always wear safety goggles when cutting metal.

## **MACHINE SAFEGUARDING REQUIREMENTS**

### **Flywheels**

- All parts of flywheels which are 7' or less above the floor or working platform shall be guarded.
- Screens shall be placed in front of all flywheel spokes to protect against accidental contact by pipe, bars, rods, and similar materials.
- Flywheel pits shall be surrounded with a standard railing and a toe board not less than 6" high with standard railing, toe-board, and spoke guard showing.

### **Machine Guards**

- Where guard or enclosure is within 2" of moving parts, openings through the guard shall not be greater than 3/8".
  - If guards are greater than 4" and less than 15" from moving parts, then the largest opening shall not be greater than 2". Where slatted guards are used, the opening shall not be greater than 1".
- Inclined belt guards shall be installed so that the vertical clearance between the lower run of the belt and the floor shall not be less than 7' at any point outside of the guard.
- Any panel in a guard exceeding 6 ft<sup>2</sup> or 42" in either dimension shall be supported by an additional frame member.
- A standard railing placed not less than 15" nor greater than 20" from a flywheel, is acceptable; but a railing shall not be used where other types of guards are specifically required such as guards for gears, sprockets, and V-belts.
- When frequent oiling must be done inside the guard, openings with hinged or sliding self-closing covers shall be provided. All points not readily accessible shall have oil fed tubes or grease gun connections outside the guard if lubricant is to be added while machinery is in motion.
- Self-lubricating bearings are recommended.

## **Gears. Sprockets. Friction Drives**

- All gears or sprockets shall be completely enclosed or shall be guarded with side flanges extending inward beyond the roots of the teeth.
- All spokes on open web gears, sprockets, or friction drives shall be guarded to prevent accidental contact.
- The contact points of all friction drives must be enclosed.

## PROPER USE OF LADDERS

Because of the potential for personal injury and property damage due to the improper use and handling of ladders, there is a need to communicate safe handling procedures for handling this equipment.

### I. Responsibilities

- Supervision
  - Supervisors are responsible for having all employees under their supervision who use ladders read and understand this and any other safety policies/procedures pertaining to ladders.
- Employees
  - Employees are responsible for reading, understanding, and complying with this instruction. Employees are also responsible for asking questions of their supervisors if they do not understand this instruction. Any employee who is aware of any safety problem is responsible for correcting the problem or reporting it to a higher authority. Violation of any safety policy procedure, or instruction may result in disciplinary action.

### II. Ladders (General)

The following practices shall be promoted to avoid mishaps:

- The base of each ladder shall be set firm and level on the floor or ground.
- Walkways for access to and from ladders, as well as areas at the base and top, shall be kept clear of ice, mud, materials, equipment, or debris. Ladder rungs or steps shall be free of ice or mud.
- Ladders shall not be used as support for scaffolds. While ladder jack scaffolds are acceptable under certain federal regulation they are for light duty use only.
- Ladders shall be long enough so that workers can perform their functions without climbing higher than the third step from the top. Refer to Figure L1 for proper signage.
- Never use two ladders spliced together.
- Manufactured ladders used on floors or other set surfaces shall be equipped with safety feet
- A ladder shall never be set up in a driveway or in front of a door where the swing of the door could cause the ladder to fall. Where this must be done, barricades shall be used and a worker stationed at the foot of the ladder to keep the ladder from being struck.
- When using a ladder in a walkway, barricade the work area.
- Workers shall face the ladder and use both hands when ascending or descending. Tools and materials shall be raised and lowered by hand lines or other means; they shall not be carried by the worker except via use of a tool belt, etc.
- Workers shall never attempt to move a ladder while they are on it and they shall avoid overreaching. Both actions can cause a ladder to fall.
- The length of straight manufactured ladders shall not exceed 30' for a single ladder or 60' for an extension ladder.
- The length of job-made ladders shall not exceed 24' for a double cleat ladder or 30' for a single cleat ladder. Refer to attached, "Ladders Made on the Job," for more information.

### **III. Step Ladders**

Step ladders shall be used only in a fully opened position with spreader bars locked. The top two steps shall never be used for standing purposes. Refer to Figure L1 for proper signage.

### **IV. Straight Ladders/Extension Ladders**

Straight ladders and extension ladders (except fixed ladders) shall be placed so that the base of the ladder is horizontally approximately 1/4 the distance from the base to the upper point of support away from the base of the wall or structure. Refer to Figure 2.

### **V. Wood Ladders**

Standard manufactured ladders shall be of proper size and construction, well cared for, and unpainted. While they shall not be painted, a clear coat of shellac or varnish on a ladder shall protect the wood but not cover up defects. They shall be discarded when cracked or split.

Job-built ladders shall be made of good stock, free from knots, and according to accepted standards. The cleats shall be recessed into the side rails, or filler blocks shall be attached to the side rails between the cleats. The cleats shall be secured with three (3) nails at each end. When cracked or split, the ladder shall be destroyed and discarded. Refer to attached "Ladder Made on the Job" for more information.

### **VI. Metal Ladders**

Metal ladders shall not be used when working on electric circuits. Refer to Figure L3 for proper signage.

### **VII. When working above second floor level:**

- When a scaffold or mechanical lift is available and appropriate for the work, do not use a ladder.
- When working from a ladder, the base of the ladder shall be stabilized by sandbags or an employee shall stabilize the ladder by holding it. When sandbags are used, two fifty-pound sandbags shall be placed behind each leg of the ladder to brace it from slipping backwards.
- Ladders shall be fastened securely to a stable support at the tip, if possible, with a rope of sufficient strength to prevent side-to-side movement. Refer to Figure L2.
- The employee shall wear a safety belt or harness when there is a safe place to anchor it. The line used to connect the belt/harness to a stable support of a building shall have a maximum length of 5'.

## SCAFFOLDS

A scaffold is a temporary, elevated working platform for supporting employees and materials.

### General Requirements

- The footings or anchorage for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose bricks, or concrete blocks shall not be used to support scaffolds or planks (*OSHA 1926.451(2)*).
- A scaffold shall support four times its maximum load (employees and material).
- Scaffold planking shall be of scaffold grade or equivalent with a maximum width of 2" X 10". Planking shall extend over the end supports not less than 6" nor more than 12".
- Scaffolds 10' or more off the ground require the use of guardrails and toe boards.
  - Toe boards shall be a minimum of 4" in height.
  - Guardrails shall be 2" X 4". Top rail height shall be 42" with a centered mid-rail. Guardrail supports (minimum of 2" X 4") shall be at maximum intervals of 8'.
  - Mid-rails shall be 1" X 6" or wider, centered between the guardrail and toe board. The mid-rail shall be nailed to the inside of the support post.

If the scaffold is erected in an area where workers or other persons will pass under it, a screen of #18 gauge U.S. standard wire of 1/2" mesh or equivalent shall be erected between the toe board and top rail of the guardrail.

- A safe access ladder shall be provided to all scaffolds.
- Overhead protection shall be provided for scaffold workers when overhead hazards exist.
- The use of lean-to-scaffolds or shore scaffolds is prohibited.
- When suspended scaffolds (or equivalent) are to be used, the Office of Campus Safety should be contacted for consultation.
- Damaged scaffolding or components shall be replaced before the scaffold is used.
- All rented scaffolds shall be examined thoroughly for condition of the scaffold (structural damage) and lack of or non-matching components (no guardrails, toe boards, etc.).
- For wooden-pole, portable, tubular, horse, outrigger, etc., type scaffold requirements, refer to OSHA 1926.451(a) through .451(y) and the attached Requirements for Various Scaffolds, Safety Engineering Standards, U.S. Insurance Group.

### Scaffold Checklist

Use the attached "[Stationary Scaffold Safety Check List](#)" when inspecting stationary scaffolds.

## **Platforms and Stairways**

For platform and stairway requirements, see "Platforms and Stairways" and "Runs and Risers for Stairs" attachments.

### **Floor and Wall openings**

Temporary, emergency, or permanent floor and wall openings shall be protected by a top rail, intermediate rail, and toe board (if required) when there is danger of an employee or material falling to a lower level. Refer to attached "Floor, Roof, Wall, and Elevator Openings" for standard rail requirements.

## **SAFE USE OF HAND AND PORTABLE POWER TOOLS**

### **Screwdrivers**

A screwdriver is the most commonly used and abused tool. The practice of using screwdrivers as punches, wedges, pinch bars, or pry bars shall be discouraged as this practice dulls blades and causes employee injury.

Screwdriver tips shall be selected to fit the screw. Sharp-edged bits will not slip as easily as ones that are dull. Redress tips to original shape and keep them clean.

Always hold work in a vise or lay it on a flat surface to lessen the chance of injury if the screwdriver should slip.

When working near electrical equipment, screwdrivers shall be equipped with insulated handles (some also come with insulated blades). Current shall be cut off.

### **Hammers**

Wooden handles shall be straight grained and free of splinters or splinters. Once split, handles shall be replaced. Make sure handles are tightly wedged.

- Never strike a hammer with another hammer.
- Discard any hammer that shows chips, dents, etc. Redressing is not recommended.
- Safety glasses shall be worn while using a hammer or any other striking tool.
- Never use a common nail hammer to strike other metal objects such as cold chisels.

### **Punches**

Never use a punch with a mushroomed struck face or with a dull, chipped, or deformed point. Punches that are bent, cracked, or chipped shall be discarded. Safety glasses shall be worn while using a punch.

## **Chisels**

Choose a chisel only large enough for the job so the blade is used, rather than only the point or corner. Never use chisels with dull blades--the sharper the tool, the better the performance. Chisels that are bent, cracked, or chipped shall be discarded. Re-dress cutting edge or struck end to original contour as needed. When chipping or shearing with a cold chisel, the tool shall be held at an angle that permits one level of the cutting edge to be flat against the shearing plane.

## **Hacksaws**

Hacksaws shall be adjusted and tightened in the frame to prevent buckling and breaking, but shall not be tight enough to break off the pins that support the blade. Install blade with teeth pointing forward.

Pressure shall be applied on the forward stroke only. Lift the saw slightly, pulling back lightly in the cut to protect the teeth. Do not bend and twist the blade. Never continue an old cut with a new blade.

## **Files**

Select the right file for the job, making sure that it has a secure handle.

Files shall be cleaned only with file-cleaning cards; never by striking. Never use a file as a pry or hammer, as chipping and breaking could result in user injury.

Grasp the file firmly in one hand and use the thumb and forefinger of the other to guide the point.

## **Axes and Hatchets**

The cutting edges are designed for cutting wood and equally soft metal. Never strike against metal, stone, or concrete.

Never use an axe or hatchet as a wedge or maul, never strike with the sides, and never use them with loose or damaged handles.

Proper axe grip for a right-handed person is to have the left hand about 3" from the end of the handle and the right hand about 1/2 of the way up.

Sharp, well-honed axes and hatchets are much safer to use because "glancing" is minimized.

Safety glasses and safety shoes shall be worn and clear swinging checked before using axes and hatchets. Axes and hatchets shall be carried with the covers on.

## **Knives**

Knives cause more disabling injuries than any other hand tool. The hazards are that the hands may slip from the handle onto the blade or that the knife may strike the body or the free hand. Use knives with handle guards if possible. Knives shall be kept sharp and in their holders, cabinets, or sheaths when not in use; the cutting stroke shall be away from the body.

Do not wipe dirty or oily knives on clothing. To clean, the blade shall be wiped with a towel or

cloth with the sharp edge turned away from the wiping hand. Horseplay of any kind (throwing, "fencing," etc.) shall be prohibited.

### **Crowbars**

Use the proper kind and size for the job. Never use makeshifts such as pieces of pipe, as they may slip and cause injury. Crowbars shall have a point or toe of such shape that it will grip the object to be moved and a heel to act as a pivot or fulcrum. A block of wood under the heel may prevent slippage and help reduce injuries.

### **Shovels**

Shovel edges shall be kept trimmed and handles checked for splinters and cracks. Workers shall wear safety shoes with sturdy soles. They shall have feet well separated to get good balance and spring in the knees. The leg muscle will take much of the load. To reduce the chance of injury, the ball of the foot (not the arch) shall be used to press the shovel into the ground or other material.

Dipping the shovel in water or greasing or waxing the shovel will prevent some materials from sticking.

When not in use, hang up shovels, stand them against the wall, or keep them in racks or boxes.

### **Box and Socket Wrenches**

The use of box and socket wrenches is indicated where a heavy pull is necessary and safety is a consideration. Box and socket wrenches completely encircle the nut, bolt or fitting and grip it at all corners as opposed to two corners gripped by an open-end wrench. They will not slip off laterally, and they eliminate the dangers of sprung jaws.

Never overload the capacity of a wrench by using a pipe extension on the handle or strike the handle of a wrench with a hammer. Hammer abuse weakens the metal of a wrench and causes the tool to break. Special heavy-duty wrenches are available with handles as long as 3'. Where possible; special penetrating oil shall be used to first loosen tight nuts.

