Metropolitan
LIBRARY SYSTEM

SAFETY MANUAL

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POLICY

Metropolitan Library System is dedicated to the health and safety of our workers and demonstrates this dedication through the development and implementation of a comprehensive safety program. One of the key elements of this safety program is the Safety Management Program adopted at this facility.

The Metropolitan Library System (”Library”) requires all employees and volunteers to follow safe working procedures. The Library has developed comprehensive health and safety programs. These programs comply with all federal, state and municipal laws, codes, regulations and standards relating to heath safety and the environment. These programs are assembled in the Library Safety Manual maintained at each Library location.

Safety standards applicable to The Library are those prescribed by the Oklahoma Department of Labor, Public Employees Occupational Safety and Health (PEOSH) Division. Generally, these standards are the same as those issued by the Federal Occupational Safety and Health Administration (OSHA).

PURPOSE

The Safety Management Program is designed to establish basic safety standards, practices, and procedures that make Metropolitan Library System a better, safer workplace. This program covers a variety of topics, including instructions for successful safety meetings, hazard identification and abatement procedures, preparation and procedures for a PEOSH inspection, and more. Rather than concentrating on any one area or standard, this program is geared towards establishing basic guidelines and procedures that will make the workplace safer for everyone. In addition, the rights and responsibilities of both the employer and workers are illustrated.

1.0 SAFETY MANAGEMENT

1.1 General guidelines: it is the belief of Metropolitan Library System that both the company and its employees will enjoy the benefits of a safe workplace. We are committed to complying with all applicable laws and regulations in our pursuit of providing a workplace that is as free of accidents, injuries, and illness as much as possible. Many benefits will be derived from following this plan. Among them are the following:

- A workplace largely free of safety hazards.
- Elimination of the costs employed with an accident in the workplace, such as medical bills and repairs to the facility.
- Elimination of collateral costs employed with accidents in the workplace, such as the cost of lost productivity from an injured employee and/or damaged equipment, the cost of training a replacement employee, etc.
- A reduction in the insurance rates for the physical location and in the workers' compensation premiums for the employees.
- Elimination of fines and penalties from regulatory agencies for non-compliance with regulations and standards.
- Increased productivity of the employees resulting from higher morale and less turnover.

It is recognized this goal cannot be realized merely through the company's efforts; and every employee must share in the responsibility with his or her efforts if this plan is to succeed to its fullest potential. Therefore, we say that safety in the workplace will be a shared responsibility, which can best be achieved by fulfillment of the principles and procedures outlined in this manual.

1.2 Basics: listed below are the basic rules and guidelines to be followed in the workplace. This list is not all-inclusive; other rules and standards specifically applicable to the department or area in which the employee works may apply. If there are any questions or issues regarding any of these guidelines, the employee should speak to his or her supervisor immediately.

- Horseplay, fighting, and practical joking have no place in the workplace, and will not be tolerated.
- Workplace cleanliness and order is to be maintained at all times. Pathways and work areas in particular must be kept clear of trash, debris, and other extraneous materials.
- Appropriate clothing and equipment should be worn and utilized for the job being performed. This means, for example, loose clothing and/or jewelry should not be worn when operating machinery.

- The correct Personal Protective Equipment should be worn/utilized at all times. There is no exception to this rule, and failure to follow it will result in disciplinary action, up to and including termination.
- Do not engage in work activities that normally require training you have not received. Never deviate from the procedures outlined in your training.
- Do not use tools for purposes other than those for which the tool was intended.
- Do not use machines or equipment that is not effectively grounded. Grounding prongs shall not be removed from plugs, nor should grounding adapters be employed. Extension cords are to be used on a temporary basis only, and should not be used to power fixed machinery.
- Under no circumstances should any guard or safety device be removed during normal operations. If any procedure (for instance, maintenance on the machine) calls for a guard to be removed, full Lockout-Tagout procedures for the machine must be followed.
- Unsafe work practices and behavior should be reported to the supervisor immediately.
- When in doubt, ask your supervisor.

1.3 Safety Committee: The site Safety Committee, has been designated as the person in charge of implementing the Safety Management Program. In addition to the general duties required for administration of this program, the Safety Committee has the following responsibilities:

- Keep Management advised of all safety and health issues.
- Assist in the preparation and distribution of company policies and procedures, which relate to health and safety issues.
- Plan, organize, coordinate all safety meetings, training sessions, and ensuring that employees attend such sessions.
- Establish accident reporting and investigation procedures and maintaining all applicable training, inspection, and workplace injury and illness logs (including the OK300 form).
- Maintain an adequate supply of the proper Personal Protective Equipment (PPE), and ensure this equipment is tested on a periodic basis.
- Keep up to date on all local, state, and federal regulations regarding safety and health issues.
- Serve as the liaison between the company and all governmental/regulatory agencies that relate to safety or health issues.

1.4 Other Management Responsibilities: management personnel of all levels (including foremen/supervisors) are expected to “lead by example” and strictly adhere to all safety policies and procedures. In addition, listed below are additional areas of responsibility for management personnel.

- Maintain knowledge and awareness of all company policies and procedures relating to safety issues and regulations.
- Maintain communication with other management and administrative personnel regarding safety and health issues.
- Ensure the proper materials and resources are available for following safety procedures, and either correcting any inadequacies noted or notifying a superior of the deficiency.
- Ensure all training requirements have been met.
- Ensure that all machinery and equipment is maintained in proper working order and used in a responsible manner.
- Inspect the work area for any unsafe or unhealthy conditions or practices and correcting such situations when encountered.
- Assign responsibilities to personnel based on their training and qualifications and holding personnel accountable for their actions.
- Conduct on-the-job safety training as needed and ensure (through such training and performance observation and evaluation) that each employee is able to work in a safe responsible manner, including the proper utilization of Personal Protective Equipment (PPE).
- Offer full cooperation and assistance in accident investigation procedures to discover causes and develop corrective actions.
- Investigate all complaints or notifications of unsafe working conditions or practices thoroughly with no form of retribution or reprisal leveled towards the person(s) bringing such conditions to the attention of management.

1.5 Global Responsibilities: Listed below are the basic responsibilities for all employees.

- All employees must exhibit strict adherence to company health and safety policies and procedures.
- No guard or similar safety device is to be removed from any piece of equipment unless the action is authorized by management and undertaken in accordance with the company's Lockout-Tagout Safety Program.
- All employees will fully assist in accident investigations or area inspections as needed.
- Any unsafe or potentially harmful working conditions are to be brought to the attention of management.
- All employees will participate in and contribute to company safety meetings.
- Sound judgment will be exercised at all times when determining what the proper course of action (from a health and safety standpoint) to be followed.

2.0 HAZARD CONTROL PROGRAM

One of the most critical components of a comprehensive safety program involves the identification of potentially hazardous areas and substances at a facility, and the communication of this information to the employees. This area is of such major concern that a separate safety program, the Hazard Communication Program, has been compiled to deal specifically with these issues. In this section is a description of the Hazard Control Program, a close relative to the Hazard Communication Program, as well as, the procedures in place at Metropolitan Library System to comply with the issues addressed in this Program.

2.1 Hazard Identification: the first step, and perhaps most important step in correcting hazardous working conditions in the facility, is identifying the hazards that exist. To identify such hazards at Metropolitan Library System, periodic inspections of the site are performed on a monthly basis. These inspections are conducted by the facility's Safety Committee, or by an authorized representative appointed by the Safety Committee. The performance and findings of such inspections are documented on a Site Hazard Inspection survey form. Blank copies of this form are found in the appendices of this manual. In addition, the most current completed Site Hazard Inspection form should be kept in the appendices of this book. As each additional survey is completed, the inspection form from that survey will replace the one previously kept in the manual. Once removed, the "old" survey form will be added to the archives in the Metropolitan Library System human resource office.

2.2 Conducting the Inspections: the Site Hazard Inspection survey form is broken up into several different sections, each of which deals with a different facet of the overall safety program. For each item in the survey, note which items are in 100% compliance by putting a checkmark in the box next to the item in question. For those items in which deficiencies are noted, note which specific locations are deficient next to the item, and make no mark in the check box.

Note that when conducting a Site Hazard Inspection for large facilities or sites, which are housed in more than one building, it is advisable to perform multiple surveys, one for each "section". A separate Site Hazard Inspection survey form should be used on each "section".

2.3 Hazard Investigation: anytime a possible hazard is identified, the Safety Committee must launch a Hazard Investigation and record the findings on a Hazard Evaluation Form. Once completed, these forms are to be kept in the appendices of this manual. The findings of a hazard investigation should fall into one of three categories:

- If it is determined no hazard actually exists: the "negative findings" should be noted on the Hazard Evaluation Form, and no further action is necessary.

- If it is determined a minor hazard exists: a "minor hazard" is judged to be one that is easily rectified with a minimum 5-10 minute expenditure of time and materials/manpower with no necessity for bringing in outside assistance/contractors/consultants, and no shutdown of productivity is required to rectify the problem. In this case, the solution can be noted on the Hazard Evaluation Form once completed; no further action is necessary.
- If it is determined a hazard exists, and that hazard is not easily/immediately correctable: a Hazard Abatement Form should be prepared for each such hazard immediately, and this fact noted on the Hazard Evaluation Form. You should then proceed to Communication and Abatement.

2.4 Communication and Abatement: Once a site hazard has been investigated, verified, and determined to be outside the definition of a "minor" hazard, steps must be taken to ensure the appropriate personnel are made aware of the hazard's existence and to see the hazard is removed. As these two processes are somewhat intertwined, they will be dealt with together in this section. The following notification and action process should be followed:

- Any hazard(s) that pose an immediate threat to the safety and/or welfare of any persons should be addressed immediately, either through proper abatement, suspension of activities in the vicinity, or shutdown of equipment, as necessary.
- The Safety Committee should be aware of the situation immediately.
- The Safety Committee will decide which personnel, if any, should be notified, and consult with other management as to the proper abatement steps.
- Any temporary safety precautions (including temporary shutdowns) deemed necessary for health and safety reasons will be put in place immediately.
- The Safety Committee will take whatever steps deemed necessary to correct the hazard. Such steps include utilizing company employees or bringing in outside specialists to perform the necessary service(s), replacing worn or faulty parts, installing new equipment or safeguards, etc.
- Once the abatement process is complete, the Safety Committee will review the work and verify the hazard has been abated.
- Once the abatement procedures have been completed, the Safety Committee will verify the hazard has been eliminated and no new hazards have resulted from the abatement process.
- The Safety Committee will verify all steps have been properly documented and the Hazard Abatement Form is filled out completely. The Hazard Abatement Form should then be filed in the appendices of this manual.