### **Electric Saws**

Electric saws shall be equipped with guards above and below the faceplate. The lower guard shall be checked frequently to be sure it operates freely and encloses the teeth completely when not cutting. Circular saws shall not be crowded into the work. The motor shall be started and stopped outside the work. At the beginning and end of the stroke or when the teeth are exposed, the operator shall use extra care to keep the body out of the line-of-cut. Saws shall be equipped with "dead man" controls or a trigger switch that shuts off the power when pressure is released.

### **Portable Grinder**

Grinding wheels shall be guarded as completely as possible. They shall never be used at greater than their rated speed. To do so may result in the wheel breaking apart due to excessive centrifugal force. Guards shall be adjustable so the operator will be inclined to make the adjustments rather than remove the guard. However, the guard shall be easily removable to facilitate

replacement of the wheel. In addition to mechanical guarding, the operator shall wear safety glasses at all times.

Care shall be exercised to protect the grinder from damage.

Since part of the wheel is exposed, it is important the employee hold the wheel so it does not touch his clothes or body.

### **Air Hoses**

Workers shall be warned against disconnecting the air hose from the tool and using it to clean machines or remove dust from clothing. Air used for cleaning shall not exceed 30 psi and workers shall wear safety glasses at all times when using air hoses. Brushing or vacuuming equipment is recommended for removing dust from clothing.

Air shall be shut off before attempting to disconnect the air hose from the airline. Any air pressure inside the line shall be released before disconnecting.

## **ELECTRICAL SAFETY**

### **Electric Codes**

The National Electric Code, NFPA 70-1984, and ANSI C1-1971 are the nationally adopted requirements for safeguarding of any persons and buildings and their contents from hazards arising from the use of electricity. The code contains basic minimum provisions considered necessary for safety. All electricians shall be familiar with these requirements.

### **Use of Electrically Powered Equipment and Tools**

- All electrically powered equipment or hand tools, except double insulated hand tools, shall be grounded.
- Portable hand tools and electrically powered equipment shall be used with a ground fault circuit interrupter (GFCI) or an assured equipment-grounding program (AEGP) (see "Ground Fault Circuit Protection" this section) shall be in effect.
- Electrical equipment shall be disconnected or the current otherwise interrupted while it is being adjusted or repaired.
- Permanent wiring shall be put in conduits.
- All breakers, motors, and appliance disconnects shall be labeled.
- Framing of electrical motors shall be grounded.
- Outlets, switching, junction boxes, etc., shall be covered.
- Exposed non current-carrying metal parts of fixed equipment that may become energized under abnormal conditions shall be grounded when in wet or damp locations; if electrical contact with metal, if operated in excess of 150 volts to ground, or in a hazardous location (see "Hazardous Locations" this section).  
**NOTE: Consider all exposed wires "hot" until verified otherwise.**

### **Ground Fault Circuit Protection**

When using extension cords, portable electrically powered hand tools, appliances, or other electrically powered equipment outdoors or in an area under construction, they shall be of the

3-wire type (except double insulated tools) and shall be connected to a GFCI or an AEGP shall be in effect.

The GFCI does not have to be used if the receptacles being used are part of a building's permanent wiring. The GFCI trips a circuit when current out leakage occurs.

The AEGP requires regular inspections of all tools, cords, and electric devices. Appropriate documentation shall be maintained. Components of an AEGP are:

- A written description of the program including specific producers.
- Qualified employees appointed to run the program. More than one person shall be appointed.
- All equipment, cords, etc., to be used shall be inspected for external defects each day. All defective equipment shall be tagged out until repairs are made. All defects, repairs, inspections, etc., shall be documented.

### **Extension Cords**

- Cords shall not be hung over nails, bolts, or sharp edges.
- Cords shall not be laid in aisles unless protected from damage; they shall be so placed so as to not create a tripping hazard.
- Cords shall not be used as a substitute for fixed wiring.
- Cords shall not be run through holes in walls, ceiling, floors, doors, windows, or hung from light fixtures or attached to building surfaces.

### **Hazardous Locations**

Standard electrical apparatus cannot be used in locations where flammable gases, vapors, dusts, and other easily ignitable materials are present.

Before electrical equipment and its associated wiring is selected for a hazardous location, the exact nature of the flammable materials present should be determined.

The National Electric Code, NFPA-70, Articles 500-503, shall be consulted before any use or installation of electrical equipment and associated wiring is selected. Listed below is a guideline for classifying hazardous locations. This guideline shall not be used as a substitute for NFPA-70, Article 500-503.

## GUIDELINES FOR CLASSIFYING HAZARDOUS AREAS

### Determining The Need For Classification

A need for classification is indicated by an affirmative answer to any of the following question.

<b>Class I</b>	Are flammable liquids, vapors, or gases likely to be present? Are liquids having flash points at or above 100 F likely to be handled, processed, or stored at temperatures above their flash points?
<b>Class II</b>	Are combustible dusts likely to be present? Are combustible dusts likely to ignite as a result of storage, handling, or other causes?
<b>Class III</b>	Are easily ignitable fibers or flyings present, but not likely to be in suspension in the air in sufficient quantities to produce an ignitable mixture in the atmosphere?

### Assignment of Classification

Classification is determined as indicated by an affirmative answer to any question.

<b>Class I Div 1</b>	<ul style="list-style-type: none"> <li>• Is a flammable mixture likely to be present under normal operating conditions?</li> <li>• Is a flammable mixture likely to be present frequently because of repair, maintenance, or leaks?</li> <li>• Would a failure of process, storage, handling, or other equipment be likely to cause an electrical failure coinciding with the release of flammable gas or liquid?</li> <li>• Is the flammable liquid, vapor, or gas piping system in an inadequately ventilated location, and does the piping system contain valves, meters, or screwed or flanged fittings that are likely to leak?</li> </ul>
<b>Class II Div 1</b>	<ul style="list-style-type: none"> <li>• Is combustible dust likely to exist in suspension in air under normal operations conditions, in sufficient quantities to produce explosive or ignitable mixtures?</li> <li>• Is combustible dust likely to exist in suspension in the air, because of maintenance or repair operations, in sufficient quantities to cause explosive or ignitable mixtures?</li> <li>• Would failure of equipment be like to cause an electrical system failure coinciding with the release of combustible dust in the air?</li> <li>• Is combustible dust of an electrically conductive nature likely to be present?</li> </ul>
<b>Class III Div 1</b>	<ul style="list-style-type: none"> <li>• Are easily ignitable fibers or materials producing combustible flyings handled, manufactured, or used?</li> </ul>
<b>Class I Div 2</b>	<ul style="list-style-type: none"> <li>• Is the flammable liquid, vapor, or gas piping system in an adequately ventilated location, but not likely to leak?</li> <li>• Is the flammable liquid, vapor, or gas handled in an adequately ventilated location, and can the flammable substance escape only in the course of some abnormality such as failure of a gasket or packing?</li> <li>• Is the location adjacent to a Division 1 location, or can the flammable substance be conducted to the location through trenches, pipes, or ducts.</li> <li>• Is positive mechanical ventilation is used, could failure or improper operation of ventilating equipment permit mixtures to build up to flammable concentrations?</li> <li>• Is the combustible dust likely to exist in suspension in air only under abnormal conditions, but</li> </ul>

	can accumulations of dust be ignited by heat developed by electrical equipment, or by arcs, sparks, or burning materials expelled from electrical equipment?
<b>Class II Div 2</b>	<ul style="list-style-type: none"> <li>• Are dangerous concentrations of ignitable dusts normally prevented by reliable dust control equipment such as fans or filters?</li> <li>• Is the location adjacent to a division 1 location, and not separated by a firewall? Are dust-producing materials stored or handled only in bags or containers and only stored--not used -- in the area?</li> </ul>
<b>Class III Div 3</b>	<ul style="list-style-type: none"> <li>• Are easily ignitable fibers or flyings only handled and stored, and not processed? Is the location adjacent to a Class III, Division 1 location?</li> </ul>

### **Wet Locations**

A switch or circuit breaker in a wet location or outside of a building shall be enclosed in a weatherproof enclosure.

In damp or wet locations, cabinets and cutout boxes of the surface type shall be weatherproof, be so placed or so equipped so as to prevent moisture or water from entering and accumulating within the cabinet or cutout box, and shall be mounted so there is at least 1/4" space between the enclosure and the wall or other supporting surface. It is recommended that boxes of nonconductive material be used with nonmetallic-sheathed cable.

In locations where walls are frequently washed or where there are surfaces of absorbent materials such as damp paper or wood, the entire wiring system, including all boxes, fittings, conduits, and cables used, shall be mounted so that there is at least 1/4" air space between it and the wall or supporting surface.

### **Lock Out/Tag Out Procedures**

Refer to "Equipment Lockout Procedures" section.

This procedure shall be used whenever the need for de-energizing electrical or mechanical equipment (to include fume hoods and other scientific equipment) arises.

### **Transportation or Movement of Equipment or Materials**

Vehicles, equipment, or materials shall not be placed closer to any high-voltage lines than the minimum clearances specified below.

### **Recommended Clearances From Energized High Voltage Conductors (While in Transit)**

<b>Voltage ( Phase to Phase)</b>	<b>Minimum Clearance (Feet)</b>
750 - 50,000	6
50,000 - 345,000	10
345,000- 750,000	16
750,000 - 1,000,000	20

## **Inspection and Repair**

1. Periodic inspections, essential to the maintenance of power tools, shall be performed.
2. Employees shall be instructed and trained to inspect tools and recognize and report defects.
3. All defective equipment shall be taken out of service and tagged or locked out until repairs or maintenance is completed.
4. Employees shall not be allowed to makeshift repairs.
5. Power tools shall be cleaned with a recommended non-flammable and non-toxic cleaner. Air-drying shall be used in place of blow-drying with compressed air.

## **EQUIPMENT LOCKOUT PROCEDURE**

This procedure is to cover locking out, tagging out, or otherwise preventing the operation of electrical or mechanical equipment fume hoods, and other scientific equipment from operating.

In this procedure, when the term "lock" is used, it is intended to cover any means of prevention required to prohibit equipment operation. It covers the use of padlocks, tags, or other physical restriction of equipment such as racking-out of switchgear or blocking fan blades.

### **Procedure**

1. Alert operator of intention to lock out or perform work on equipment.
2. Before starting work, make sure equipment cannot be set into motion without your activation.
3. Attach lockout device and/or signed and dated tag.
4. If additional operations shall be performed on the same equipment, those shall also use lockout/tag out procedures.

**NOTE: When more than one craft is working on the same equipment, it is recommended that a multiple locking device be used.**

5. When your work is completed, remove your tag/lock. Only the person attaching the tag/lock shall remove it.
6. Equipment shall not be operated until all work is completed and the last tag/lock is removed.

**NOTE: For scientific equipment, a lockout tag/lock shall be affixed by the person in charge and be removed only after a technician or service person has rendered such equipment safe and operable.**

Examples of lock out tags/locks, [click here](#). Insert page 87 Section III here

## **RE-USING STEEL DRUMS AND CONTAINERS**

A steel drum and/or container shall not be re-used until it has been rinsed three to four times with water unless it will be refilled with a compatible substance. A steel drum and/or container having contained a water-reactive substance shall not be rinsed out with water under any circumstances. The Office of Campus Safety shall be contacted if a suitable rinse cannot be found.

Under no circumstances shall the top, bottom, or side of a steel drum and/or container having

contained a flammable or toxic substance be removed with a cutting torch.

## **MATERIAL HANDLING**

Material handling is done by every person in every department on campus. It is done as either his/her sole duty or as part of his/her regular duties. Material handling can either be done by hand or with mechanical help (fork lift, hoist, hand trucks, etc.).

The following are general safety rules and requirements regarding material handling and material handling equipment regularly used on campus.

### **I. LIFTING BY HAND**

Lifting and carrying can be done without injury by using the following criteria:

#### **Personal Protection**

**NOTE: Minor office material lifting is exempt from Personal Protection section of "Lifting By Hand."**

- Hand protection shall be used when lifting; however, gloves or loose clothing shall not be worn around moving equipment.
  - Leather gloves and aprons shall be worn when handling rough or sharp objects.
  - Chemical gloves, splash suits, and eye protection shall be worn when handling chemicals of any nature (corrosives, flammable, etc.).
- Eye protection shall be worn at all times.
- Warehousing, trades, and other occupations involving lifting of heavy objects shall wear steel-toed shoes and/or shin guards.

#### **Body Condition**

How much should you lift? Lifting capacity depends on body condition; that is, flexibility and strength, and physical make-up. To help your condition, build up your strength by a regular exercise program and stretch your body before doing any lifting.

#### **Sizing Up The Load**

- Questions to ask:
  - Is it too big for you to handle?
  - What about the shape? Is it irregular, square, rectangular, etc.?
  - Can you get a firm, comfortable grip?
  - How many loads are there and where are they going?
- Lifting It Right. *There are six steps to proper lifting:*
  - Keep feet parted--one alongside the object and one behind the object. Comfortably spread feet give greater stability; the rear foot is in position for the upward thrust of the lift.
  - Keep back straight, nearly vertical. Use the sit-down position to do so, but remember that "straight" does not mean absolutely "vertical". A straight back keeps the spine, back muscles, and organs of the body in correct alignment. It minimizes the compression of the guts that can cause hernia.
  - Tuck in chin so the neck and head continue the straight back line and keep

- spine straight and firm. .
- Grasp the object with the whole hand. The palm grip is one of the most important elements of correct lifting. The fingers and hand are extended around the object to be lifted. Use the full palm; fingers alone have very little power. Wearing gloves is recommended.
  - Tuck elbows and arms in and hold load close to body. When the arms are held away from the body, they lose much of their strength and power. Keeping the arms tucked in also helps keep body weight centered. See attached diagrams.
  - Keep body weight directly over feet. This provides a more powerful line of thrust and ensures better balance. Start the lift with a thrust of the rear foot.

**NOTE: Taken from The National Safety Council "Accident Prevention Manual".**

Insert Section III Page 91 here

\*When setting the load down, the same six proper lifting steps shall be used in reverse.

To place an object on a bench or table, the worker shall first set it on edge and push it far enough onto the support to be sure it will not fall. The object shall be released gradually as it is set down. It shall be moved in place by pushing with the hands and body from in front of the object. This method prevents fingers from being pinched. It is especially important that an object placed on a bench or other support be securely positioned so that it will not fall, tip over, or roll off. Supports shall be correctly placed and strong enough to carry the load. Heavy objects like lathe chucks, dies, and other jigs and fixtures shall be stored at approximately waist height.

To raise an object above shoulder height, the worker shall lift it first to waist height. He/she shall rest the edge of the object on a ledge, stand, or hip. He/she shall then shift hand position so the object can be boosted after the knees are bent. The knees shall be straightened out as the object is lifted.

To change direction, the worker shall lift the object to the carrying position and turn the entire body including the feet. He/she shall avoid twisting the body. In repetitive work, the person and the material both shall be positioned to prevent twisting of the body when moving the material.

### **Team Lifting**

1. When two or more people carry one object, they shall adjust the load so that it rides level.
2. When long sections of material (pipe, lumber) are carried, the load shall be carried on the same shoulder and both persons shall walk in step.
3. When team lifting, one person shall be designated to give the signal when to lift.

### **Handling of Specific Shapes**

- Barrels and drums
  1. It is recommended that a hand truck or other type of material handling equipment be used for lifting and transporting barrels and/or drums.
  2. If it is necessary to roll a barrel or drum, the worker shall push against the sides

with both hands. To change directions, the drum or barrel shall be stopped, the direction changed by grabbing the upper and lower rim seams, and movement started.

3. When uprighting a full drum, the six steps to safe lifting shall be adhered to.
- Long Objects (Pipe, Lumber, Barsteel, etc.) *There are two schools of thought on this. The method chosen shall be determined by the obstructions to be encountered.*
    1. The item shall be carried on the shoulders with the front end held as high as possible to avoid striking other employees--especially when going around corners.
    2. The item shall be carried on the shoulders with the front end low so it does not catch overhead objects.
  - Compressed gas cylinders
    1. Compressed gas cylinders may be rolled on the bottom edge for short distances. They shall never be dragged.
    2. Because of their shape, smooth surface, and weight, cylinders are difficult to carry by hand. Cylinders weighing more than 40 pounds total shall be transported on a hand or motorized truck, suitably secured to keep them from falling.
  - Items to remember when lifting by hand:
    1. Avoid twisting while turning with a load.
    2. Watch for narrow places when moving materials.
    3. Avoid high reaching and lifting. A suitable ladder or platform shall be used to get up to load.
    4. Do not jump with a load.
    5. Do not catch or throw loads.
    6. Check the materials to be lifted for nails, splinters, rough strapping, or other might injure hands.
    7. Ascertain good visibility--especially on stairs.

## II. HANDTRUCKS

- General
  1. Keep truck under control at all times.
  2. Trucks shall be stored in designated areas--not in aisles.
  3. **Housekeeping--all** aisles and loading areas shall be kept clear.
  4. Always move the truck at a safe speed. Do not run.
  5. Loads shall be packed securely; avoid overhanging.
  6. No riders or horseplay.
  7. Hands shall be kept inside to protect them in narrow areas if the truck does not have knuckle guards or handles.
- One Axle Hand trucks
  1. Keep the center of gravity of the load as low as possible. Place heavy objects below higher objects.
  2. Place the load so it is carried by the axle, not the handles.
  3. Load only to a height that will allow a clear view ahead.
  4. When lifting from a horizontal position, have a straight back and lift with the legs. The load shall be put down the same way.
  5. Let the truck carry the load. The operator shall balance and push only.
  6. Never walk backwards with a hand truck.

7. For extremely bulky or pressurized items, such as gas cylinders, strap or chain the item to the truck. Valve caps shall be on valves.
  8. Always move the truck at a safe speed. **Do not run.**
- Two Axle Trucks NOTE: Many one-axle hand truck rules apply here also.
    1. Load evenly to prevent tipping
    2. Push. Do not pull.
    3. The truck shall not be loaded so high that the operator cannot see where in the direction of travel. If the load is high, two persons are needed; one to push and one to guide.
    4. Truck contents shall be arranged so they will not fall if accidentally bumped.
    5. When entering elevators or tight areas, enter with the load forward. Make sure load is bound to truck.

### III. SOME REQUIREMENTS FOR HEAVY CONSTRUCTION EQUIPMENT (Rollers, Compactors, Front-end Loaders, Bulldozers, Trucks, etc.)

- General
  1. All vehicles of these types shall have a suitable horn available which is tested before the vehicle is used.
  2. Operators shall wear seat belts at all times when machinery is in operation.
  3. All controls (brakes, steering, etc.) shall be tested each shift before the vehicle is used.
  4. No riders shall be allowed on machines unless the machine is designed to carry riders.
  5. Blades, buckets, and shovels on earth-moving machines shall be lowered to the ground when the equipment is parked or unattended.
  6. All earth-moving equipment shall have a rollover protection structure (ROPS) and seat belts.
  7. Trucks that are loaded by a crane, power shovel, loader, or similar equipment shall have a cab shield and/or canopy strong enough to protect the operator from shifting or falling materials. Operators shall be out of the vehicles while they are being loaded. Brakes shall be set.
  8. All trucks, excluding pickup trucks and earth-moving equipment, shall have an audible warning device that sounds automatically when they are backing up. The sound shall be able to be heard at least 200' away.
  9. Smoking during vehicle refueling is prohibited.
  10. All vehicles shall be operated in a safe manner. Earth-moving equipment shall not exceed 15 mph.
  11. All vehicles shall be inspected before each use and thoroughly on a regular basis.

### IV. FORK TRUCKS

Fork trucks are used to carry, push, pull, lift, stack, and tier materials.

- Training
  - Only trained and authorized operators shall be permitted to operate a powered industrial truck.

- Guarding
  1. Hazardous moving parts such as chain and sprocket drives and exposed gears shall be guarded to protect the operator in his normal operating position.
  2. All fork trucks shall have an overhead guard in accordance with ANSI B 56.1.
  3. Exposed tires shall have guards that will stop particles from being thrown at the operator.
  4. Hydraulically driven lifting systems shall have a relief valve installed and suitable stops shall be provided to prevent travel over of the carriage.
  5. A load backrest extension shall always be used when the type of load presents a hazard to the operator. The top of a load shall not exceed the height of the backrest.
  
- Loading
  1. If the material being handled is obstructing the view, the operator is required to travel backwards. The operator shall face the direction of travel at all times.
  2. Only loads within the rated capacity of the truck shall be handled. No counter weights shall be allowed. A nameplate showing the weight of the truck and its rated capacity shall be located in plain view of the truck.
  3. Backwards tilt shall be used to stabilize the load.
  4. Loads shall be checked for overloading and for loose material before making the lift.
  5. Extreme care shall be taken when handling long items, i.e., bar stock and lumber.
  6. The load shall never be driven in an upward position, nor raised or lowered while moving.
  7. Forks shall be locked to the carriage, and the fork extension designed so as to prevent unintentional lifting of the toe or displacement of the fork extension.
  8. Bridge plates and dock boards shall be strong enough to support the intended load. They shall also have sideboards, anti-slip surfaces, and be secured to the dock.
  9. Chocks shall be used on truck wheels when unloading.
  
- Inspections
  - All fork trucks shall be inspected before each use and thoroughly on a regular basis.
  
- Miscellaneous
  1. Powered industrial trucks shall be equipped with horns.
  2. Steering wheel knobs are prohibited.
  3. All trucks shall be equipped with an **ABC** fire extinguisher.
  4. Fork trucks shall not be used on upper level floors unless the floors are designed for that load capacity.
  5. Diesel or gasoline fork trucks shall be used in adequately vented areas only.
  6. Never give rides on a fork truck unless the truck is designed for it.
  
- General Operating Requirements
  1. No excessive speed or reckless driving.
  2. When the operator will be farther than 25' from the truck, the forks shall be down, motor cut off, and emergency brake applied.
  3. No one shall be allowed to pass under the elevated portion of any truck--loaded or empty.
  4. The operator shall come to a stop at blind corners and before passing through

- doorways.
5. Extreme caution shall be taken when operating on turns, ramps, grades, or inclines.
  6. Reverse control shall never be used for braking.
  7. Always drive with the load pointing upgrade unless a bulky load permits poor visibility.
  8. Trucks shall not be used for any purpose other than the one for which they were designed, i.e., bumping skids, pushing piles of material out of the way, using forks as a hoist, etc.
  9. Trucks shall ascend or descend grades slowly. When ascending or descending grades in excess of 10%, loaded trucks should be driven with the load upgrade. Unloaded trucks should be operated on all grades with the load engaging means downgrade.
  10. When standard forks are used to pick up round objects such as rolls or drums, care shall be taken to see that the tips do not damage the load or push it against workers.
  11. Operators of lift trucks shall not move improperly loaded skids or pallets, broken pallets, or loads too heavy for the truck.

NOTE: Using a lift truck as an elevator for employees shall only be done if the work platform is securely seated on the forks, fastened to the vertical face, and provided with handrails and toe boards. The truck shall also have an overhead guard for the operator's protection. The operator shall not leave the controls while the truck is being used as a man lift.

## V. HOISTS

- General
  1. Hoists are used to raise, lower, and transport heavy loads for limited distances.
  2. Hoists shall not be used to lift, support, or otherwise transport people unless designed for that purpose.
  3. The load capacity of each hoist shall be shown in conspicuous figures on the hoist body. Lifts shall not be made beyond the rated capacity of the hoist, slings, chains, ropes, straps, etc.
  4. All hoists shall have safe operating procedures affixed to them.
  5. Hoists operating on rails, tracks, or trolleys shall have positive stops or limiting devices on the equipment, rails, tracks, or trolleys to prevent overrunning of safe limits.
  6. Pick up loads only when they are directly under the hoist.
  7. Unless they are grounded, rope-operated electric hoists shall have non-conducting control cords.
  8. Control cords shall be clearly marked "hoist" or "lower" or a similar combination.
  9. The block shall not be lowered below the point where less than two full wraps of rope remain on the hoisting drum.
  10. When lifting and moving material, the area should be clear. No one shall be allowed to walk under the load.
  11. No load shall be left suspended without an operator at the controls.
  12. When not in use, the hoist shall be lifted in the upward position.
- Inspections
  1. Hoists shall be inspected before each use. Regularly scheduled detailed inspections shall pay special attention to load hooks, ropes, brakes, limit switches, wear damage, and rail stops.
  2. During inspection and/or repair, the power shall be disconnected. A warning sign

stating such shall be posted.

## VI. AERIAL BASKETS

- Aerial baskets shall be of the proper design and construction for the intended work.
- The design limits of the equipment must be thoroughly understood and the baskets operated within the limits of their capabilities.
- Daily inspections are necessary to uncover defects before they become serious in nature. (Note and report holes in the basket.)
- All maintenance, both preventive and corrective, shall be performed by qualified personnel.
- It is not safe to assume that an operator familiar with one type of aerial basket or equipment can operate other types.
- Adequate clearances shall be observed. The ability to judge distances is essential.
- Sufficient rubber protective equipment is as necessary in working from aerial baskets as in working from a pole.
- When jobs involving both "bare-hand" work from a basket and work from a structure are performed, coordination and teamwork between the two methods is of primary importance.
- Job briefing and follow-up on training are essential for safe operation.

## VII. Hand signals

Following are basic hand signals that all operators and riggers of cranes, hoists, boom trucks, aerial baskets, etc., shall use.

Insert page 100-101 Section III here.