3.0 ACCIDENT INVESTIGATION

Accident investigation, and accompanying investigations of "near-misses", is a vital component of the Safety Management Program. While the ultimate goal of any good safety program is to prevent accidents from occurring, it is acknowledged that accidents can happen. When those occasions arise, whether injury or damage occurs, it is the policy of Metropolitan Library System to fully investigate the circumstances surrounding the accident, determine the causes, and apply the steps necessary to prevent such events from reoccurring. The outline on the following page documents the chain of events to be followed in the event of an accident or near miss.

3.1 Accident Investigation Process:

1. Accident or Near Miss occurs
2. Agency Notification: Public Sector Employers are required to notify the Oklahoma Department of Labor whenever a fatality occurs in the workplace, or when a work-related accident or exposure results in the hospitalization of five or more workers. This report must be made in writing within 48 hours. The required Fatality Catastrophe Report Form is available on the Oklahoma Department of Labor website. Oklahoma Department of Labor may require copies of internal accident reports, Oklahoma Highway Patrol or Police Reports, and official death certificates. In the event of an accident, the Safety Committee, will be responsible for notifying Oklahoma Department of Labor.
3. Accident Investigation Report completed.
   Note: It is essential that this, along with other required forms, be filled out as soon after the accident as possible, while evidence and recollections remain fresh.
4. Hazard Evaluation Form completed.
5. Workers' Comp forms completed.
   Note: All facility accidents, injuries, and illnesses must be evaluated for Workers' Comp purposes.
6. Hazard Abatement Form completed.
   Note: This step is not necessary if the findings of Step (3), above, conclude there is no real hazard present, i.e., chance or circumstance rather than a failing of the facility, its training, or equipment caused the accident.

The detection and elimination of sources of loss through investigation is one of the most effective methods of improving the loss control record of an organization.

Once the accident sequence is set in motion, little can be done to control the degree of severity. The difference between a "near miss" and a major accident is usually a matter

of chance. Whether an employee turns an ankle or merely trips, is largely incidental. For this reason, all accidents and "near misses" should be investigated.

3.2 Logic of Accident Investigation: accident investigation is based upon the logic that:

- All accidents and losses have causes. Eliminate the causes and prevent the accident or loss.
- Accident and loss causes can be determined. Corrective actions can be developed and applied that will eliminate the causes, and prevent similar accidents or losses.

3.3 Area of Focus: in investigating accidents or losses, the following areas should be focused upon:

- How was the injury, damage, or loss incurred; exactly WHAT happened and where?
- Under what circumstances did the accident occur; in other words, WHY?
- Once the details have been reconstructed, WHAT can be done to prevent a similar accident, damage, or loss from recurring?

Prevention of recurrence is the most important goal of an investigation. Fault finding or placing blame serves no useful purpose, and is not a part of accident prevention. Prevention of similar occurrences is accomplished through correcting procedures and conditions, as well as, through training.

3.4 Benefits of Accident Investigation:

- Prevent accident recurrence.
- Eliminate economic loss resulting from faulty workmanship, damaged equipment, or injured employees.
- Create an awareness of problem areas.
- Discover how methods and procedures can be improved.
- Identify additional items to be included in future inspections.

3.5 Accident to Be Investigated: Any accident that causes even a "minor" accident that has serious potential should be investigated. The time spent will vary according to how serious, in terms of: production loss, injury, potential for future recurrence, and the complexity and extent of the causes. In other words, all accidents should be investigated to some extent.

3.6 Investigation Personnel: usually, the immediate supervisor of those involved should investigate. The immediate supervisor:

- Knows the most about the operation, employees, and the situation;
- Has a personal interest in identifying accident causes (the supervisor views accidents as affecting "my" workers and operation);

- Is able to take immediate action to prevent an accident from recurring.
- Is responsible for the existence of safe operating methods and work conditions
- Is trained in accident investigation

3.7 When to Investigate: while it seems obvious that accidents should be investigated immediately, in many cases, time elapses before a thorough investigation is carried out. Accidents should be investigated promptly because:

- Facts are fresh in the minds of witnesses and those involved in the accident;
- Witnesses have not had a chance to talk and influence each other's thinking;
- All physical conditions remain the same;
- People are still available;
- Quick response will show management's concern for reporting, investigating, and taking corrective action.

3.8 Where to Investigate: all investigations should be made where the accident occurred, if possible. At the scene of the accident are the conditions, equipment, employees, and circumstances that give direct evidence of clues to underlying causes. Investigations should not be carried out in the supervisor's office or in any place other than the scene of the accident (when feasible).

3.9 What to Investigate: there are a number of weaknesses in accident investigations. One primary weakness is the investigator only looks at the obvious conditions and facts; often many related causative factors go unnoticed. A thorough accident investigation involves exploring:

- The physical conditions, e.g. site condition, weather, equipment;
- The employees, e.g. emotions, health, attitudes;
- Other factors, e.g. rush jobs, overtime, shorthanded operations, previous near misses.

3.10 Conducting an Investigation Interview: the first step in a normal accident investigation is to interview the person(s) involved. Generally, the interview should be conducted according to the following steps:

- Put the person at ease. Emphasize prevention as your goal, not blame.
- Conduct the interview at the scene of the accident (if feasible).
- Ask employees or witnesses their version of the accident. Let the person tell the story without interruption.
- Ask any necessary questions. Avoid any "why" questions at this point; they tend to make the employees defensive.
- Repeat the employees or witnesses' story, as you understand it. This assures you understand, and it allows the person to correct the story, if necessary.

- Close the interview on a positive note. This reaffirms the purpose of the interview and sets the tone for the rest of your investigation.

Great care not to question an upset individual who has just sustained an injury or emotional shock should be exercised. Wait until the person calms down, or the doctor or nurse gives permission.

An accident investigation report is a written report of the findings of an accident investigation, and is often written on a preprinted form**. FILLING OUT AN ACCIDENT INVESTIGATION FORM IS NOT AN INVESTIGATION,** although many people treat it as one. However, the form can serve as a guide for determining what the investigation should reveal.

Preparing a good report is important, because it provides both the details and recommendations. The report presents an opportunity to relay to management what actions are needed and provides the information necessary to justify the expenses associated with the remedies.

The report must include the "Immediate" and "Basic Causes". "Immediate Causes" are those unsafe conditions or acts, which are closest to the accident (i.e., the extension cord lying on the floor that tripped an employee, or the poor lighting that caused an employee to fall). "Basic Causes" are those underlying causes that allow the immediate causes to exist. To determine the basic cause, ask the question, "Why did the unsafe condition exist, or why did the unsafe act take place?"

4.0 ACCIDENT ANALYSIS

Once management has discovered the cause(s) of an accident through investigation, the problem can be analyzed, then a solution can be developed that will help avoid a similar accident in the future. By grouping accident investigation reports and accident records, common causes or trends can be determined. Once the causes or trends are evident, remedies can be applied to control them. Applying the proper remedies will decrease the possibility of similar accidents occurring in the future.

4.1 Analysis Process: efficient analysis can be achieved by using the following process.

- ASSEMBLE information taken from accident investigation forms and accident records.
- GROUP similar information, and try to determine if there is a pattern of accident cause/trends.
- IDENTIFY source of loss, areas, etc., on which to concentrate.
- STUDY possible solutions to the problem.
- DETERMINE alternatives (remedies) that can be applied to prevent recurrence of this type of accident.
- SELECT the most appropriate alternative.

4.2 Application of Findings: once a remedy is selected, it must be applied. If loss prevention is to be effective, efforts must be directed towards the chief sources of loss (or potential loss). These sources may relate to particular operations or departments, to areas within your shop, or to types of accidents or injuries.

5.0 RECORDKEEPING

5.1 Requirements: In addition to the forms required by this plan, the following materials are to be kept:

- All documents reflecting communication between management and employees on safety-related issues, such as memos and letters to employees on safety-related issues.
- Documentation regarding new employees' orientation sessions and all training records.
- Reference materials that form the basis for safety-related decision-making. These could be pamphlets or materials from safety, trade or professional organizations.
- Oklahoma Department of Labor forms OK300, OK300A, and OK301.

6.0 COMMUNICATION

It is vital to recognize that open communication between management and employees on health and safety matters is essential. The following communication/information sharing system has been put in place to establish a continuous flow of information between management and employees.

6.1 Orientation: all new employees will be introduced into the company's safety and health policies and procedures, and will not be allowed to assume their roles until all necessary training has been completed.

6.1 Bulletin Boards: important information about health and safety topics, such as upcoming meetings, identified (and uncorrected) hazards, etc., will be posted to keep employees informed.

6.2 Safety Meetings: safety meetings on a variety of topics will be held on a regular basis to maintain the "safety ethic". Suggested topics and additional material on conducting safety meetings is covered below.

6.3 Employee Suggestions: input from the employees is always appreciated, and all reasonable suggestions and complaints will be given serious consideration. In particular, no employee will be punished for reporting a hazardous situation or complaining about a safety issue, even if a hazard investigation reveals the complaint is baseless. Provisions will be made for gathering employee feedback, either through reporting to the employee's supervisor, use of a suggestion box, or formal recognition of an idea at a safety meeting.

7.0 SAFETY TRAINING

Safety training has become an increasingly important part of every supervisor's job. Workers need ongoing training to be able to handle their jobs correctly, efficiently, and safely. Not just training, as required by a standard, but training over every aspect of their job duties. In addition, many companies now expect workers to be able to perform a wider variety of tasks.

7.1 Lack of Training: lack of training, especially safety training, is very costly. Unsafe procedures are often reflected in poor and inefficient work habits, which make productivity and quality improvements hard to achieve. They may cause the employer to fall behind in today's very competitive marketplace. Workers and their employers pay dearly; lost workdays, sick pay, insurance payments, and workers' compensation costs add up quickly for companies of all sizes. In addition, the cost of both insurance and workers' compensation is always increasing, which forces the employer to look harder for ways to reduce work-related claims and costs. The money that goes for those payments is not available for other, very important items of service, such as safety.

7.2 Training Evolution: complicating matters is the fact that safety training cannot become a static process. No longer can employees be trained on a few topics and be sent on their way. Safety training and employee knowledge must evolve over time due to the passing of new governmental safety regulations and the hastening enforcement of both new and old regulations.