## VIII. SLINGS

- Materials Used
  1. The type of sling to be used is determined by the load to be lifted.
  2. Fiber rope is particularly suitable for the handling of loads that may be damaged by contact with metal slings. Fiber rope is generally made from manila, sisal, benequen, nylon (2.5 x breaking strength & 4 x elasticity of manila), polyester, and polypro-pylene (special applications). Manila and nylon ropes give the best uniform strength and service.
  3. Wire rope is used widely instead of fiber rope because:
    - It has a greater strength and durability under severe working conditions.
    - Its physical characteristics do not change when used in varying environments.
    - It has controlled and predictable stretch characteristics.
    - Where mechanical type loop endings are employed or where swayed or pressed on terminations are used.
- Chain slings are used when a high resistance to abrasion and corrosive substances is needed. Chain slings are generally made from alloy steels such as stainless steel, monel metal, bronze, etc.
- Web slings are used when lifting loads in need of surface protection; used on tubular, nonferrous, ceramic, painted, polished, highly machined, and other products with a fine

or delicate surface.

- Two types of web slings:
  1. synthetic web--nylon or polyester
  2. metal mesh web--alloy steel = sharp edges, concrete, high temperature
- Rated Capacity
  1. As the sling is used, factors such as abrasion, nicking, distortion, corrosion, and other factors affect the load rating.
  2. Slings can be used at various angles, but stress increases rapidly with the angle of lift. All slings shall be ordered with this in mind.  
NOTE: Most slings have catalogs and rating tables for load rating worked out--consult them.
  3. Each sling shall bear a tag indicating its rated load capacity. Rated capacity is based on newly manufactured slings.
  4. Allowances shall be made when hitches are used.
  5. If loads having sharp edges or corners are to be lifted, pads or saddles shall be used to protect the ropes and chains.
- Inspection
  1. Slings shall be checked daily by trained employees.
  2. Any damaged or suspected damaged slings shall be removed immediately from service and made unusable.
  3. Fiber ropes shall be inspected every 30 days and more often if used in critical applications. Rope shall be examined over the length of the rope for wear, abrasions, powdered fibers between strands, variations in size or roundness of strands, dislocation, and rotting.
  4. Wire rope shall be inspected when installed, weekly during use, and regularly by a trained inspector. Wear of crown wires, broken wires, kinking, high strands, corrosion, loose wires, nicking, and lubrication shall be checked. (See attached wire rope wear and damage chart.) Experience and judgment of all factors, combined with the length of time in service and the tonnage hoisted by the rope, determines when it should be discarded.
  5. Chain slings shall be inspected daily by personnel using the chain and semi-annually or more often by persons qualified by experience or training. A link-by-link inspection shall be made to detect bent links, cracks in welded areas, transverse nicks and gouges, corrosion pits and elongation (stretching by overloading). NOTE: See attached, "Wire Rope Wear and Damage."
  6. Web slings shall be inspected by the user it each time they is used. Also, periodic inspections shall be made by a person experienced in the inspection of web slings. Web slings shall be checked for abrasive wear, cuts, tears, snags, punctures, etc.

NOTE: See following diagram, "Maximum Allowable Wear at Any Point of Link."

## MATERIAL HANDLING GEAR

RECOMMENDED MINIMUM SIZES OF GEAR TO BE USED WITH VARIOUS SIZES OF ROPE				
Improved Plow Steel Wire Rope		Round Pin or Screw Shackle		New Wrought Iron Chain
6 Strand: 19 Wire Hemp Center		Diameter of Pin(in.)		
Diameter (in.)	Safe Load (lbs.)	Screw Pin	Round Pin	Diameter of Link Stock(in.)
1/2	4,300	3/4	5/8	3/8
9/16	5,400	3/4	3/4	9/16
5/8	6,600	7/8	3/4	5/8
3/4	9,400	1	7/8	3/4
7/8	12,800	1 1/8	1	7/8
1	16,000	1 1/4	1 1/8	1
1 1/8	21,200	1 1/2	1 3/8	1 1/8
1 1/4	26,000	1 5/8	1 1/2	1 1/4
1 3/8	31,400	1 3/8	1 5/8	1 3/8
1 1/2	37,000	2	2	1 1/2

### EYE HOOKS

If the throat opening of any hook exceeds the dimension given below for the corresponding diameter of the eye, the hook has been overstrained and shall not be used.

### STRENGTH OF MANUFACTURED EYE HOOKS -- DROP FORGED STEEL, WELDNESS

Inside Diameter of Eye (inches)	Throat Opening	Safe Working Load (pounds)
3/4	1	1,000
7/8	1-1/16	1,200
1	1-3/16	1,400
1-1/8	1-1/4	2,400
1-1/4	1-3/8	3,400
1-3/8	1-1/2	4,100
1-1/2	1-3/4	5,000
1-5/8	2	6,000
1-3/4	2-1/16	8,000
2	2-1/4	9,400
2-1/8	2-1/2	11,000
2-3/4	3	13,600
3-1/8	3-3/8	16,000
3-1/2	4	22,000

## SHACKLES

All shackle pins shall be straight and all pins of screw pin type shall be screwed in all the way. If width between the eyes is greater than listed below, the shackle has been overstrained and shall not be used.

Round Pin Type Shackle Diameter of Pin(in.)	Safety Type Shackle Maximum Width Between Eyes (in.)	Screw Pin Type Shackle Safe Working Load (lbs.)
1/4	3/8	560
3/8	9/16	1,400
1/2	11/16	2,700
5/8	13/16	3,600
3/4	1-1/16	5,600
7/8	1-1/4	7,800
1	1-1/2	10,400
1-1/8	1-5/8	13,200
1-1/4	1-7/8	16,000
1-3/8	2	20,000
1-1/2	2-1/8	24,000
1-5/8	2-1/4	28,000
1-3/4	2-3/4	32,000
2	2-3/4	36,000
2-1/4	3-1/4	46,000
2-1/2	4	56,000

## APPLYING WIRE ROPE CLIPS

A correct method of attaching U-bolt wire rope clips to rope ends is the base of the clip bears against the live end of the rope, while the "U" of the bolt presses against the dead end.

The clips are usually spaced about six rope diameters apart to give adequate holding power.

Before ropes are placed under tension, the nuts on the clips shall be tightened. It is advisable to tighten them again after the load is on the rope to take care of any reduction in the rope's diameter caused by the weight or tension of the load.

A wire rope thimble shall be used in the loop eye to prevent kinking when wire rope clips are used. The correct number of clips for safe application, and spacing distances, are shown in the table below.

### Number of Clips and Spacing for Safe Application

Rope Diameter (in)	Approximate Weight (lbs)	Minimum No. Clips for Each Rope End	Spacing of Drop Forged Clips (in)
3/16	0.10	2	1-1/8
1/4	0.19	2	1-1/2
5/16	0.29	2	1-7/8
3/8	0.47	2	2-1/4
7/16	0.70	2	2-5/8
1/2	0.78	3	3
5/8	1.06	3	3-3/4
3/4	1.59	4	4-1/2
7/8	2.40	4	5-1/4
1	2.72	5	6
1-1/3	3.20	6	6-3/4
1-1/4	4.50	6	7-1/2
1-3/8	4.60	7	8-1/4
1-1/2	5.80	7	9
1-5/8	7.20	7	9-1/4
1-3/4	9.50	8	9-1/4
2	12.50	9	12
2-1/4	15.50	9	13-1/2
2-1/2	18.00	9	15

### MAXIMUM ALLOWABLE WEAR AT ANY POINT OF LINK

Chain Size (inches)	Maximum Allowable Wear (inches)
1/4	3/64
5/64	
1/2	7/64
9/64	
3/4	5/32
11/64	
1	3/16
7/32	
9/32	
1-1/4	1/4
1-1/2	5/16
1-3/4	11/32

## ILLUMINATION FOR OCCUPATIONAL TASKS

Glare, diffusion, direction, uniformity, brightness, color, and brightness ratios affect visibility and the ability to see easily, accurately, and quickly. Poor lighting is uncomfortable and possibly hazardous.

The desirable quantity of light for any particular installation depends primarily upon the work that is being done. As the illumination of the task is increased, the ease, speed, and accuracy of accomplishing it are also increased. Following are two tables of levels of illumination for industrial areas as recommended by the American National Standard A11.1 "Practice for Industrial Lighting."

Quantity of illumination is stated in foot-candles (1 foot-candle equals approximately 10.8Lux) and is measured with a light meter. The Office of Campus Safety will measure this upon request.

## MAXIMUM LUMINANCE RATIOS

### Environmental Classification

	A	B	C
Between tasks and adjacent lighter surroundings	1 to 3	1 to 3	1 to 5
Between tasks and more remote darker surfaces	10 to 1	20 to 1	*
Between luminaries (or windows, skylights, etc.) adjacent to them	20 to 1	*	*
Anywhere within normal field of view	40 to 1	*	*

\*Brightness Ratio control not practical.

- A Interior Areas where reflectance of entire space can be controlled in line with recommendations for optimum seeing conditions.
- B Areas where reflectance of immediate work area can be controlled, but control of remote surroundings is limited.
- C Areas (indoor and outdoor) where it is completely impractical to control reflectance and difficult to alter environmental conditions.

Note: From the normal view point, brightness ratios of areas of appreciable size in industrial areas shall not exceed those in the above table.

From: American National Standard A11.1-1973, Practice for Industrial Lighting, Illuminating Engineering Society.

## LEVELS OF ILLUMINATION RECOMMENDED FOR SAMPLE OCCUPATIONAL TASKS

Area	Foot-Candles
Assemble-rough, easy seeing	30
Assemble-medium	100
Building Construction-General	10
Corridors	20
Drafting Rooms-Detailed	200
Electrical Equipment, testing	100
Elevators	20
Garages-Repair areas	100
Inspection, Ordinary	50
Inspection, Highly Difficult	200
Loading Platforms	20
Machine Shops-Medium Work	100
Materials-loading, Trucking	20
Offices-General Areas	100
Paint dipping, Spraying	50
Service Spaces-Wash Rooms, etc.	30
Sheet Metal-Presses, shears	50
Storage Rooms-Inactive	5
Storage Rooms-Active, Medium	20
Welding-General	50
Woodworking-Rough sawing	30

**1 foot-candle = 10.76 lux.**

*From: A132.1-1973, Office Lighting*

# Section 3

## INSPECTION PROCESS

1. Locate each component of each category listed within your area of authority. (Listing this information may help to facilitate future inspections.)
2. Identify from the categories listed those items that require regular inspection. Consider the hazards; results of the loss of item use; parts and components likely to develop unsafe conditions; heat; misuse; abuse; theft; etc.
3. Use the appropriate word to describe hazard or condition found; i.e. "broken," "loose," "missing," "holes," etc. Give a more precise description of the unsafe condition when called for. Give a quantitative description when called for.
4. List: (1) the general area, (2) specific item[s] and location[s], (3) hazard or unsafe condition.

EX: Fire Protection --Emergency light B6 Smith Hall-Unit vandalized. Atmospheric Conditions--General illumination SE corridor Jones Hall--Bulb burned in ceiling fixture.

## INSPECTION CATEGORIES

<p><b>1. FIRE PROTECTION</b></p> <ul style="list-style-type: none"> <li>• Extinguishing Equipment</li> <li>• Evacuation Plans</li> <li>• Sprinkler Systems</li> <li>• Manual Alarms</li> <li>• Emergency Lighting</li> </ul> <p>Heat/Smoke Detection System</p>	<p><b>2. TOOLS</b></p> <ul style="list-style-type: none"> <li>• Power Hand Tools</li> <li>• Wiring</li> <li>• Hand Tools</li> </ul> <p>Storage of Tool</p>	<p><b>3. PERSONAL PROTECTIVE EQUIPMENT</b></p> <ul style="list-style-type: none"> <li>• Goggles,Glasses,Face Shields</li> <li>• Safety Shoes, Gloves</li> <li>• Respirators</li> <li>• Self-contained Breathing Apparatus</li> <li>• Protective Clothing Hard Hats and Bump caps</li> </ul>
<p><b>4. MATERIAL HANDLING EQUIPMENT</b></p> <ul style="list-style-type: none"> <li>• Power Trucks, Hand Trucks</li> <li>• Elevators</li> <li>• Cranes and Hoists</li> <li>• Conveyers</li> <li>• Cables, Ropes, Slings</li> </ul> <p>Forklift Charger</p>	<p><b>5. MACHINERY</b></p> <ul style="list-style-type: none"> <li>• Guarding</li> <li>• Belts, Pulleys, Gears, Shafts, etc.</li> <li>• Oiling, Cleaning, and Adjusting</li> <li>• Maintenance and Oil Leakage</li> <li>• Wiring</li> </ul> <p>Space Lines Painted</p>	<p><b>6. PRESSURE EQUIPMENT</b></p> <ul style="list-style-type: none"> <li>• Steam Equipment</li> <li>• Air Receivers, Compressors</li> <li>• Cylinders, Piping Hoses</li> <li>• Boilers/Vats</li> </ul>