7.3 Safety Training Regulations: safety training is no longer a voluntary program. Programs such as these are necessary to reduce the increasing costs of insurance and possible litigation.

In fact, safety training is mandatory for almost every company because of the many laws and regulations that have been issued by federal and state governments in recent years governing workplace safety. The Occupational Safety and Health Administration (OSHA) has thousands of standards that affect the operations of every type of industry. In addition, if something doesn't fall under a specific standard, PEOSH also has what's known as the **"General Duty Clause"** of the Occupational Safety and Health Act of 1970. This all-inclusive regulation states that:

- *Each employer shall furnish to each of his employees employment and a place of employment, which are free from recognized hazards, that are causing or likely to cause death or serious physical harm to its employees.*
- *Each employee shall comply with occupational safety and health standards and all rules, regulations and orders pursuant to this Act, which are applicable to his own actions and conduct.*

7.4 Supervisors: Supervisors and safety committees have a major responsibility for carrying out all company safety policies and initiatives. They are on the scene and able to identify when workers are complying with safety procedures and when they are not.

First-line management personnel have an extremely complex task of making sure workers are able to do their jobs in a way that promotes safety, while maintaining a level of productivity and minimizing risk.

Your company has comprehensive training for major programs such as Hazard Communication, Lockout/Tagout, and Bloodborne Pathogens. However, there are many safety regulations and perhaps even more safety risks on the job. Although the programs are very comprehensive, alone they are not enough to ensure worker safety. In order to maintain a safe workplace, safety has to be taught and reinforced on an ongoing basis. This is where safety meetings come into play.

7.5 Make Room for Safety: your initial reaction to management may be to wonder how you are going to fit safety into your overloaded list of responsibilities. You will discover that it does not take much time; especially once you gain more experience. You may even find that safety training solves more problems than it creates. The abundance of government safety regulations makes safety training more important every year. Your company is required to provide workers with a safe working environment and the training they need to protect themselves from hazards and accidents. Everyone is expected to participate in the company's effort to meet those requirements.

7.6 Training Is Not Enough: safety regulations do not only mandate training; they also require that workers follow what they have learned on the job. A company that trains workers in some aspect of safety, such as using appropriate protective clothing, but then does not enforce the use of such clothing on the job, will have serious legal responsibilities in the event of an inspection. Of course, when workers do not practice safety, they are more likely to injure themselves, expose themselves to hazardous substances, or otherwise endanger themselves and others. That is why safety meetings are a critical part of the Safety Program for Injury and Illness Prevention. They are the best means for ensuring that each individual worker knows how to do each part of his or her job safely while continuing to use that knowledge every day.

8.0 SAFETY MEETINGS

8.1 Safety Meetings: safety meetings provide opportunities to focus on specific hazards, operations, and attitudes. They allow the safety committee and supervisors to select topics and formats specific to the needs of the employees. Safety meetings can be formal, pre-announced group presentations using videos, expert speakers and other planned aids. They can be brief, informal one-on-one or small-group discussions, and demonstrations designed to deal with problems or knowledge gaps that have been identified. Small group

meetings provide supervisors and safety committees with the opportunity to determine the strengths and weaknesses of their operations and their workers. Safety meetings have the important function of providing employees a place in which they may present their opinions. Often employees have knowledge they have gained throughout years of service or experience that make solutions to problems easier to determine. In addition, by including employees, you develop a sense of responsibility and self-worth that can only contribute positively to your overall employer-employee relationships.

8.2 Safety Meeting Outlines: this manual contains a set of safety meeting topics that cover a wide variety of safety situations and issues. They range from general employee safety responsibilities; to the safe use of hand tools; to personal protective equipment; to introducing a new machine or hazardous substance. These meeting topics are designed to be short and flexible. They are intended to reach the widest range of situations and groups. You should add details from your own operation to the existing outlines or develop additional outlines based on the samples provided. You can copy these sheets for workers attending the meeting to be used as a review tool and as an on-the-job reference guide.

8.3 Planning Safety Meetings: when you plan a safety meeting program, you must structure it to meet the specific needs, strengths, and weaknesses of your workers. You have an advantage over outside safety professionals because you know your audience and can determine what approach will work best for them.

8.4 Know Your Audience: as you start to plan the type, length, and format of your safety meetings, here are some things to think about:

- **Age:** workers of all ages need to learn and practice safety.
- **Educational level**: if you have workers with limited formal education, or workers who do not speak English, you will have to adjust your program to allow for these employees. Be alert to your workers' ability, or inability, to understand written instructions and to comprehend English. Do not embarrass them, just be sure you are presenting information in a way they can understand. You may need to have a one-on-one session or incorporate the help of a translator to assist these employees so they fully understand your message.
- **Experience:** again, you have to tailor your message to your audience. If workers are relatively inexperienced, you will have to take a slow, systematic approach and limit each safety meeting to a very narrow topic area. Otherwise, you will overload them with too much information. Experienced workers should understand your references to equipment and procedures, allowing you to focus more on the safety aspects. However, experienced workers are more likely to resist changes in the way they do their jobs, so you will have to sell them on safety and the legal issues. If your group

is a mix of experienced and inexperienced workers, you may want to consider asking some of the senior workers to participate in parts of your presentation. This will allow you to tailor basic elements of the meeting to the less experienced group and get the more experienced workers to contribute without becoming bored. It may help to reinforce the experienced workers' recognition of and commitment to the importance of safety.

- **Length of Meetings:** how long an attention span do your workers have? How long can they sit still and concentrate? How much can they absorb at once? You will have to answer these questions to determine how often you can have safety meetings and how long they can last. The meeting format is a factor in determining meeting length. People cannot sit and concentrate for long lectures and videos unless the program involves them directly. Another factor, and perhaps the biggest, is how long you can keep your workers off the job without seriously disrupting operations and upsetting deadlines.

- **Prior Safety Training:** the more safety training workers have received, the easier each subsequent meeting becomes. Once workers understand certain safety basics and incorporate them into their jobs and work styles, it is not difficult to add new procedures.

- **Attitudes:** if you have workers who are hostile to you, the company, their jobs, and/or the meeting topic, safety meetings can be difficult or even impossible. These workers will attend meetings only because they are required. You can expect that they will be reluctant to participate in discussions and practice sessions.

  If you have this problem, address the situation before the beginning of the session. Allow workers to express their feelings and ask them to keep an open mind. Again, your best bet here is to emphasize these meetings benefit them by making their workplace safer.

8.5 Kinds of Safety Meetings: safety meetings come in all types and sizes, but most can be viewed as either formal or informal meetings.

- **Formal Meetings:** all successful safety programs should include some formal meetings that are planned and announced in advance to provide groups of employees with information and training on specific issues, regulations, procedures, and hazard protection. The agenda to be covered in the meetings may come from your observations of training needs and gaps in safety procedures and regulations. If you carry out periodic inspections to identify hazards and dangerous work practices on the job, you will have an ongoing list of potential safety meeting topics. Company accident and injury records are another source of guidance for safety meetings. Does

your OK300 log show an abundance of eye injuries? It may be because goggles are not being worn. Any trend in the data you collect can be a potential topic.

Be flexible, even when you work out an advance schedule of safety meetings, other situations that call for safety meetings are likely to emerge. They may include:

- Recent accidents or near misses;
- Changes in company or group safety trends;
- New equipment, techniques, procedures, products, or hazardous substances management directives to emphasize company, legal or insurance, requirements.

➢ **Informal Meetings:** in addition to formal meetings, informal meetings are needed as well. You have to be alert to opportunities for informal training of small groups in response to habits and actions you observe on the job.

Many of these informal, "tailgate" or "toolbox", meetings can still be planned. If you have noted a recurring problem among several employees, you can mentally assemble information on the correct procedures. When the employees are working on a related task, step in and provide some hands-on direction to show them how to do the job safely. Each succession should focus on only one topic.

Keep these meetings short, not more than 5 or 10 minutes, and have them frequently. This makes the meetings seem like part of the regular routine, rather than criticism and discipline, and it allows you to have opportunities to highlight safety.

8.6 Other Meeting Opportunities: observations are not the only method for choosing material for a safety meeting. One possibility is to hold an annual or quarterly safety review to go over what has been covered in training. Point out how it has translated into improved safety or productivity on the job. If such gains have not been realized, reviews are even more necessary. In addition, you may wish to include safety in meetings called for other purposes. The more frequently a message is communicated, the more likely employees will remember it.

Look for ways to continually tie the safety message to workers' daily activities. For instance, you can review the basics covered in a recent safety meeting by pointing out how they were followed, or ignored, recently on the job. Although you may bring up some "sore" points for your employees, it is important that they look at safety as positive. It is important to get workers to view safety as a helpful tool. It also pays to seek occasions to praise workers for incorporating safety on the job. Many companies give prizes or awards for achieving a certain number of accident-free days or months. You may want to reward groups, as well as, individuals. Have an annual or quarterly lunch or a "doughnuts and coffee" session. Hold impromptu sessions to honor workers who have done an outstanding job with safety, such as cleaning up a hazardous spill correctly.

These "events" do not have to be expensive or elaborate. You can present the group or individuals with certificates, plaques, T-shirts, mugs, or other items honoring their achievement; or you can just credit them publicly for their efforts.

8.7 Choosing a Safety Meeting Format: plan the format for each safety meeting to meet your overall objective and to get your particular topic message across. You will probably use different formats for different topics. Here are the most common methods and tools used in this type of training.

- **Lectures:** lectures should be only a part of your program. It is a good way to define the purpose of your meeting, to outline what you will cover, and how long it will take. It should not be the only method of explaining the material unless it is a very short meeting on a very limited and specific topic. Lectures are usually best when broken up with audiovisuals, discussions, or hands-on participation.

  Remember, you are not the only possible person to address the meeting. Your company's higher management or other supervisors may be willing to participate. You may want to invite them to provide an introduction that underlines the importance of good safety practice to the company. Outside experts on such topics as emergency response or hazardous waste can provide valuable information and examples. Perhaps, you can get a representative from your equipment manufacturer to demonstrate how a new piece of equipment works. Often, they are more than willing to provide this service.

  If you are going to be the main speaker, try to outline what you want to say, rather than reading a whole presentation. This makes you seem more flexible and receptive. Look directly at your audience as you talk. This allows you to be more conversational and more interesting.