<p><b>7. UNSAFE PRACTICES</b></p> <ul style="list-style-type: none"> <li>• Excessive Vehicle Speed</li> <li>• Improper Lifting</li> <li>• Smoking in Dangerous Areas</li> <li>• Horseplay</li> <li>• Running in Aisles or on Stairs</li> <li>• Removing Machine or other Guards</li> </ul> <p>Working on Unguarded Moving Machinery</p>	<p><b>8. CONTAINERS AND TANKS</b></p> <ul style="list-style-type: none"> <li>• Scrap Bins</li> <li>• Trash Receptacles</li> </ul> <p>Barrels and Carboys</p>	<p><b>9. HAZARDOUS MATERIALS</b></p> <ul style="list-style-type: none"> <li>• Storage</li> </ul> <p>Labeling</p>
<p><b>10. CONFINED SPACES</b></p> <ul style="list-style-type: none"> <li>• Shafts, Pits</li> <li>• Sumps</li> <li>• Floor Openings (including those usually kept covered)</li> </ul>	<p><b>11. PERSONAL SUPPORTING</b></p> <ul style="list-style-type: none"> <li>• Equipment</li> <li>• Ladders</li> <li>• Scaffolding</li> <li>• Platforms</li> <li>• Sling Chairs</li> <li>• Staging</li> </ul>	<p><b>12. WALKWAYS &amp; ROADWAYS</b></p> <ul style="list-style-type: none"> <li>• Aisles x_ Ramps</li> <li>• Dockboards</li> <li>• Walkways</li> <li>• Vehicle ways</li> </ul>
<p><b>13. ENVIRONMENTAL CONDITIONS</b></p> <ul style="list-style-type: none"> <li>• Dusts</li> <li>• Sprays</li> <li>• Vapors</li> <li>• Fumes</li> </ul>	<p><b>14. BUILDINGS &amp; STRUCTURES</b></p> <ul style="list-style-type: none"> <li>• Floor Surfaces</li> <li>• Grounds</li> <li>• Windows</li> <li>• Stairs</li> <li>• Roofs</li> <li>• Walls and Partitions</li> </ul>	<p><b>15. ELECTRICAL EQUIPMENT</b></p> <ul style="list-style-type: none"> <li>• Bonding</li> <li>• Grounding</li> <li>• Plugs</li> <li>• Cords</li> <li>• Connectors</li> <li>• Switches</li> <li>• Outlets</li> <li>• Fuse Boxes</li> <li>• Extension Cords and Multiple Receptacles</li> </ul>
<p><b>16. FIRST AID</b></p> <ul style="list-style-type: none"> <li>• Kits, Stretchers and Fire Blankets</li> <li>• Emergency Showers</li> <li>• Eye Wash Stations</li> </ul>	<p><b>17. MISCELLANEOUS</b></p> <ul style="list-style-type: none"> <li>• Acids and Caustics</li> <li>• New Processes</li> <li>• Chemicals &amp; Solvents</li> <li>• Emergency Phone Numbers</li> </ul>	

## **GUIDE TO SHOP INSPECTIONS**

The categories below correspond to those listed on the Shop Inspection Report. Items to be inspected within each category are listed separately, along with guidelines for inspecting each.

### **1. FIRE PROTECTION**

- Extinguishing Equipment (fire extinguisher)
  - Gauge should read "charged"
  - Mounted for easy accessibility
  - Proper kind for location
  
- Evacuation Plans
  - Posted
  - Torn, worn, or missing
  - In need of updating
  
- Sprinkler System
  - Full, partial, none
  - Heads leaking or broken off
  - Sufficient vertical clearance for activation (18")
  
- Manual Alarms
  - Broken, vandalized, missing
  
- Emergency Lighting
  - Battery pack operable (push button to test)
  - Inverter
  - Power generator
  
- Heat/Smoke Detection System
  - Detectors broken, missing

### **2. TOOLS**

- Power Hand Tools
  - Condition of wiring, housing x\_ Wiring-
  - UL approved
  - Double insulated (tag on cord)
  - Third prong intact on 3-prong style
  
- Hand Tools-Condition of tool
  - Condition of handle
  
- Storage of Tools
  - Designated storage location for each tool

### **3. PERSONAL PROTECTIVE EQUIPMENT**

- Goggles, Glasses, Face Shields (Availability, Work where required)
  - Condition
  - Proper protection for task
  
- Safety Shoes, Gloves
  - Available

- Worn where required
- Condition
- Respirators
  - Available
  - Clean
  - Suited to task
- Self-Contained Breathing Apparatus
  - Available (all parts)
  - Cylinder pressure in "good" zone
  - Condition (mask, straps, canister, and hoses)
- Hard Hats and Bump Caps
  - Available
  - Liners are intact
  - Integrity

#### 4. MATERIAL HANDLING EQUIPMENT

- Power Trucks, Hand Trucks
  - Adequate aisle space and turning room
  - Posted speed limits
- Elevators
  - Condition
  - Doors close slowly and easily
- Cranes and Hoists
  - Rated capacities visible
  - Hooks
- Conveyors
- Cables, Ropes, Slings, Chains
  - Excessive fraying of cables and ropes
  - Bends, kinks in cables, ropes
  - Stretching or stress points
- Fork Lift Charger
  - Area ventilation
  - No smoking rule enforced, signs posted
  - Operating instructions posted
  - No flammable/combustibles nearby

#### 5. MACHINERY

- Guards
  - All guards operative
  - All machinery is guarded
  - Push sticks available

- Belts, Pulleys, Gears, Shafts
  - Guarded, with housing
  - Condition
  - Gear teeth worn
- Oiling, Cleaning, Adjusting
  - Rusty parts
  - Excessive dust and grime buildup
  - Equipment unplugged or de-energized
- Maintenance, Oil Leakage
  - Oil leaks on equipment, floor
  - Equipment unplugged or de-energized
  - Lock out tags used
- Wiring
  - Grounded with 3-prong plugs intact
  - Condition of wiring and cables
  - Adequate voltage
  - Each piece of equipment on separate circuit
- Spacing Lines
  - Lines painted around each piece of equipment and worker space
  - Lines painted around equipment stock area

## 6. PRESSURE EQUIPMENT

- Steam Equipment (steam cleaners)
- Air Receivers, Compressors
  - Air hose pressure at 15 psi
  - Gauges operable and set within limits
- Cylinders, Piping, Hoses
  - Cylinders chained
  - Cylinder cap in place
  - Condition of gauges, regulators, cylinders
  - Hoses bound together
- Boilers
  - Pressure gauge operable
  - Vats

## 7. UNSAFE PRACTICES

- Excessive Vehicle Speed
  - Posted speed limits
- Improper Lifting
  - Lifting techniques taught
  - Lifting techniques followed

- Smoking in Dangerous Areas
  - NO SMOKING signs posted and observed in such areas as painting, welding and cutting, charging, storage, etc.
- Horseplay-
  - Forbidden while on SLU premises whether lunch, or break
  - Signs posted in suspect areas
- Running in Aisles or on Stairs
  - Forbidden Practice
  - Signs posted in suspect areas
- Removing Machine or Other Guards
  - Lockout/Tag out procedures
- Replacement/Repair dates
- Working on Unguarded Moving Machinery

## 8. CONTAINERS AND TANKS

- Cylinders x\_ Scrap Bins
  - Emptied daily or once per shift
- Trash Receptacles
  - Emptied Daily
- Barrels and Carboys
  - Should always be 'triple rinsed'

## 9. HAZARDOUS MATERIALS

- Storage
  - Flammable in flammable liquids cabinets
  - Paints and thinners in paints lockers battery at work
- Labeling
  - All containers shall be properly labeled; transfer containers shall have the name of the product within written in bold letters.

## 10. CONFINED SPACES

- Shafts, Pits,
  - Covered
  - Shaft entrance plan
  - No flammables or combustibles allowed

## 11. Personnel Supporting Equipment

- Ladders

- 4:1 run/rise
- Proper kind for job
- Condition
- Scaffolding
  - Condition
  - Flooring
  - Caster brakes (if not stationery) on metal flat feet on wood
  - All workers on suspended scaffolding shall be equipped with safety harnesses & lanyard which will be tied off
- Platforms
  - Check for decay, dry rot, weakening
  - Railing, mid-rail, toe boards required above 10 feet
- Sling Chairs
  - Users shall be equipped with safety harnesses and lanyards which shall be tied off
- Staging
  - Check for dry rot, decay, weakening
  - Evenness of surface
  - Illumination

## 12. WALKWAYS AND ROADWAYS

- Aisles
  - 44" in the clear
  - Aisle lines painted
  - Overhead Clearances
- Ramps
  - Free of oil or grime
  - Non-slip surface applied
  - Condition of ramp and curbs
- Dock boards
  - Clear of stored items
  - Free of oil, grease, and grime
- Walkways
  - Condition of surface
- Vehicle ways
  - Mirrors at blind intersections
  - Adequate illumination
  - Condition of surface
  - Adequate turning space

## 13. ENVIRONMENTAL CONDITION

- Dusts and Sprays

- Airborne dust or mist from an operation
- Concentration
- Causes (probable or actual)
- Exact location
- Vapors and Fumes
  - Causes (probable or actual)
  - Exact location
  - Area ventilation
- General Illumination
  - Fixtures/bulbs missing or broken
  - Lighting appears adequate

#### 14. BUILDINGS AND STRUCTURES

- Floor Surfaces
  - Loose/broken tiles
  - Always damp/wet
  - Uneven surface
  - Slippery
- Grounds
  - Broken/uneven pavement
  - Holes in ground
  - Ground protrusions (metal rods, etc.)
  - Drainage
  - Storm drains clogged
- Windows
  - Operate easily
  - Designated fire windows unblocked, path clear
  - Panes broken or out
- Stairs
  - Condition of treads
  - Landings used as storage
- Roofs/Drains
  - Roof in need of repair(s) scheduled
  - Drains clogged
  - Drain pipes broken off or cracked
- Walls and Partitions
  - Constrict free movement of people
  - Interfere with emergency exits or exit access
  - Need to be reflected on posted evacuation plans

#### 15. ELECTRICAL EQUIPMENT

- Bonding

- Grounding
  - Metal drums properly grounded to earth
  - Electrical installations grounded to earth
- Plugs
  - Electrical equipment so designed has three prongs intact and utilized
  - Double insulated where indicated by cord tag; has appropriate housing (plastic)
- Cords
  - Condition of cord and area where cord meets plug
  - Secured to floor in aisles
- Extension Cords and Multiple Receptacles
  - Circumstances prompting extension cords and locations of same
  - Circumstances prompting multiple receptacles and locations of same
  - Condition
- Connectors
  - Condition
- Switches
  - Condition
- Outlets
  - Condition
  - Location
- Fuse Boxes
  - Labeled
  - Door closes properly
  - No fuse "substitutions"

#### 16. First Aid Eye Wash Stations

- Availability/accessibility
- Water in portable units changed often

#### 17. MISCELLANEOUS

- Acids and Caustic
  - Stored separately
  - Properly labeled
- New Processes, Chemicals, Solvents
  - Appropriate Material Safety Data Sheets (MSDS)
  - Safety protocols written
  - Labeling and storage
- Emergency Phone Numbers
  - Posted on or near each phone in building
  - Phone number correct

## **INSPECTION PROCESS**

1. Locate each component of each category listed within your area of authority. (Listing this information may help to facilitate future inspections.)
2. Identify from the categories listed those items that require regular inspection. Consider the hazards; results of the loss of item use; parts and components likely to develop unsafe conditions; heat; misuse; abuse; theft; etc.
3. Use the appropriate word to describe hazard or condition found; i.e. "broken," "loose," "missing," "holes," etc. Give a more precise description of the unsafe condition when called for. Give a quantitative description when called for.
4. List: (1) the general area, (2) specific item[s] and location[s], (3) hazard or unsafe condition.  
EX: Fire Protection --Emergency light B6 Smith Hall-Unit vandalized. Atmospheric Conditions--General illumination SE corridor Jones Hall--Bulb burned in ceiling fixture.