- **Audio Visual Presentations:** audiovisual presentations are a good way to get people's attention and to demonstrate both the potential problems posed by your topic and the correct way to do things. Slides, videotapes, and films are available on many safety topics. These tools make an effective contribution to a safety meeting. Some audiovisual aids come with workbooks and other materials designed to reinforce learning. You have the option of ordering packaged audiovisual materials or creating your own.

  If you have a 35mm camera or a video camera, you may make any topic more relevant by illustrating it with slides or videos of your work area. Take pictures of equipment, procedures, or situations that you would like to be the focus of your discussion. If you are planning a safety talk on housekeeping, take pictures of good and bad examples within your facility. The message is more personal when people see themselves, their work area, and equipment highlighted in this way. Please note that

a safety meeting is not a place to reprimand employees for deficiencies, it is a time to learn, so do not insult your employees.

Your company may wish to seek out safety suppliers as another possible audiovisual source. Check to see if they have any materials on hand or products they recommend. A large flipchart and felt-tipped marker are useful for highlighting or outlining information during the safety meeting.

- **Programmed Instruction:** programmed instruction reading material and written exercises can be effective supports to the other parts of your safety meeting. If your audience is accustomed to reading, use books and workbooks to reinforce the learning to test how well workers have absorbed the information.
- **Demonstrations:** demonstrations should be included whenever possible. Show the correct way to perform an operation. Use real labels or material safety data sheets when going over that particular information. Have protective clothing and equipment with you as an example. Real-life examples are an excellent way to tie the training to on-the-job application.
- **Hands-On Practice:** hands-on practice is recommended whenever possible. It gives workers a chance to try out the methods, equipment, or techniques you are covering. It gives you a chance to see how they use the methods and allows you to make corrections on the spot in a controlled environment. When you are conducting a session that includes hands-on practice, take the employees through each step of the material. First explain the procedure, and then demonstrate. Highlight key points, and then allow each employee to try. If there seems to be a general difficulty with some specific task or concept, go back to the beginning and demonstrate again, and then ask for questions. Do not move on until all workers have had a chance to try to master the new skill. Give immediate feedback on what they are doing right and immediate assistance when they are having difficulties. Then follow up within a few days to see if they still know how to do the task correctly or if they have any questions.
- **Discussion:** discussion is an excellent way to find out whether workers understand your message and to respond to any questions or problems. If possible, involve management, supervisors, and/or outside experts in discussion sessions. It is important that you or the other leaders always control the discussion so that reinforcements can be made. Here are a few hints for effective discussions:

    - Always Answer Questions: if you do not have the information, make a note of the question, find out the answer, and get back to the person as quickly as possible. This demonstrates the high regard in which the meeting is held.

    - Prepare Ahead: open discussion does not always come easily. Prepare questions to get the ball rolling. If no one volunteers an answer, call on people individually to respond.

- Don't Pass Judgment on Answers: if someone gives an incorrect response, correct it without comment. If the question calls for a matter of judgment, give people a chance to voice different opinions. Perhaps an informal vote on how to handle the problem may be in order.

- Compliment Good Responses or Observations: you do not have to get carried away, but be sure people get positive feedback when it is deserved.

- Keep to the Topic: it is easy to get side tracked on side issues, such as a recent football game. Stay focused on the safety topic at hand.

- Continually Relate What You Are Discussing to the Job: ask participants for examples of related problems. Ask employees if they have had situations like the one you are discussing. Ask them to give details about how they handled the situation. These situations are important because some employees may not be able to bridge the gap between discussion and application.

  Use discussion periods to get a feel for how well participants understand the general and specific areas covered by the meeting. Determine whether you need to go back over the material.

- **Handouts:** handouts are a very useful on-the-job reminder, but do not hand them out until the end of the session. They will be a distraction to participants. Examples of useful handouts include a copy of the agenda you have covered, an outline of the topics, a safety newsletter, or a prepared list of safety tips on the subject.

8.8 Schedules: setting a schedule for safety meetings allows you to plan, get approvals, and assemble information and materials. Planning usually means a more effective meeting. Companies vary on how much authority they grant safety Committees or supervisors to plan and execute safety meetings. Sometimes the directive to schedule meetings will come from management or from company safety managers. If you are asked by management to plan and conduct meetings, work with your manager to develop a list of topics and times.

Be sure you follow your company's policies and get approvals from all required parties. Going through approved channels with a schedule of safety meetings helps meet important company objectives, and can provide you with valuable recognition from management. Failing to follow policy can create unnecessary problems and slow safety training. Even if you are developing a schedule on your own, it is a good idea to run it past your supervisor. He/she may suggest additional topics or may be able to provide assistance in one of the programs you have planned. He/she may have some objection to something on your schedule, and it is better to discover these things early so you can work them out.

Try to plan your safety meetings several months ahead. You might change the schedule as new issues emerge. An advance schedule helps you to think about what you want to cover and to look for examples, speakers, and materials that will assist you. A typical safety meeting schedule will include both topics the company identifies as important (e.g., new regulations, tasks with high accident rates, new equipment), as well as those weaknesses you have spotted on your own (e.g., use of respirators, lockout procedures, material handling).

8.9 Setting Your Objectives: every safety meeting should have its own specific objectives or results that should be achieved. You must include broader objectives that are part of the company's overall agenda. Such objectives might include:

- Developing a safety mindset among workers
- Addressing specific company safety needs
- Improving productivity by reducing accidents
- Reducing costs resulting from injury and illness
- Training employees to recognize and report hazards
- Bringing new employees into line with company safety emphasis and practices
- Training employees to recognize and avoid unsafe practices
- Training employees to automatically incorporate safety into routine work procedures
- Explaining how to prevent or minimize injuries on the job
- Training employees how to respond to emergencies
- Providing smooth and safe introductions of new equipment, procedures and substances
- Reinforcing previous training
- Achieving compliance with federal and state safety regulations

8.10 Be Specific and Clear: each actual meeting should be very specific; stating what you want workers to be able to do or know after the training is completed. Your objectives should also state how you would measure or define when the workers have actually reached that goal. For example, a company safety objective might be to train employees to prevent on-the-job injuries. And the specific meeting objective might be to train employees on how to prevent hand injuries by wearing proper protective clothing and using machine guards. The result should be that all trained employees wear gloves when required and always having machine guards in place. There should be no reported hand injuries in the next quarter.

8.11 Priorities: evaluate your meeting objectives and set priorities for specific topics that will help you meet those objectives. You cannot do everything at once, so focus on what is most important to you and your company. If a key objective is improving productivity by reducing accidents, your priority should be safety meetings on correct procedures for the operations where accidents are most frequent. If a key objective is recognizing and

reporting hazards, your meetings might be over grouping common hazards so they can be explained, demonstrated, and emphasized. Make safety meeting topics as specific as possible. It is more effective to have a meeting on using dollies and hand carts properly than on material handling safety.

8.12 Using Supervisory Knowledge: make use of supervisory personnel whenever possible. If training needs are shared, there may be opportunities to combine objectives and priorities. Consulting with other supervisors can help avoid scheduling a meeting when workers or facilities are tied up. When you are working on management approval for your schedule, consult with your supervisor on when to give advanced notice to workers about the planned meetings.

8.13 Worker Involvement: if possible, it is a good idea to let workers know your intentions. Allow them to assist you in selecting topics. If they have areas they are not comfortable with or where they feel more training is required, try to include those subjects on the schedule or at least note them for the next round of safety meetings. Once the schedule is approved, post it if company policy permits. This gives workers an opportunity to think about the topics and it emphasizes the importance you place on safety.

8.14 Notification: notify employees well in advance of the date, time, and location of the safety meeting. Give employees a time frame, and be sure to let them know if attendance is mandatory. It is usually better to schedule meetings in the morning when people are most alert. Many people are sluggish after lunch. Later in the afternoon, they may pay more attention to the clock than to the meeting program. It is recommended to schedule meetings early in the week so that the concepts can be put right to work and you can provide immediate feedback to individuals on whether they are applying their new safety knowledge correctly or not.

8.15 Attendance: confirm attendance with each individual the day before the meeting. Make sure that they sign the appropriate forms after the meeting to document attendance.

8.16 Location: decide the location of the training and make sure there are comfortable chairs for everyone. Make sure there is adequate room for any materials you want to display, audiovisual equipment, etc. Select a location where you will not be disturbed or distracted. Prepare a "Do Not Disturb" sign for the door. If necessary, reserve the training area for your use. Some safety meetings, such as those to introduce new equipment, have to be held on the plant floor. You will have to do some extra planning to make sure your meeting will not interrupt work schedules and that you will not be interrupted by other workers. Perhaps you can schedule such sessions during lunch hour and give the meeting participants a different lunch break.

8.17 Presentation Preparation: it is important to be prepared in advance for the meeting. Here are things to think about in advance:

- Assemble any equipment audiovisuals, flip charts, samples of protective clothing or material safety data sheets, handouts, etc. in advance.
- Make sure you know how to use any video equipment or that someone else is available to work it for you.
- Determine in advance how long the meeting should take and try to stick within the time frame, unless participants get involved to make it worth running longer.
- Vary your presentations. Mix your meeting styles on a regular basis by focusing one meeting around demonstration and practice, and the next around audiovisuals and discussion, etc.
- Rehearse your presentation. That way, you will be more confident and more conversational when you talk. Have an outline to refer to so you do not miss anything important. Make sure you let participants know what you will be covering and why it is important at the beginning of the meeting.
- Be enthusiastic. If you seem to be just going through the motions, workers probably will not take the training seriously.
- Think about any problems you might encounter, such as unruly or hostile participants, and decide how you will handle them.
- If you want to encourage group participation, develop questions in advance that can get discussions going. Be sure to ask open-ended questions. Ask employees for examples that relate to what you are discussing to get them involved.
- If you will be sharing the meeting presentation with others, meet with them in advance to plan who is going to do what. No matter how many people are giving presentations, one person should be in charge of the meeting to ensure the agenda is followed.
- Get to the meeting early to make sure you have everything you need. Put up any posters or charts and set up video equipment. Arrange chairs so everyone can see videos, posters, etc. If the meeting is expected to be long, have coffee or water available. Arrange for telephone messages to be taken during the meeting. If you have taken the time to organize, you will be more relaxed when the participants arrive and you will be ready to start on time.
- Focus the program on participants' jobs. Make sure they realize the training has direct impact on them.

8.18 Conducting Safety Meetings: training requires familiarity with the procedures and topics covered in the training sessions and an ability to communicate with others. In many ways, supervisors train workers all day when they provide direction on how to perform various tasks or correct employees and show them proper procedures. Training is a more focused activity than many supervisory tasks. Here are a couple of tips for keeping the meeting focused:

- Know your subject: prepare yourself by reading, talking to safety personnel and other supervisors, and observing any problems in how workers are currently dealing with the particular topic on the job. Assemble examples, materials, and anything you can think of that will help you relay your message.
- Keep it simple: you have a particular message that you have to get across to a group, so it is important to deliver that message in a way that everyone can grasp. Do not give people more than they can absorb in one meeting.

- Communication is an important part of every supervisor's job, and it is an essential skill if you want your workers to understand the importance of safety and how it fits into their jobs. It is not enough just to say the words: You have to be sure your listeners get the message. The communication skills that go into instruction and motivation are such an everyday part of your job; you may not give them much thought. Nevertheless, a great deal of study has been done to determine the skills and traits of the best communicators. You are probably aware of these many skills; others are easy to add once you are conscious of them.
- Any presentation can be broken up into two parts: what you say and how you say it. It is very important to stick to the topic. If you are sidetracked, your listeners could end up with pieces of different messages rather than the specific message of your meeting. What you say depends on your audience. You know their attitudes, their attention span, and their sense of humor, try to relate to them so that they will be more open to hearing what you have to say. Think in advance about the examples you will use to connect the topic to workers' jobs. The effectiveness of the safety meeting depends on how well you relate the concepts. Tape record a safety meeting presentation and try to listen to yourself objectively. How would you respond if you were a worker at that meeting? Would you get the message? Would you be motivated?

8.19 Effective Presentations: if you are not fully satisfied with how you sound, here are some "tricks of the trade" from professional speakers. These tips are not complicated, but they will help you be more comfortable and effective in front of an audience.

- Listening: communication is a two-way street. Your message has to reach its audience, and they have to respond in some way. So a good communicator is not just a good speaker, he or she is also a good listener. A good listener hears what the other person is saying and lets the person know that he or she has been heard. When you really listen, you not only learn a lot about your workers' knowledge and concerns. You also demonstrate that what they think and feel is important to you. A good listener:

  - Listens: do not interrupt or ask questions until the person has had his or her say.

- Looks at the Person Speaking: give the speaker the same attention you hope to receive when you speak.
- Clarifies for Understanding: be sure you understand what the other person is saying, rephrase it and ask if you understood correctly.

➢ Feedback: once you are certain that you can listen well, the next step, feedback, will be easy and obvious. You probably give feedback, praise, and constructive criticism routinely on the job; this should also be incorporated into your safety meetings. Giving feedback enables you to let your workers know you recognize them and their work. It lets you guide their work, including their safety efforts, in the proper directions.

Feedback is often underused or used improperly. It is easy to assume that people do not need a pat on the back for doing what is their job. However, if you want them to keep on doing what is right, you have to let them know that you notice and think it is important. Give credit when it is due. Say exactly what action or statement was important and why. Give credit for correct responses to questions you raise at safety meetings especially if they make the connections between concepts and on-the-job use. Give credit to good questions, too. They show the worker is paying attention and really wants to gain and use safety knowledge.

When you see workers using proper safety procedures on the job, tell them you have noticed and are impressed by their mastery of new skills and their efforts to improve your department's safety record. It is important to do this with workers who always do things properly, as well as, those who show improved safety awareness. When people are praised for behavior, they will continue to try to do a good, safe job.

➢ Constructive Criticism: sometimes you must criticize or correct your workers. Constructive criticism can, when done properly, improve behavior and learning without making the worker defensive. The key to effective constructive criticism is to focus on specific, observable, performance related behaviors and the problems they create. Do not attack an individual whose performance was faulty. Suppose that a worker’s question during a safety meeting indicates that he or she missed or misunderstood your point. Do not attack or ridicule the questioner. Correct the misunderstanding in a matter-of-fact tone. Credit the person for demonstrating interest by asking a question. Then explain that your point was apparently misunderstood and repeat it, preferably with a clear example. Ask the person to repeat the point back to you in his or her own words to make sure you got the message across this time.

If you see someone not following safety procedures on the job or using safety equipment improperly, immediately set the person straight in a helpful way. Make

your criticism out of earshot of other workers to avoid embarrassment. The point of criticism is not what was done wrong, but what should be done. Phrase your criticism in a way that assumes the person wants to do it right. If possible, lead with something positive about the worker's action ("I'm glad to see you protecting yourself by wearing gloves..."). Then (without a "but" or "however" in the middle to put the listener's guard up) explain specifically what was done wrong and why it is important. ("The substance you are working with could have potentially toxic vapors, too. You can protect yourself and the rest of us even better if you always keep the container closed when you are not using it.)

- Discipline: you may occasionally encounter a worker or situation that calls for more drastic measures. You have to take action that makes it clear that you cannot allow anyone to create a safety risk. Discipline, like the other forms of feedback, works best if it is an immediate response to a specific observed action. Of course, the punishment has to be in accordance with all of your company's protocols on this subject.

8.20 Formal Meeting Format: while each meeting should and will be different, these guidelines will help you grab participants' attention and make your meeting flow more smoothly. You will be more relaxed and confident when you get used to following a general format.

- **Begin the meeting by explaining what you will cover and why it is important:** try to use an anecdote or other "warm-up" to get people interest and relaxed.
- **Position the meeting in terms of company safety objectives:** mention any relevant safety trends at the company or in the industry or any applicable regulations. Emphasize top management's commitment to safety and endorsement of this safety meeting program.
- **Keep your tone informal during the meeting:** it encourages participants to feel less distant and more involved in what is occurring. A little humor may be appropriate, especially in a long meeting, where workers may begin to feel overwhelmed by all they are learning. Let them know you appreciate their time and effort.
- **Stick to your agenda:** be flexible enough to respond to questions or concerns you have not considered. If questions and concerns are voiced on a certain topic, note it as one that might require its own safety meeting.
- **Give examples of violations of safety rules and their consequences:** be as dramatic as possible, while keeping your examples realistic. Associate the risks to which employees expose themselves and others by not following the rules and not taking advantage of the engineering controls, protective equipment, etc., available to them.
- **Summarize continually as you go along:** try to connect any "theoretical" subjects (handling spills, proper lifting techniques, etc.) with actual events or tasks in your work unit. Be sure people see the value of what you're meaning.

- **Refer to specific examples whenever possible:** demonstrate with labels, protective clothing, etc.
- **Ask regularly for examples and questions:** if anyone is skeptical about the importance or relevance of your topic, deal with it immediately. Get other workers to explain to the skeptic and the group why they think this safety issue is important to them.
- **End each safety meeting with a wrap-up that summarizes what was covered:** it is valuable to thank the participants for their interest and involvement.
- **Be specific about what you expect employees to do because of this meeting:** remind them of how what they have learned will keep them safe and healthy.
- **Plan a positive ending for the meeting:** send participants off with some encouraging words as an incentive to really put what they have learned to work on the job. If you have scheduled the next safety meeting in an ongoing program, remind them of the time, place, and topic.

8.21 Conducting an Informal Meeting: an informal safety meeting is a more casual discussion than the formal type of presentation covered previously. It may last only 5 or 10 minutes and may involve fewer people. It is less likely to include outside experts, audiovisuals, and handouts.

The informal meeting is often used to introduce a relatively simple new procedure or substance, or to correct problems you have spotted on the job. However, just because the meeting is brief and informal does not mean it does not need preparation. You do not need a detailed agenda, but you should make notes or prepare a checklist to make sure you cover everything that is important.

Once you have explained the procedure or problem, demonstrate how to do it correctly. Ask for and encourage questions and discussion, and provide opportunities for hands-on practice.

8.22 Rewarding Safety Achievements: most people think "reward" means money, or something money can buy, but that is just one type of reward. A reward is anything the individual wants to receive. It can be private or public praise, a positive memo in the personnel file, or some special privilege, as well as monetary rewards. You cannot hand out cash for safety achievements alone. It would be better for you to come up with rewards for individuals (even better, for the group) to show that you notice their safety achievements and think they are important. The following are some proven motivational techniques and rewards.

- Praise: you cannot compliment someone often enough, as long as, the praise is sincere and reflects specific good performance. “You are doing a great job” does not mean a great deal. A much better option is, “Your thoughtfulness and efficiency in

handling lockout/tagout procedures has reduced our accident rate, while keeping our maintenance right on schedule. Thanks."

- Example: encourage someone who has mastered a particular technique to share his or her expertise. Ask that person to do demonstrations during safety meetings or to help workers who are new or struggling with the task. Ask for advice on how to improve instruction so other workers will perform as well as this person. Appoint good safety performers to a plant safety Committeee.

- Challenge: some workers want constant challenges and opportunities to learn and grow. You might reward them with a chance to take courses, go to a trade show, or learn a new job.

- Suggestion systems: a suggestion system encourages workers to develop ideas that reduce hazards or improve safety on the job. This works best if it is a company-wide program with clear directions on the type of suggestions sought, special suggestion forms, and a Committeee appointed by top management to review and select suggestions for implementation.

  An effective suggestion program should acknowledge each suggestion and respond quickly so that workers know their ideas are really getting attention. When a suggestion is rejected, workers should be told why. When a suggestion is accepted, the worker should receive recognition. Some companies award a small percentage of the money that the suggestion saves the company. For safety ideas, savings are usually calculated based on elimination or reduction of accidents and injuries. Most companies with suggestion systems set a cap on the amount of money an employee can receive for a "winning" suggestion.

- Safety Contests: your company or department may want to participate in one or more of the many safety contests sponsored by the National Safety Council, local safety councils and industry trade associations. Most of these contests are based on accident statistics over a period of six months, a year, etc. The sponsoring organizations may have posters and other materials that you can use to help spur interest. Another option may be to work with other supervisors in your company to create interdepartmental safety contests. This is a great way to build team spirit within departments while raising safety performance throughout your company.

- Prizes: conduct departmental safety contests with prizes. You could have a drawing of all those who have gone a month without an accident. Give the winner a T-shirt or a free meal at a local restaurant. You might give a similar prize to employees who have not missed a safety meeting in a year, whose safety suggestion is making the work place safer, or who reported a hazard that prevented an accident or spill. Group prizes can be effective, too. Reward a team achievement with caps, T-shirts, etc.,

imprinted with the company logo or safety slogan, something that visibly links the achievement with the award.