## **INSPECTION CATEGORIES**

### **1. HOUSEKEEPING**

- Floors Trash
- Receptacles
- Aisles

### **2. OPERATIONS**

- Clearance
- Aisle Markings
- Lighting
- Storage Bins
- Stacking/Storage
- Pallets
- Flammable/Hazardous Materials

### **3. POWERED INDUSTRIAL TRUCKS**

- Training
- Charging Area

### **4. FIRE PROTECTION**

- Fire Extinguisher
- Smoking
- Prevention Precautions

# GUIDE TO WAREHOUSE INSPECTIONS

## 1. HOUSEKEEPING

- Floors
  - Shall be kept clear and free of debris, water, oil, etc.
  - Shall be free of holes, rough surfaces, etc.
- Trash Receptacles
  - Shall be a sufficient number available to reduce trash buildup
  - Must be of adequate size to handle to load
- Aisles
  - Kept clear of all protruding stored items

## 2. OPERATIONS

- Clearance
  - Shall be sufficient in aisles, loading areas, doorways, and wherever passage or turns are made for mechanical handling equipment
- Aisle Markings
  - Shall be a thick yellow line to prevent stacking in that reserved area
- Lighting
  - Adequate
- Storage Bins
  - Condition
  - Sufficient for load
- Storage/Stacking
  - Floor piled storage shall not create a hazard in aisles, etc.
  - Heavy items on bottom, lighter items on top
- Pallets
  - Condition (no broken slats, etc.)
- Flammable/Hazardous Material
  - Stored separately from other materials
  - Appropriately marked
  - Stored in approved cabinet

## 3. POWERED INDUSTRIAL TRUCKS

- Training
  - By all operators, on operation and charging of industrial trucks (i.e., OJT, lecture, demonstration)
- Charging Area
  - Special area shall be designated and posted as such

- Safe operating instructions posted at battery charging station

#### 4. FIRE PROTECTION

- Fire extinguisher
  - Adequate number
  - Appropriate type (CO<sub>2</sub>, DC, H<sub>2</sub>O)
  - Mounted with bottom not more than 3' above ground
  - Maintenance, with inspection tag up-to-date
  - Gauge shall read "charged"
- Smoking

NO SMOKING signs shall be posted around the warehouse, especially in areas containing flammable materials, where a no smoking policy shall be maintained

#### **HOT ENVIRONMENTS**

When the rate of heat transfer from the body by convection, radiation, and sweat evaporation is not adequate, then warming of the body occurs.

Excessive warming of the body can lead to heat stroke, which can be fatal unless treated promptly and properly. Other consequences of heat stress include heat exhaustion, heat cramps, and a rash called "prickly heat."

All employees who work in hot environments shall be trained in the recognition of heat stress warning signs and the appropriate emergency treatments should symptoms occur.

Symptoms

1. Heat Cramps--Painful intermittent spasms of the voluntary muscles following hard physical work in a hot environment. Cramps usually occur after sweating and often begin at the end of a work shift.
2. Heat Exhaustion--Profuse sweating, weakness, rapid pulse, dizziness, nausea, and headache. The skin is cool and sometimes pale and clammy with sweat. Body temperature is normal or subnormal. Nausea, vomiting, and unconsciousness may occur.
3. Heat Stroke--Sweating is diminished or absent. The skin is hot, dry, and flushed. Increased body temperature, which if uncontrolled, may lead to delirium, convulsions, coma, and even death. Medical care is urgently needed.

Evaluation and Control

1. Prevention Measures fall into three categories: engineering, administrative, and use of personal protective equipment.

- Engineering methods--mechanical procedures used to reduce the stress of hot environments, i.e., increasing general ventilation, use of local exhaust, cooling fans, shielding, isolation, relocation, redesign or substitution of equipment and/or processes.
- Administrative methods--work practice controls used to limit duration of heat stress or rest areas for rapid body cooling such as acclimation to heat, a work-rest regimen, distribution of work load, and doing hot work in the coolest part of the day.

- Personal protective equipment--used only when a person must remain in a hot environment long enough to cause unacceptably high heat strain without protection. This varies in the amount and type of clothing, from short-sleeved cottons to body cooling suits.

NOTE: All these methods of prevention shall incorporate increased high electrolyte fluid and water intake.

If an evaluation is necessary, contact Campus Safety.

## **HEAT-RELATED DISORDERS**

It is important for the employer to provide training in the symptoms and effects of heat stress and heat stroke. It is also important to stress the importance of drinking fluids and maintaining proper electrolyte levels.

### **HEAT EXHAUSTION**

Symptoms: Fatigue; weakness; profuse sweating; normal temperature; pale clammy skin; headache; cramps; vomiting; fainting.

Treatment:

1. Medical Alert
2. Remove worker from hot area
3. Have worker lie down and raise feet
4. Apply cool, wet cloths
5. Loosen or remove clothing
6. Allow small sips of water or electrolyte beverage if victim is not vomiting, then encourage victim to drink as much as possible
7. Instruct victim to stay out of heat for the remainder of the day

Prevention:

1. Take frequent breaks
2. Increase fluid intake
3. Allow workers to become acclimatized to heat

Causes:

1. High air temperature
2. High humidity
3. Low air movement
4. Hard work
5. Not enough breaks
6. Insufficient fluid intake
7. Full body clothing
8. Workers not acclimated to heat

## **HEAT STROKE**

Symptoms: Dizziness; nausea; severe headache; hot and dry skin; confusion; collapse; delirium; coma; death.

Treatment:

1. Medical emergency alert--life-threatening situation
2. Remove worker from hot area
3. Remove clothing
4. Have victim lay down
5. Cool body by any means available--cold water, chemical cooling ice packs, ice rubbed vigorously over body
6. Do not give stimulants
7. Give cold drinks if patient can cooperate
8. Transport victim immediately to nearest medical facility

Causes:

1. High air temperature
2. High humidity
3. Low air movement
4. Hard work
5. Not enough breaks
6. Insufficient fluid intake
7. Full body clothing
8. Not acclimatized

Telephone numbers of physicians

## **EXCAVATIONS, TRENCHING, AND SHORING**

All excavations over 5' deep shall be sloped, shored, sheeted, braced, or otherwise supported. When soil conditions are unstable, excavations more shallow than 5' shall be sloped, supported, or shored.

Methods of Excavations, Trenching, and Shoring

1. One method is to slope the sides of the cut to the "angle of repose". This varies with different types of soil and shall be determined on each individual project. (See ANGLE OF REPOSE FOR SLOPING SIDES OF EXCAVATIONS.)
2. A second method of support is shoring, i.e., sheeting, tightly placed timber shores, bracing, trench jacks, piles or other materials installed in a manner strong enough to resist the pressure surrounding the excavation. (See SHORING SYSTEMS FOR TRENCHES.)
3. A third method is to use a trench box. A trench box is a pre-fabricated movable trench shield composed of steel plates welded to a heavy steel frame. (See TRENCH SHIELD.)

## Factors for Adequate Protection

1. **Soil Structure:** Carefully identify soil structure. Wet soil, sandy soil, or areas that have been backfilled are relatively unstable and need strong support.
2. **Weather Conditions:** Changing weather conditions shall be taken into consideration. Excess rainwater loosens the soil and increases the pressure of the shoring system.
3. **Superimposed Loads:** Heavy equipment and materials such as pipes or timbers shall be kept as far back from the excavation as possible. If this cannot be done, these added pressures are to be taken into consideration.
4. Any additional vibration in the surrounding area shall be taken into consideration

## Installation

1. Support systems shall be installed starting at the top and working to the bottom. Care shall be taken to place cross beams or trench jacks in true horizontal position and to space them vertically at appropriate intervals. Braces shall be secured to prevent sliding, falling, or kickouts. (See TRENCH JACKS IN TRUE HORIZONTAL POSITION AND SPACED VERTICALLY.)
2. All material used shall be in good condition.
3. Shoring shall closely follow excavation work.
4. Unstable excavation bottoms below the water line shall be guarded. (See EXCAVATION BOTTOM BELOW WATER LINE.) Adequate drainage is required to prevent surface water from entering the excavation.
5. Barricades shall be placed around all excavated openings. Signage stating "DANGER: EXCAVATION" shall be placed around the opening.
6. When employees are in a trench of 4' or more, a ladder or steps shall be provided and located for quick exit. There shall not be more than 25' lateral travel to ladder or steps
7. Ladders used in excavations shall be in good condition, secured, and they shall extend 3' above the excavation.

## Removing the Material

After the trench has been cleared, workers shall remove the shoring from the bottom up taking care to release jacks or braces slowly. In unstable soil, ropes shall be used to pull out the jacks or braces from above.

## Inspection

Shoring shall be inspected daily by a competent person.

NOTE: See attached for load-bearing value of soil, size of cross braces, and size of spacing of members of trench shoring.

<b>Trench Shoring -- Size of Cross Braces</b>					
Minimum Requirements		Size of Cross Braces (inches)			
Depth of Trench	Kind or Condition of Earth	Width of Trenches			
		Up to 3 ft.	3 to 6 ft	6 to 9 ft	9 to 12 ft
5 to 15 feet	Hard, Compact	2x6	4x4	4x6	6x6
	Likely to Crack	2x6	4x4	4x6	6x6
	Soft, Sandy, or filled	4x4	4x6	6x6	6x8
	Hydrostatic Pressure	4x4	4x6	6x6	6x8
10 to 15 feet	Hard	4x4	4x6	6x6	6x8
	Likely to crack	4x4	4x6	6x6	6x8
	Soft, sandy, or filled	4x6	6x6	6x8	8x8
	Hydrostatic Pressure	4x6	6x6	6x8	8x8
15 to 20 feet	Any Pressure	4x12	6x8	8x8	8x10
over 20 feet	Any Pressure	4x12	8x8	8x10	10x10

Maximum spacing of members is 4' vertically and 6' horizontally for all trenches more than 5' deep. Trench jacks may be used in lieu of, or in combination with, cross braces. Shoring is not required in solid rock, hard shale, or hard slag.

Where desirable, steel piling and bracing of equal strength may be substituted for wood.

<b>Trench Shoring -- Size and Space of Members</b>					
Minimum Requirements		Size and Space of Members (inches)			
Depth of Trench	Kind or Condition of Earth	Uprights		Stringers	
		Min Size	Max Size	Min Size	Max Size
5 to 10 feet	Hard, Compact	3x4 or 2x6	72" (6')	---	---
	Likely to crack	3x4 or 2x6	36" (3')	4x6	48" (4')
	Soft, Sandy or Filled	3x4 or 2x6	Close Sheating	4x6	48
	Hydrostatic Pressure	3x4 or 2x6	Close sheating	6x8	48
10 to 15 feet	Hard	3x4 or 2x6	48" (4')	4x6	48
	Likely to Crack	3x4 or 2x6	24" (2')	4x6	48
	Soft, Sandy, or Filled	3x4 or 2x6	Close Sheating	4x6	48
	Hydrostatic Pressure	3x6	Close Sheating	8x10	48
15 to 20 feet	any condition	4x6	Close Sheating	4x12	48
over 20 feet	any condition	3x6	Close Sheating	6x8	48

Maximum spacing of members is 4' vertically and 6' horizontally for all trenches more than 5' deep.

Shoring is not required for solid rock, hard shale, or hard slag.

Where desirable, steel piling and bracing of equal strength may be substituted for wood.

## **CONFINED SPACES**

"Confined Spaces" is intended to mean a relatively small or restricted space such as a tank, boiler, vault, tunnel, open ditch or any place where entry or exit is limited or ventilation is poor.

Hazards of Confined Spaces

1. Lack of oxygen can cause a worker to collapse almost instantly.
2. Toxic gases or vapors can poison or suffocate workers.
3. Combustion, a buildup of flammable/combustible gases or vapors, can burn or explode.
4. Heat can cause heat exhaustion, cramps, etc.
5. Noise intensifies in small spaces and can cause hearing loss, as well as interfere with communication.
6. Mechanical equipment can cause sparks to ignite flammable or combustible gases, or cause physical injury.
7. Falls can cause injury-falls from one level to another or by slips and trips.

The following practices shall be adhered to when entering a confined space:

### **A. Review Guidelines**

- Determine potential hazards.
- Review safety equipment required.
- Review emergency measures.

### **B. Get Proper Approval**

- Obtain an entry permit from your supervisor.
- Post it at worksite, if required.

### **C. Lockout/Tag out Sources of Danger (See "Lockout/Tag out")**

### **D. Test for Potential Hazards**

- All confined spaces shall be tested for possible oxygen deficiency and flammable/combustible gas/vapor content by a qualified person.
- If hazardous gases/vapors are detected, ventilate and clean the space, then test again.

### **E. Ventilate**

- If inadequate ventilation is suspected, a blower shall be made available to assure sufficient air supply.

F. Assemble Proper Equipment and Post Observers

- Required respirators, lifelines, tools, etc., shall be gathered before entering.
- An observer shall be posted near the entrance in case an emergency rescue is needed.

G. Miscellaneous

- Before welding, burning, cutting, or brazing work starts, a hot work permit shall be obtained. (See "Hot Work/Cutting and Welding Permit")
- If asbestos pipe insulation is to be removed in a confined space, it shall be done by employees trained in asbestos removal techniques using proper personal protective equipment.

H. Never

- Enter a confined space not authorized to do so.
- Enter a confined space unless an observer is posted near the entrance.
- Smoke in a confined space.

## **GROUNDS MAINTENANCE**

Prevention of accidents and injuries from tools and machines used in grounds maintenance requires that equipment be chosen for a specific purpose and that it be used and maintained properly. Fuel and chemicals shall be stored and used properly. Workers shall be thoroughly trained and shall wear proper clothing and use protective equipment as required. (See "Personal Protective Equipment".)