- Recognition: spread the word on important safety achievements, such as an idea that eliminated a hazard or an exceptional period without an accident. Write a memo and post it on bulletin boards, submit the information to the company newsletter, or announce it at a departmental or plant meeting.

- Celebration: recognize group achievements with coffee and doughnuts or pizza parties to show workers you recognize and appreciate what they have accomplished.

8.23 Keeping Safety Meeting Records: it is important to keep records of all safety meetings for your reference, for your company's management, and for PEOSH and other regulatory agencies that may want to inspect your company's compliance with training requirements. Keep track of the date and topic of each meeting, as well as, who attended. This is particularly important when your meeting deals with an area where training is explicitly required by law. You do not need elaborate training records, but you do need something on paper. The easiest way to do this is to have a sign-up sheet at each safety meeting with your name, the date, and the topic at the top. Have each employee sign that he or she has attended the session. A "Safety Meeting Topics" form is included within the "Sample Forms and Resource Materials" section of this binder.

8.24 Safety Meeting Evaluation: no person or program is going to be perfect the first time. It is important to evaluate your safety meetings regularly to determine what has worked best and what needs to be improved. This can be done in several ways.

- Self-evaluation: after each meeting, review it objectively. Were you well organized? Was the group attentive? Did they ask questions and participate? How did they respond to the audiovisual components? Was the meeting the right length? Was the length acceptable? Was the meeting room a good choice for the purpose?
- On-the-job evaluation: equally important, evaluate the results back on the job. Are workers using the methods and procedures covered in the meeting? Is there an improvement in safety or a reduction in accidents?
- Participant evaluation: you may want to provide participants with anonymous questionnaires on each meeting or on the overall program. Ask what they liked and did not like about the content, presentation, length, etc.
- Tests: a test is the best way to find out if the safety meeting did the job of transferring the information. You might consider giving short written tests at the end of a session if you think your group will accept and can handle that approach. You might do informal "tests" on the job several weeks after the meeting. Ask a worker to perform a procedure that you covered or to describe the key information on a label.

- Cost evaluation: safety meetings can demonstrate savings in such areas as workers' compensation, insurance, and lost time due to accidents, productivity, etc. Such documentation will make all parties feel better about the program.

Use all of these evaluations, as well as, feedback from any other supervisors, safety professionals, or managers who attended the meeting to help you improve future safety sessions. Take any employees criticisms seriously. The most important result is not whether participants enjoyed the safety meeting but whether the meeting improved actual on-the-job safety. It is certainly desirable to get people interested and involved, but what is most critical is to get the message across.

Once you have considered all the evaluations, decide if you want to modify the agenda of future meetings to emphasize the approaches, demonstrations, or audiovisuals that seemed to be most effective. You may want to adjust the length of programs. If comments suggest meetings are too long, break the next topic into two shorter segments. Finally, change your schedule to include or remove topics on an as needed basis.

Now that you know why safety meetings are so important and have guidelines to follow when you plan and conduct them, you are ready to proceed with a safety meeting program that works.

APPENDIX A: EMPLOYEE FIRST REPORT OF INJURY

Instructions: Employees shall use this form to report all work related injuries, illnesses, or "near miss" events (which could have caused an injury or illness) – *no matter how minor*. This helps us to identify and correct hazards before they cause serious injuries. This form shall be completed by employees as soon as possible and given to a supervisor for further action.

I am reporting a work related: ❑ Injury ❑ Illness ❑ Near miss	
Your Name:	
Job title:	
Supervisor:	
Have you told your supervisor about this injury/near miss? ❑ Yes ❑ No	
Date of injury/near miss:	Time of injury/near miss:
Names of witnesses (if any):	
Where, exactly, did it happen?	
What were you doing at the time?	
Describe step by step what led up to the injury/near miss. (continue on the back if necessary):	
What could have been done to prevent this injury/near miss?	
What parts of your body were injured? If a near miss, how could you have been hurt?	
Did you see a doctor about this injury/illness? ❑ Yes ❑ No	
If yes, whom did you see?	Doctor's phone number:
Date:	Time:
Has this part of your body been injured before? ❑ Yes ❑ No	
If yes, when?	Supervisor:
Your signature:	Date:

APPENDIX B: SUPERVISOR ACCIDENT INVESTIGATION FORM

Name of Injured Person _____

Date of Birth _____ Telephone Number _____

Address _____

City _____ State _____ Zip _____

(Circle one) Male Female

What part of the body was injured? Describe in detail. _____

_____

What was the nature of the injury? Describe in detail. _____

_____

Describe fully how the accident happened? What was employee doing prior to the event? What equipment, tools being using? _____

_____

_____

Names of all witnesses:

_____ _____

_____ _____

Date of Event _____ Time of Event _____

Exact location of event: _____

What caused the event? _____

_____

_____

Were safety regulations in place and used? If not, what was wrong? _____

_____

Did employee go to doctor/hospital? Yes No

Doctor's Name _____

Hospital Name _____

Recommended preventive action to take in the future to prevent reoccurrence:

_____

_____

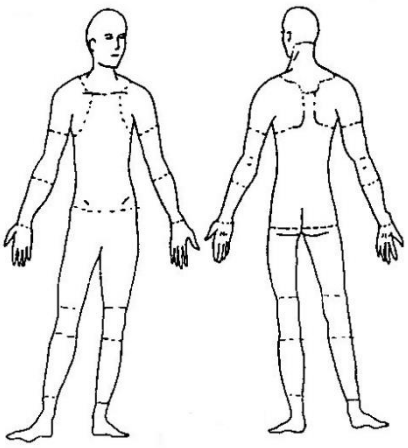
_____

Supervisor Signature _____ Date _____

APPENDIX C: SAFETY COMMITTEE ACCIDENT INVESTIGATION REPORT

Instructions: Complete this form as soon as possible after an accident that results in serious injury or illness. (Optional: Use to investigate a minor injury or near miss that *could have resulted in a serious injury or illness*.)

This is a report of a: ❑ Death ❑ Lost Time ❑ Dr. Visit Only ❑ First Aid Only ❑ Near Miss	
Date of accident:	Report made by: ❑ Employee ❑ Supervisor ❑ Team ❑ Other

Step 1: Injured Employee (Complete this part for each injured employee)		
Name:	Sex: ❑ Male ❑ Female	Age:
Department:	Job Title:	
Part of body affected: (shade all that apply) 	Nature of injury: (most serious one) ❑ Abrasion, scrapes ❑ Amputation ❑ Broken bone ❑ Bruise ❑ Burn (heat) ❑ Burn (chemical) ❑ Concussion (to the head) ❑ Crushing Injury ❑ Cut, laceration, puncture ❑ Hernia ❑ Illness ❑ Sprain, strain ❑ Damage to a body system ❑ Other _____	This employee works: ❑ Regular full time ❑ Regular part time ❑ Seasonal ❑ Temporary Time with this employer Time doing this job:

Step 2: Describe the Accident			
Exact location of the accident:			Exact time:
What part of employee's workday? ❑ Entering or leaving work ❑ Doing normal work activities ❑ During meal period ❑ During break ❑ Working overtime ❑ Other_____			
Names of Witnesses (if any):			
# of Attachments:	Written Statements:	Photographs:	Maps/Drawings:
PPE being used (if any):			

Describe, step-by-step the events that led up to the injury. Include names of any machines, parts, objects, tools, materials and other important details. Continue on attached sheets if necessary.

Step 3: Why did the accident happen?	
Unsafe workplace conditions: (Check all that apply) ❑ Inadequate guard ❑ Unguarded hazard ❑ Safety device is defective ❑ Tool or equipment defective ❑ Workstation layout is hazardous ❑ Unsafe lighting ❑ Unsafe ventilation ❑ Lack of needed personal protective equipment ❑ Lack of appropriate equipment / tools ❑ Unsafe clothing ❑ No training or insufficient training ❑ Other: _____	Unsafe acts by people: (Check all that apply) ❑ Operating without permission ❑ Operating at unsafe speed ❑ Servicing equipment that has power to it ❑ Making a safety device inoperative ❑ Using defective equipment ❑ Using equipment in an unapproved way ❑ Unsafe lifting ❑ Taking an unsafe position or posture ❑ Distraction, teasing, horseplay ❑ Failure to wear personal protective equipment ❑ Failure to use the available equipment / tools ❑ Other: _____
Why did the unsafe conditions exist?	
Why did the unsafe acts occur?	
Is there a reward (such as "the job can be done more quickly," or "the product is less likely to be damaged") that may have encouraged the unsafe conditions or acts? ❑ Yes ❑ No If yes, describe:	
Were the unsafe acts or conditions reported prior to the accident? ❑ Yes ❑ No	
Have there been similar accidents or near misses prior to this one? ❑ Yes ❑ No	

Step 4: How can future accidents be prevented?
What changes do you suggest to prevent this accident/near miss from happening again? ❑ Stop this activity ❑ Guard the hazard ❑ Train the employee(s) ❑ Train the supervisor(s) ❑ Redesign task steps ❑ Redesign work station ❑ Write a new policy/rule ❑ Enforce existing policy ❑ Routinely inspect for the hazard ❑ Personal Protective Equipment ❑ Other: _____
What should be (or has been) done to carry out the suggestion(s) checked above? Continue on attached sheets if necessary.

Step 5: Who completed and reviewed this form? (Please print)	
Written by:	Title:
Department:	Date:
Names of investigation team members:	
Reviewed by:	Title:
Department:	Date:

APPENDIX D: SAFETY MEETING SIGN-IN SHEET

Meeting Topic: _____ Date: _____

Meeting Time: _____ Meeting Place: _____

Conducted by (Name and Title): _____

Subject(s) Discussed: _____

_____

_____

_____

_____

_____

Attendees:

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

Approved By: _____ Date: _____

APPENDIX E: WORKERS COMPENSATION FORMS

See Next Page

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PURPOSE

To inform employees of the hazards associated with bloodborne pathogens and the procedures for handling exposures

SCOPE

This program applies to all employees who may be exposed to bloodborne pathogens. Specifically, this includes:

Job Title	Department / Location
Library Staff	Office, Library, restrooms
Facilities Maintenance Staff	Office, Library, restrooms, parking lot

1.0 EXPOSURE DETERMINATION

1.1 An exposure incident, as defined by PEOSH, means a specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious material that results from the performance of an employee's duties. If an exposure should occur, the immediate supervisor or nearest manager shall be immediately informed so that the proper course of action can be followed.

2.0 COMPONENTS OF EXPOSURE CONTROL

2.1 Possible exposures: the Metropolitan Library System shall ensure that the work site is maintained in a clean manner. Employees could possibly be exposed:

- during clean up operations from sharp metals and/or broken glass
  - They shall not pick up this material with their hands.
  - It shall be cleaned up using mechanical means, such as a shovel or tongs, or by wearing heavy leather gloves.

- while rendering First Aid
  - Protective gloves shall be worn while administering first aid

2.2 Accident guidelines: universal precautions shall be observed to prevent contact with blood or other potentially infectious materials while rendering aid or any other activity where an employee is exposed to blood or body fluids. The employer shall have available a bloodborne pathogen spill kit and personal protective equipment for universal precaution protocol at no cost to the employee. Each job site shall have available hand washing facilities or antiseptic solution/wipes and shall have immediate access to emergency facilities, or first aid trained personnel who will provide emergency care.

2.3 Handling: all blood and body fluids shall be considered potentially infectious materials. Appropriate PPE will be provided (at no cost) and used when handling potentially infectious materials. All procedures involving blood or other potentially infectious materials shall be performed in such a manner as to minimize splashing, spraying, and spattering of these substances. All contaminated bandages and cleaning materials shall be placed and labeled in leak proof bags / containers for handling, storage, and transportation. These bags / containers shall be deposed as regulated waste and not as regular trash. All sharps are to be disposed of in acceptable sharps containers that are puncture resistant with a tight-fitting lid or seal and a proper label.

2.4 Decontamination: all equipment or environmental surfaces after contact with blood, body fluids, or other infectious materials shall be cleaned and decontaminated with 10% bleach to water or antiseptic solution by trained personnel.

2.5 Regulated Waste Disposal: Regulated waste is placed in containers that are closable, constructed to contain all contents and prevent leakage, appropriately labeled DO NOT RECYCLE, or color-coded red or red-orange, and closed prior to removal to prevent spillage or protrusion of contents during handling. All contaminated sharps are discarded immediately or as soon as feasible in sharps containers that are closable, puncture-resistant, leak proof on sides and bottoms, and labeled DO NOT RECYCLE. These containers are not to exceed 2/3 capacity before proper disposal.

2.6 Laundry Procedures: Laundry contaminated with blood or other potentially infectious material will be handled as little as possible. Contaminated laundry will be bagged and containerized at the location where it was used, and it will not be sorted or rinsed in the location of use. All employees who handle contaminated laundry will utilize personal protective equipment to prevent contact with blood or other potentially infectious material. Contaminated laundry will be laundered by a professional method. If contaminated laundry is to be cleaned by an outside source, Metropolitan Library System will inform the outside service of the requirements in 29CFR1910.1030 (d).

2.7 Hepatitis B Vaccination: The hepatitis B vaccination series is available at NO COST within ten (10) working days of initial assignment to employees identified in the exposure determination section of this plan. An employee may choose to decline the vaccination; the employee must sign a declination form (waiver). Employees who initially decline the vaccine, but who later wish to have it may then have the vaccine provided at NO COST. The vaccine will be administered by the appropriate medical clinic. The Human Resource Department is responsible for ensuring the vaccine has been offered and waivers signed for each employee. Metropolitan Library System will not make participation in a pre-screening program a prerequisite for receiving Hepatitis B vaccination.

2.8 Post-Exposure Evaluation and Follow-up: All exposure incidents will be reported, investigated, and documented. When the employee/customer incurs an exposure incident, it will be reported to the Human Resource Department within 24 hours of the incident. Following a report of an exposure incident, the exposed employee/customer will immediately receive a confidential medical evaluation and follow up.

The source individual's blood will be tested as soon as feasible and after consent is obtained in order to determine HBV and HIV infectiousness. If consent is not obtained, the Human Resource Department will establish that legally acquired consent cannot be obtained. When the source individual is already known to be infected with HBV or HIV, testing for the source individual's known HBV or HIV status need not be repeated. Results of the source individual's testing will be made available to the exposed employee, and the employee will be informed of applicable laws and regulations concerning

disclosure of the identity and infectious status of the source individual. Collection and testing of blood for HBV and HIV serological status will comply with the following:

- The exposed individual's blood will be collected as soon as feasible and tested after consent is obtained.
- The blood sample will be preserved for up to 90 days to allow the employee to decide if the blood should be tested for HIV serological status. However, if the exposed employee elects to have the baseline sample tested during this waiting period; perform testing as soon as feasible.
- The employee will be given appropriate counseling concerning precautions to take during the period after the exposure incident. The employee will also be given information on what potential illnesses to be alert for and to report any related experiences to appropriate personnel.

2.9 Administration of Post-Exposure Evaluation and Follow-Up

2.9.1 Information Provided to the Healthcare Professional: The Human Resource Department will ensure that the health care professional responsible for the employee's Hepatitis B vaccination is provided with the following:

- A copy of 29 CFR 1910.1030, Bloodborne Pathogens Standard;
- A written description of the exposed employee's duties as they relate to the exposure incident;
- Written documentation of the route of exposure and circumstances under which exposure occurred;
- Results of the source individuals blood testing, if available; and
- All medical records relevant to the appropriate treatment of the employee including vaccination status.

2.9.2 Healthcare Professionals Written Opinion: The Human Resource Department will obtain and provide the employee with a copy of the evaluating health care professional's written opinion within 15 days of the completion of the evaluation. The health care professionals written opinion for HBV vaccination will be limited to whether HBV vaccination is indicated for an employee, and if the employee has received such vaccination. The health care professionals written opinion for post exposure follow-up will be limited to the following information:

- Whether the Hepatitis "B" Vaccine is indicated and if the employee has received the vaccine, for evaluation following an exposure incident and the employee has been informed of the results of the evaluation, and

- The employee has been told about any medical conditions resulting from exposure to blood or other potentially infectious material. This opinion will not reference any personal medical information.

3.0 TRAINING

3.1 Training and training records: Training will be conducted before initial assignment and will have yearly refresher. Training records will include the following information:

- The dates of the training sessions
- The contents or a summary of the training sessions
- The names and qualifications of persons conducting the training
- The names and job titles of all persons attending the training sessions
- Training records will be maintained for 3 years from the date of training

3.2 Availability: employee training records and the exposure control plan will be provided upon request for examination and copying to employees and their representatives.

4.0 RECORDKEEPING

4.1 Medical records: accurate records will be established and maintained for each employee with occupational exposure. This record shall include:

- The name and social security number of the employee
- If applicable, a copy of the employee's Hepatitis B vaccination status, including the dates of all Hepatitis B vaccinations and any medical records relative to the employee's ability to receive vaccination
- A copy of all results of examinations, medical testing, and follow-up procedures
- The employer's copy of the healthcare professional's written opinion
- A copy of the information provided to the healthcare professional

These records will be kept for the duration of the employee's employment plus 30 years.

4.2 Confidentiality: Metropolitan Library System will ensure that all employee medical records are kept confidential and are not disclosed or reported, without the employee's express written consent, to any person within or outside the workplace except as required by law. The records will be maintained for the duration of employment plus 30 years.

4.3 Transfer of records: whenever Metropolitan Library System ceases to do business, the employer shall transfer all records subject to this section to the successor employer. The successor employer shall receive and maintain these records. Whenever Metropolitan Library System ceases to do business and there is no successor employer to receive and maintain the records subject to this standard, the employer shall notify affected current

employees of their rights of access to records at least three (3) months prior to the cessation of the business.

APPENDIX A: HEPATITIS-B VACCINATION INFORMED REFUSAL

Inactivated Hepatitis-B vaccine is now available. The safety and efficacy of the vaccine have been extensively tested. After a series of three intramuscular doses of Hepatitis-B vaccine given in the deltoid muscle over a six-month period, greater than 90% of healthy adults developed protection against Hepatitis-B. Protection against illness was complete for persons who developed antibodies after vaccination but before exposure; however, the duration of protection and subsequent need for booster doses have not been defined. There is no evidence that the vaccine ever caused Hepatitis-B, but persons who have been infected with HBV prior to immunization may develop clinical Hepatitis despite vaccination. The vaccine against Hepatitis-B is prepared from recombinant yeast cultures and is free of association with human blood products.

I understand that due to my occupational exposure to Bloodborne or other potentially infectious materials, I may be at risk of acquiring Hepatitis-B virus (HBV) infection. I have read the above information about Hepatitis-B and the Hepatitis-B vaccine. I have also reviewed the health education materials provided. I believe that I understand the benefits and risks of Hepatitis-B vaccination. I understand that I must have all three doses of vaccine to confer immunity. However, as with all medical treatment, there is no guarantee that I will become immune, that the vaccine will prevent me from developing Hepatitis-B, or that I will not experience an adverse side effect from the vaccine.

I, the undersigned_____, an employee of
(EMPLOYEE'S NAME)

_____of_____
Metropolitan Library System [City, State]

Give the following informed consent/refusal regarding the Hepatitis-B vaccination:

INITIAL IN THE SPACE PROVIDED

_____ I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring Hepatitis-B virus (HBV) infection. I have been given the opportunity to have a prescreen evaluation and to be vaccinated with Hepatitis-B vaccine, at no charge to myself. However, I **decline** Hepatitis-B vaccination at this time. I understand that by declining this vaccination, I continue to be at risk of acquiring Hepatitis-B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with Hepatitis-B vaccine, I can receive the vaccination series at no charge to me.

_____ _____
Employee’s Signature Date Employer’s Signature Date

APPENDIX B: AUTHORIZATION TO RECEIVE HEPATITIS B VACCINE

AUTHORIZATION TO RECEIVE HEPATITIS B VACCINATION SERIES

(NON-EXPOSURE REQUEST)

Employer: Metropolitan Library System

Library Manager/Supervisor Instructions:

1. If the request is because of an on-the-job exposure, complete the Injured Employee/Supervisor's First Report of Injury form and follow the instructions on the CompCHOICE Authorization to Treat Form.
2. Assist the employee in selecting the appropriate provider from the library system's CompCHOICE First Injury Provider list.
3. Complete this form.
4. Fax a copy of the completed form to Human Resources at 606-3737 (HIPAA/Confidential).
5. Send the original of this form with the employee for their initial appointment.