It is important that maintenance workers be able to recognize poisonous vines, shrubs, fruits, and insects. (See "Poison Ivy and Oak".) They shall avoid contact with poison oak and ivy and permanently destroy all poisonous growths. They shall guard against insects and infections, and scrub hands thoroughly after working outdoors. All cuts and scratches received outdoors shall be treated with proper antiseptic covering. All foreign matter such as glass, metal, and wire shall be removed from the grounds to be maintained. Gloves, sturdy shoes, and appropriate garments for protection shall be worn at all times.

Hand Tools:

See "Safe Use of Hand and Portable Power Tools "

Gasoline Powered Equipment

The following points shall be followed when handling gasoline:

- Gasoline shall never be used for cleaning floors, tools, clothes, or hands. Gasoline is to be used in engines as a source of fuel only.
- Gasoline shall only be stored in approved closed containers. Never use an open container, glass, or other breakable container.
- Pouring gasoline from one container to another may generate a charge of static electricity. A metal-to metal contact shall be maintained.
- Gasoline spills shall be cleaned up immediately to prevent accumulation of vapors. Do not allow electrical switches to be turned on until the gasoline vapors have dispersed. Electrical devices that start automatically such as cold-water fountains may have to be shut off at the main switch if the main switch can be pulled safely.
- If gasoline is spilled on a person, the saturated clothing shall be removed immediately and the person kept away from sources of ignition. The affected area of the skin shall be washed with soap and water to avoid a skin rash or irritation. If the eyes are involved, they shall be flushed with water and get the person to a doctor.
- Gasoline tanks or equipment parts that are likely to contain gasoline shall be drained or dismantled only out-of doors or in a well-ventilated area free from sources of ignition.
- Smoking shall be allowed in approved areas only. Smoking shall not be allowed in fueling areas, fuel system servicing areas, maintenance areas, bulk fuel delivery areas, etc.
- Gasoline shall not be dispensed into a fuel tank while the engine is running or the motor is hot.
- Equipment with fuel in the tank shall not be stored inside a building where vapors could reach an open flame or spark. Allow the engine to cool before storing in any enclosure.
- Never run an engine indoors.

## Lawn Trimmers:

Edgers and trimmers shall be treated with the same caution as mowers because they, too, have a heavy metal cutting blade that can throw debris or cut a finger.

Guards shall be kept in place and in working order. Keep the blades sharp. Do not put hands near the working area unless the machine is turned off and unplugged.

Nylon-cord weed trimmers cannot hurt as seriously as metal blade trimmers-edgers, but getting hit by the line can sting. The operator shall disconnect the power cord when adjusting the cutter cord length or changing the reel, applying the same precautions as with any electrical appliance. Care shall be taken in wet areas and the cord checked periodically for cracks or breaks in the insulation.

Gasoline-powered mowers and tractors shall meet the American National Standard B71.1, "Safety Specifications for Power Lawn Mowers, Lawn and Garden Tractors, and Lawn Tractors". Snow throwers shall meet ANSI B71.3, "Safety Specifications for Snow Throwers".

## Power Lawn Mowers:

Before starting, supervisors shall make sure the operator is well trained in using the mower. If it is the first time the mower will be used that season, the operator shall review the instruction manual. Before starting to mow, the operator shall pick up rocks, glass, tree branches and twigs, and any other objects that could become lethal missiles if thrown out by the mower blade and observe the location of fixed objects such as pipes, lawn sprinkler heads, and curbs that could damage the mower or break off and become missiles. Any wheel height adjustment shall be made prior to starting the mower; disconnect the spark plug wire when cleaning, repairing, or inspecting the mower. Unauthorized persons shall not be allowed to be in the mowing area. The operator shall make a quick inspection for loose nuts and bolts, check the engine oil level (if the mower has a separate oil reservoir), and fill the fuel tank before starting. Using a vented can with a flex spout. The operator shall wear work shoes and safety glasses. A brimmed hat, long pants and a long-sleeved shirt will protect against sunburn.

The operator shall be instructed to mow in daylight or good artificial light and to push the mower forward as much as possible because feet can be injured when pulling a mower backward. When mowing on a slope or terrace, a series of horizontal passes along the incline shall be used. If the operator pushes up the incline, he/she runs the risk of having the mower drift back onto his/her foot. If he pushes down, he/she could lose his footing and fall into the mower

The mower shall not be used when the grass is wet and slippery. If the grass is damp or high, cut at a slower speed, if possible, and set the cutting height higher than for dry grass; otherwise, the discharge chute may clog up.

Rotary blades can also pick up stones, pieces of wire, nails, or other objects hiding in the grass, and throw them out of the discharge chute at high speeds. Guards shall be in place every time the catcher is not used.

The operator shall shut off the engine and make certain that the blade has stopped completely

before taking off the grass catcher to empty it, attempting to free obstructions from the discharge chute, adjusting the cutting height or performing any operation requiring him/her to put his/her hands or feet near the blade.

#### Riding Mowers:

Suggested safe practices for riding mowers include the following:

- The operator shall be fully instructed in handling riding mowers. He/she shall know the controls, know how to stop the machine quickly, and shall read the owner's manual--especially at the beginning of each mowing season.
- The work area shall be cleared of objects that might be picked up and thrown. Fixed objects that might damage the mower shall be identified. All areas cannot be reached by a riding mower; some corners or sharp slopes will have to be mowed by a power mower. When planning landscaping, leave enough space around new plantings for easy mower access and allow for future growth.
- Disengage all attachment clutches and shift into neutral before attempting to start the engine (motor). Disengage power to attachments and stop the engine before making any repairs or adjustments. Disengage the power to attachments when transporting them or when they are not in use. All possible precautions shall be taken when leaving the vehicle unattended such as disengaging the power takeoff, lowering the attachments, shifting into neutral, setting the parking brake, stopping the engine, and removing the ignition key.
- When mowing, the operator shall stay alert for holes in the terrain and for other hidden hazards. Do not start or stop suddenly when going uphill or downhill. Mow up and down the face of steep slopes; never mow across as the wheelbase is longer than the thread so the unit is more stable that way. Reduce speed on slopes and on sharp turns to prevent tipping or loss of control. Extreme caution shall be used when changing direction, especially on slopes. Do not back up without looking to make certain it is safe to do so. Watch for traffic when crossing or near roadways. When using attachments, direct discharge of materials away from anything that could be hurt or damaged by it.
- Maintain vehicle and attachments in good operating condition and keep safety devices in place. Keep all nuts, bolts, and screws tight, and make sure the equipment is in safe working condition; check especially blade mounting bolts. If the vehicle or its attachments strike a solid object, stop and inspect for damage; the damage shall be repaired before restarting and operating the equipment. The engine governor settings shall not be changes; the engine shall not be over speeded; discharge guards shall always be in the down position.

#### Garden Tractors:

- Garden tractors shall have safeguards for all moving parts to reduce the hazard of contacting belts, chains, pulleys, and gears.
- Garden tractors shall have a throttle, gears, and brakes that are accessible and can be operated smoothly with minimum effort.
- Safety instructions shall be provided with the garden tractor. There shall be warning labels on the machine itself.

- The operator shall read the owner's manual and shall reread its recommendations before each use of the garden tractor.
- Never allow children or unauthorized persons to operate the tractor and keep them away from these areas during operation.
- The operator shall wear sturdy, rough-soled work shoes, and close-fitting slacks and shirts to avoid entanglement in the moving parts. He/she shall never operate a garden tractor in bare feet, sandals, or sneakers.
- The machine shall be turned off and the spark plug wire disconnected when the machine is to be adjusted.
- The operator shall always drive up and down the slopes--rather than across when using a garden tractor on a hill for greater stability. (This instruction is different than that for power lawn mowers.)
- Garden tractors shall be started outdoors, not in a garage where carbon monoxide gas can collect
- No smoking shall be allowed near the garden tractor or gasoline storage can.
- Unauthorized persons shall be kept away from the machines and the fuel
- All loose or broken parts, especially blades shall be tightened or replaced.
- Get expert servicing regularly; it may prevent serious injuries .
- Bypass starting of tractors shall not be allowed. (See Section, "Bypass Starting of Tractors.")

#### Pesticides:

Insecticides, herbicides, fungicides, disinfectants, rodenticides, and animal repellents are all pesticides. The safe use of pesticides is everyone's responsibility. The user, however, has the major responsibility which begins the day a pesticide is selected and purchased and continues until the empty container has been disposed of properly.

All labels shall include a list of what the product will control, directions on how to apply the pesticide, a warning of potential hazards, and safety measures to follow. Before using any pesticide poison, read the label carefully. The label states the hazards involved, antidotes, and first aid instructions. Those poisons that have DANGER-POISON on the label are highly toxic. If inhaled, eaten, or allowed to frequently remain on skin, they could kill. Poisons that have WARNING on the label are moderately toxic and can be quite hazardous. Poisons that have CAUTION on the label have low toxicity, but could cause harm if the poison is eaten or grossly misused. Label instructions for mixing, handling, and applying shall be followed. BE SURE--DO NOT GUESS.

#### APPLICATION:

Any restricted-use pesticide used around a plant shall be applied by a certified handler according to law (Public Law 92.516).

The least toxic pesticide shall be used for the job in order to reduce hazards.

Only enough pesticide to last one season shall be purchased. This cuts down on storage and disposal problems. The following precautions shall be observed:

- Use pesticide poisons only for the purposes stated on the label.

- Keep pesticide poisons in the original labeled container. Check for leaks or container damage.
- Mix pesticide poisons carefully (outdoors if possible), keep off skin, and avoid breathing dust or vapors. Use protective clothing and equipment including respirators for toxic chemicals. See "Personal Protective Equipment."
- Set aside a special set of mixing tools (measuring spoons and a graduated measuring cup) for use with sprays and dusts only. Keep them with the chemicals.
- Avoid spilling. Set aside a level shelf or bench in a well-ventilated area, preferably outside, for mixing chemicals. A level, uncluttered surface helps avoid spills. If chemicals do spill, wash hands at once with soap and water. Then hose down the mixing area and contact the Office of Campus Safety.
- Never smoke or eat while spraying or dusting.
- Someone shall always be "in attendance" when pesticides are being used.
- During application, stay out of the spray drift. Avoid outside application on a windy day.
- If pesticide poison gets on skin or clothing, immediately remove clothing and take an all-over bath or shower; be sure to shampoo and use plenty of soap and water. Wash clothing before reuse and contact Campus Safety.
- When finished, wash immediately with soap and water. Do not smoke, eat, or drink without washing first.
- Never allow unauthorized personnel around treated areas or pesticide poison mixing, storage, and disposal area.

#### Safe Storage:

- Pesticide poisons shall be stored in a well-ventilated, locked area or building. Packages that are likely to be damaged by dampness shall be kept off the floor.
- Poisons shall be kept in tightly closed, original containers. The label gives information needed in case of accidents. Do not store pesticides in other containers.
- Do not store clothing, respirators, lunches, cigarettes, or drinks with pesticide poisons. They may pick up poisonous vapors or dusts or soak up spilled poisons .
- Keep soap and plenty of water handy. Seconds count when washing poisons from the skin.

#### Disposal:

Dispose of pesticides through the SLU Hazardous Waste Program only. See "Hazardous Waste Program."

#### Emergency Information:

If an emergency occurs, additional advice and information on antidotes for specific pesticides may be obtained from the Student Health Center or a local hospital. Telephone numbers shall be conspicuously posted.

#### Poison Ivy and Poison Oak:

All maintenance workers shall be trained to recognize poison ivy and poison oak.

- Poison Ivy grows as a vine up to 50' long or as a small plant. The leaves of this plant always grow in groups of three. The leaves of poison ivy are green in late spring and summer; reddish in the early spring, late summer, and fall.

- Poison Oak is most commonly a bush, although it sometimes grows as a vine up to 30' long. The leaves always grow in groups of three and are green in late spring and summer; reddish in early spring, late summer, and fall.

Exposure to poison ivy or oak can be acute (short-term) or chronic (long-term). Acute exposure is received by touching the plant, swallowing parts of the plant, or inhaling smoke of the burning plant. Local signs and symptoms begin 12 hours to 7 days after exposure. Chronic exposure (repeated exposure) increases the severity of the symptoms which could lead to severe poisoning.

Symptoms include itching, swelling, blister formation, oozing, and crusting. Generalized signs and symptoms include fluid accumulation, weakness, malaise, and fever.

Prevention:

- Employees shall be able to recognize these poisonous plants and know how to avoid them.
- If exposure is possible, heavy clothes and leather gloves shall be used.
- Upon exposure, the employee shall wash thoroughly with soap and water, and remove all contaminated clothing for washing.

NOTE: Ingesting of poisonous plants does not help achieve immunity.

Treatment:

Upon exposure, the employee shall wash thoroughly with soap and water and be brought to the Student Health Center for evaluation.

[Grounds Maintenance Safety Inspection Report](#)

## CUSTODIAL SAFETY

### General

- Use fresh cleaning supplies or sanitary disposal supplies. Wash hands often.
- Obey all hazard-warning signs. If there are any questions, ask the supervisor first.
- Never reach into or pack down trash with bare hands.
- Don't let trash pile up. Empty it regularly.
- Keep storage places neat and equipment clean.
- Any equipment showing signs of electrical trouble shall be removed from use, and then reported immediately to the supervisor.
- Keep machine guards in place. When work requires, wear protective equipment.
- Don't risk it. If repairing--unplug, use lock out tag out procedures. See "Equipment Lock Out Procedures".
- To unplug: grip at plug (do not yank on cord), dry hands before handling electrical equipment.
- Prevent falls. Keep cords and vacuum hoses out of the way.
- Report "booby traps" (ripped carpets, loose, missing, or broken tiles) in flooring.
- Move equipment slowly. Park equipment away from doorways or corners.
- Do not block aisles, stairs, and exits.

### Cleaning

- Alkaline cleaners shall not be used on terrazzo.
- Mild alkaline cleaners may be used on asphalt tile.
- Oils are unsuitable for rubber tile. When applied to wood floors, the fire hazard increases.
- To keep floor clean, safe, and sanitary, the recommendations of the flooring manufacturer shall be followed. Procedures shall be standardized and detailed.
- In general, the routine maintenance procedure for linoleum, marble, terrazzo, asphalt tile, and other types of flooring is to clean the floors with a soft floor brush or vacuum cleaner. When necessary, damp-mop with clean, cold water.
- Floor shall be cleaned one section at a time. If traffic in the area is heavy, that section shall be roped off. When soap is used, any soapy film shall be removed by thorough rinsing to avoid a slippery condition.
- Ordinary wash for polishing wood, tile, and similar floor surfaces is unsuitable because of its inherently slippery nature.
- Soft floors such as asphalt, vinyl, and linoleum shall be cleaned four times a year. Hard floors such as concrete and terrazzo shall be cleaned and sealed once a year.
- Slippery materials spilled on floors shall be cleaned promptly. Clean all spills as soon as possible.
- To remove grease and oils, the area can be covered with slaked lime to a depth of 1/4" (5mm). After two or three hours, the lime is then removed with a scraper or stiff brush. Various sand commercial cleaners can also be used.
- Protection shall be used when handling strong chemicals. Wear gloves if using steel wool.
- Ventilate area if painting, spraying insecticide, or using toxic cleaners. Do not mix ammonia and chlorine products.
- Avoid leaving floor too wet, using too much wax, and not buffing enough.

### Aisles

- Aisles shall be kept clear at all times.

### Fire Protection

- See “Building Safety, Louisiana Building Coe for State Owned Buildings.”

#### Ladders

- See “Proper Use of Ladders” and “Personal Protection Equipment, Eye, Face and Hand Protection”.

# Grounds Maintenance Safety Inspection Report

Department \_\_\_\_\_

Date \_\_\_\_\_

- I. Power Equipment (self propelled or riding mowers, edgers)  
Maintenance
  1. Power equipment free from serious gasoline leaks?
  2. All guards in place?
  3. Gas throttles in good working order?
  4. Breaking mechanism in good working order?
  5. Cutting blades sharp?
  6. Frame in good condition, nuts, bolts, other connections snug and fast?
  
- II. Handtools  
Maintenance
  1. Cutting edges sharp?
  2. Handles not cracked or split?
  3. Protected from damage during transport to job site or when stored?
  
- III. Personal Protective Equipment
  1. Crew members equipped with appropriate eye protection?
  2. Crew members have appropriate footwear (no sandals or tennis shoes)?
  3. Crew members have shirts on (no tank tops)?
  
- IV. Wheelbarrows
  1. Handles not cracked?
  2. Pneumatic tires properly inflated?
  3. Body bolts secure?
  
- V. Chemicals
  1. Properly stored (cool, dry, isolated)?
  2. When applied, personal protective equipment used (gloves, goggles, respirator)?
  3. Personal protective equipment in good condition?
  
- VI. Garbage Containers
  1. Properly stored when not in use?
  2. Handles and lids free of cracks?
  
- VII. Grinder
  1. Wheel is guarded (spindle end and nut covered)?
  2. Is workrest adjustable and secure?
  3. Is grinder securely fastened to bench or floor stand?
  4. Workrest no farther than 1/8" from wheel?

For Every Deficiency: Identify the deficiency and correction/recommendation by using section and number (ex: I3. Gas throttles not in good working order - repair). Add any recommendations necessary for items not covered in this report. Use additional sheet, if needed. Inspector NOTE: If self-inspection, send a copy of this report to Campus Safety.

# Hazardous Waste Label

NAME OF CHEMICAL/WASTE: \_\_\_\_\_

IF WASTE IS MIXED/BLENDED, LIST EACH COMPONENT AND PERCENTAGES OF EACH: \_\_\_\_\_

ESTIMATED AMOUNT (in gm/lbs/mL/pt/L/gal/ft): \_\_\_\_\_ STATE: \_\_\_\_\_

LIQUID \_\_\_\_\_ SOLID \_\_\_\_\_ GAS \_\_\_\_\_ TOXIC: FLAMMABLE \_\_\_\_\_

CORROSIVE \_\_\_\_\_ REACTIVE \_\_\_\_\_

OTHER: \_\_\_\_\_

GENERATOR: \_\_\_\_\_

BUILDING: \_\_\_\_\_ LAB/RM#: \_\_\_\_\_

TEL#: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

# LADDER INSPECTION CHECKLIST

<b>General</b>	<b>Needs Repair</b>	<b>Condition O.K.</b>
Loose steps or rungs (considered loose if they can be moved at all by hand)		
Loose nails, screws, bolts, or other metal parts		
Cracked, split, or broken uprights, braces, steps, or rungs		
Slivers on uprights, rungs, or steps		
Damaged or worn nonslip bases		
<b>Stepladders</b>		
Wobbly (from side strain)		
Loose or bent hinge spreaders		
Stop on hinge spreaders broken		
Broken, split, or worn steps		
Loose hinges		
<b>Extension Ladders</b>		
Loose, broken, or missing extension locks		
Defective locks that do not seat properly when the ladder is extended		
Deterioration of rope, from exposure to acid or other destructive agents		
<b>Trolley Ladders</b>		
Worn or missing tires		
Wheels that bind		
Floor wheel brackets broken or loose		
Floor wheels and brackets missing		
Ladders binding in guides		
Ladder and rail stops broken, loose, or missing		
Rail supports broken or section of rail missing		
Trolley wheels out of adjustment		
<b>Trestle Ladders</b>		
Loose hinges Wobbly		
Loose or bent hinge spreaders		
Stop on hinge spreader broken		
Center section guide for extension out of alignment		
Defective locks for extension		
<b>Sectional Ladders</b>		
Worn or loose metal parts		
Wobbly		
<b>Fixed Ladders</b>		
Loose, worn or damaged rungs or side rails damaged or corroded parts of cage		
Corroded bolts and rivet heads on inside of metal stacks		

Damaged or corroded handrails or brackets on platforms		
Weakened or damaged rungs on brick or concrete slabs		
Base of ladder obstructed		
<b>Fire Ladders</b>		
Markings illegible		
Improperly stored		
Storage obstructed		
<b>ADDITIONAL COMMENTS:</b>		

**HAZARD COMMUNICATION  
INFORMATION**

**THE HAZARD COMMUNICATION  
STANDARD,**

a listing of hazard materials/chemicals,  
and

**MATERIAL SAFETY DATA SHEETS**

are available at the office of Hazardous Materials  
Room 118, Pursley Hall, Phone 549-2157

**IN THE EVENT OF A CHEMICAL SPILL,**

**CALL 549-2157 OR 549-2222,**

**IMMEDIATELY**

**Nights, weekends, or holidays, call Campus  
Police at 549-2222.**

**THIS NOTICE MUST BE POSTED  
PROMINENTLY**

# OFFICE PHYSICAL PLANT HOT WORK CUTTING/WELDING PERMIT

Applies only to area specified below.

Date: \_\_\_\_\_ Location and Building: \_\_\_\_\_

Nature of Job: \_\_\_\_\_

Welder's

Name: \_\_\_\_\_

Permit Expires: Date: \_\_\_\_\_ Time: \_\_\_\_\_

**Yes No N/A**

## PRECAUTIONS:

Sprinklers in service \_\_\_\_\_

Cutting/welding equipment in good repair \_\_\_\_\_

## PRECAUTIONS WITHIN 15' OF WORK:

Floors free of combustibles \_\_\_\_\_ Combustible floors protected \_\_\_\_\_

\_\_\_\_\_ Flammable liquids removed or protected \_\_\_\_\_ Explosive atmosphere in

area eliminated \_\_\_\_\_ All walls and floors opening covered \_\_\_\_\_

Fire resistant coverings under work \_\_\_\_\_

## WORK ON WALLS OR CEILINGS:

Construction is non-combustible \_\_\_\_\_ Combustibles moved away from  
otherside of the wall \_\_\_\_\_

## WORK ON ENCLOSED EQUIPMENT:

Enclosed equipment cleared of all combustibles \_\_\_\_\_ Containers purged of  
flammable liquids \_\_\_\_\_

## FIRE WATCH:

Fire watch will be provided during and at least 30 minutes after completion \_\_\_\_\_

\_\_\_\_\_ Fire watcher is trained in use of this equipment and in sounding alarm \_\_\_\_\_

\_\_\_\_\_ Fire watcher is supplied with appropriate fire extinguisher \_\_\_\_\_

**\*Applicable items must be answered "yes" before permit is approved.**

## HAZARD COMMUNICATION QUESTIONNAIRE

For the following questions, please answer YES, NO, or SOMEWHAT:

- \_\_\_\_\_ 1. Do you think the information presented will or could be helpful to you in your everyday work?
- \_\_\_\_\_ 2. Was the material presented interesting?
- \_\_\_\_\_ 3. After reflecting on what you have been exposed to, do you feel you have a better knowledge of:
- o \_\_\_\_\_ the NFPA Hazard Identification System?
  - o \_\_\_\_\_ hazardous materials/chemicals signage?
  - o \_\_\_\_\_ the MSDS?
- \_\_\_\_\_ 4. After reviewing the materials in your handout packet, do you feel like they could be important to you (serve as a guide) should you come face-to-face with hazardous materials that you must handle?
- \_\_\_\_\_ 5. If you must handle hazardous materials on occasion, do you feel the information passed on to you could help to keep you from becoming sick or injured?
- \_\_\_\_\_ 6. Do you feel the instructors were prepared for the session?
- \_\_\_\_\_ 7. Was the material presented in a meaningful fashion?
- \_\_\_\_\_ 8. If an advanced Hazard Communication session (conducted by the same instructors) was available, would you be interested in attending?

Please feel free to make any comments regarding the materials presented, instructors, meeting room, length of class, etc.

# STATIONARY SCAFFOLD SAFETY CHECK LIST

PROJECT: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

DATE OF INSPECTION: \_\_\_\_\_ INSPECTOR: \_\_\_\_\_

## Yes No

Are scaffold components and planking in safe condition for use and is plank graded for scaffold use?

- |       |       |  |
|-------|-------|--|
| _____ | _____ | Is the frame spacing and sill size capable of carrying intended loadings?  |
| _____ | _____ | Have competent persons been in charge of erection of scaffold?   |
| _____ | _____ | Are sills properly placed and adequate size? Have screw jacks been used to level and plumb scaffold instead of unstable objects such as concrete blocks, loose bricks, etc.? |
| _____ | _____ | Are base plates and/or screw jacks in firm contact with sills and frame?   |
| _____ | _____ | Is scaffold level and plumb?   |
| _____ | _____ | Are all scaffold legs braced with braces properly attached?  |
| _____ | _____ | Is guard railing in place on all open sides and ends above 10' (4' in height if less than 45")?  |
| _____ | _____ | Has proper access been provided?   |
| _____ | _____ | Has overhead protection or wire screening been provided where necessary?   |
| _____ | _____ | Has scaffold been tied to structure at least every 30' in length and 26' in height?  |
| _____ | _____ | Have free standing towers been guyed or tied every 26' in height?  |
| _____ | _____ | Have brackets and accessories been properly placed: _____  |
|       |       | Brackets? _____ Putlogs? _____ Tube & Clamp? _____   |
|       |       | All nuts & bolts tightened?  |
| _____ | _____ | Is scaffold free of makeshift devices or ladders to increase height?   |
| _____ | _____ | Are working level platforms fully planked between guard rails?   |
| _____ | _____ | Does plank have minimum 12" overlap and extend 6" beyond supports?   |
| _____ | _____ | Are toeboards installed properly?  |
| _____ | _____ | Have hazardous conditions been provided for: _____ Power lines?  |
|       |       | _____ Wind loading? _____  |
|       |       | Possible wash-out of footings? _____ Uplift and overturning moments due to placement of brackets, putlogs, or other causes?  |
| _____ | _____ | Have personnel been instructed in the safe use of the equipment?   |







**DISCREPANCIES (BY FLOOR OR AREA):**

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**RECOMMENDATIONS OR COMMENTS:**

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