Employee: _____ SSN: _____
(First, MI, Last)

DOB: _____ Job Title: _____
(MM/DD/YYYY)

Home Address: _____

City: _____ OK Zip Code: _____

Work Telephone: _____ Home Telephone: _____

Name of Authorizing Manager/Supervisor (print): _____
(First, MI, Last)

Signature of Manager/Supervisor: _____ Date: _____

Title: _____

Employee Instructions:

1. Select a provider from the CompCHOICE First Injury Provider list.
2. Take the original of this completed form to that provider.
3. Read and sign the Consent and Release statement.

CONSENT AND RELEASE

I, (Employee name) _____, hereby request of and authorize the Metropolitan Library System, through the medical services provider selected by me from the available list of providers, to provide for me the series of three Hepatitis B vaccinations acknowledging that this is being provided based on my own free-will decision to do so and hold harmless the Metropolitan Library System for any reactions or ramifications as a result of receiving this series of shots. I furthermore authorize the medical services provider to notify the Metropolitan Library System's Human Resources Office of receipt of each of these vaccinations for billing and occupational health and safety record keeping and compliance. I understand that the medical services provider will not release any information indicating the presence of a disease or condition to the library system.

I HEREBY STATE I HAVE READ AND FULLY UNDERSTAND THIS CONSENT AND RELEASE

Signature: _____ Date: _____

Witness: _____

Medical Service Provider Instructions:

Bill: Human Resources Office
Metropolitan Library System
300 Park Avenue
Oklahoma City, OK 73102

Telephone (405) 606-3739

Fax: (405) 606-3737 (HIPAA/Confidential)

May-08

APPENDIX C: HEPETITIS VACCINE PROVIDERS

McBride Clinic – Occupational Medicine – West
4901 W. Reno Avenue, Suite 500
Oklahoma City, OK 73127

405.230.9250

Hours of Operation:
Monday – Friday
7 AM to 5 PM

McBride Clinic – Occupational Medicine – Edmond
3406 S. Boulevard
Edmond, OK 73013

405.230.9700

Hours of Operation:
Monday – Friday
7 AM to 5 PM

APPENDIX D: POST EXPOSURE EVALUATION FORM

This form fills the exposure recording requirements for distribution to the Employee, appropriate Healthcare Professional, and employee record folder (kept by Safety & Health Director). Three copies should be made and distributed accordingly. Also steps should be taken (if possible) to rectify a correctable situation to prevent further harm or injury.

I. Identify source individual's name and position

II. Describe the conditions surrounding the exposure. (e.g. power failure)

III. Describe all areas and routes affected by the exposure.

IV. Describe possible cause of the accident. (e.g. human error)

V. Describe the equipment involved in the exposure

Employee's Signature Date Employer's Signature Date

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SCOPE

This document contains basic guidelines and rules to help ensure the safe handling and storage of compressed gas cylinders. All employees who handle compressed gas cylinders must be trained on their proper use, handling, and storage.

Mishandled cylinders may rupture violently, release their hazardous contents or become dangerous projectiles. If a neck of a pressurized cylinder should be accidentally broken off, the energy released would be sufficient to propel the cylinder to over three-quarters of a mile in height. A standard 250 cubic foot cylinder pressurized to 2,500 PSIG can become a projectile attaining a speed of over 30 miles per hour in a fraction of a second after venting from the broken cylinder connection.

1.0 BASIC SAFETY

1.1 Selection:

- Select the least hazardous gases that will work.
- Purchase only the necessary quantities.
- Select gases with returnable containers.

1.2 Receiving: When receiving gas cylinders, they shall be inspected for the following:

- Check for leaks
- Visually inspect the cylinder for damage
- Ensure the cylinder has a safety relief device
- Ensure the valve cover and shipping cap is on
- Check for proper labeling

1.3 Damaged cylinders: If a cylinder is damaged, in poor condition, leaking, or the contents are unknown, contact your cylinder vendor and return it. Damaged cylinders should be stored outside if possible and separated from all other cylinders and fuels.

1.4 Personal protective equipment (PPE): Proper personal protective clothing and equipment shall be worn. At a minimum, eye protection and appropriate work shoes and gloves when engaged in moving or transporting cylinders.

1.5 Safety Data Sheets: Always have an appropriate *Safety Data Sheet (SDS)* available and be familiar with the health, flammability and reactivity hazards for the particular gas.

2.0 CYLINDER MARKINGS

2.1 Labels: Cylinders must be properly labeled, including the gas identity and appropriate hazards (e.g., health, flammability, reactivity).

2.2 Stamped markings: Cylinders have several stamped markings. The top mark is either a DOT or an International Code Council (ICC) marking indicating pertinent regulations for that cylinder. The second mark is the serial number. Under the serial number is the symbol of the manufacturer, user or purchaser. Of the remaining marks the numbers represent the date of manufacture, and retest date (month and year). A (+) sign indicates the cylinder may be 10% overcharged, and a star indicates a ten-year test interval.

3.0 CYLINDER STORAGE

3.1 Compatibility: Cylinders should be stored in compatible groups:

- Flammables separated from oxidizers
- Corrosives separated from flammables

- Full cylinders separated from empties
- All cylinders separated from corrosive vapors.

3.2 Storage: Store cylinders in an upright position at all times. Oxygen cylinders must be kept a minimum of twenty feet from flammable gas cylinders or combustible materials. If this is not possible, separation by a non-combustible barrier at least 5 feet high having a fire-rating of at least one-half hour is required. Cylinders must be kept away from sources of heat. Cylinders must be kept away from electrical wiring where the cylinder could become part of the circuit. Store cylinders in well-ventilated areas designated and marked only for cylinders.

3.3 Securement: Compressed gas cylinders should be secured firmly at all times. A clamp and belt or chain, securing the cylinder between "waist" and "shoulder" to a wall, are generally suitable for this purpose.

3.4 Empty cylinders: Separate empty cylinders from full ones. Close the valve and mark empty cylinders “EMPTY.” Empty cylinders should be stored as carefully as those that are full because residual gas may be present.

3.5 Cylinders not in use: Keep valves closed and valve protective caps in place when the cylinder is not in use.

3.6 Outdoor storage: Cylinders stored outdoors should be protected from weather when possible. Also, warning signs for mobile equipment such as forklifts should be posted to provide warning and prevent contact.

4.0 MOVING CYLINDERS

- Use a cylinder cart and secure cylinders with a chain.
- Don't use the protective valve caps for moving or lifting cylinders.
- Don't drop a cylinder, or permit them to strike each other violently or be handled roughly.
- Unless cylinders are secured on a special cart, regulators shall be removed, valves closed and protective valve caps in place before cylinders are moved.

5.0 CYLINDER USE

- Be sure all connections are tight. Use soapy water to locate leaks.
- Keep cylinders valves, regulators, couplings, hose and apparatus clean and free of oil and grease.
- Keep cylinders away from open flames and sources of heat.
- Safety devices and valves shall not be tampered with, nor repairs attempted.
- Use flashback arrestors and reverse-flow check valves to prevent flashback when using oxygen-fuel systems.

- Regulators shall be removed when moving cylinders, when work is completed, and when cylinders are empty.
- Cylinders shall be used in an upright position.
- The cylinder valve should always be opened slowly. Always stand away from the face and back of the gauge when opening the cylinder valve.
- When a special wrench is required to open a cylinder or manifold valve, the wrench shall be left in place on the valve stem when in use; this precaution is taken so the gas supply can be shut off quickly in case of an emergency; and that nothing shall be placed on top of a cylinder that may damage the safety device or interfere with the quick closing of the valve.
- Fire extinguishing equipment should be readily available when combustible materials can be exposed to welding or cutting operations using compressed cylinder gases.

6.0 THINGS NOT TO DO

- Never roll a cylinder to move it.
- Never carry a cylinder by the valve.
- Never leave an open cylinder unattended.
- Never leave a cylinder unsecured.
- Never force improper attachments on to the wrong cylinder.
- Never grease or oil the regulator, valve, or fittings of an oxygen cylinder.
- Never refill a cylinder.
- Never use a flame to locate gas leaks.
- Never attempt to mix gases in a cylinder.
- Never discard pressurized cylinders in the normal trash.
- Never use gas from a compressed gas cylinder for cleaning purposes.

7.0 POISON GASES

Poison gases represent a significant hazard. Special precautions not otherwise necessary become prudent when using poison gases:

- Common poison or highly toxic gases include:
  - arsine (AsH_3)
  - ethylene oxide (EtO)
  - hydrogen cyanide (HCN)
  - nitric oxide (NO)
  - phosphine (PH_3)
- Certain poison gases (e.g., Ethylene Oxide) can only be used if specific OSHA regulations (1910.1047) and safe practices are followed.
- Emergency procedures should be made clear to all involved.

- Poison gas use after normal working hours requires the approval of the Director of Facilities Maintenance or the Assistant Director of Facilities Maintenance.
- Fume hoods and other ventilation need to be tested before use and checked frequently during the project involving poison gas.
- Notify the Safety Committee before your first use of the poison gas.
- The Safety Committee should also be informed about the locations and types of poison gas in use.
- Document these procedures in your chemical hygiene plan. As with all chemicals, obtain and review the Safety Data Sheet (SDS) for the poison gas. Maintain an extra copy of the SDS in your chemical hygiene plan.
- Disposal of poison gas cylinders can often cause problems. Cylinders should be returned to the manufacturer when possible. If unable to return to the manufacturer, cylinders must be disposed of by a hazardous waste disposal company.

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PURPOSE

This program is designed to reduce or eliminate workplace exposure to crystalline silica. Exposure to crystalline silica can cause silicosis, a serious lung disease. More than one million U.S. workers, including over 100,000 in high risk settings, are occupationally exposed to crystalline silica. A wide range of industries use silica, including construction, mining, maritime, foundries, ceramics and glass manufacturing, electronics, agriculture, rock quarry/crushing, and abrasives manufacturing.

POLICY

It is the policy of Metropolitan Library System that no employee is exposed to crystalline silica above the OSHA PEL of 50µg/m^3 TWA_8. All required engineering and work practice controls are to be followed at all times.

1.0 POTENTIAL EXPOSURES

1.1 Respirable crystalline silica means quartz, cristobalite, and/or tridymite contained in airborne particles that are determined to be respirable by a sampling device designed to meet the characteristics for respirable- particle size- selective samplers.

1.2 Assessment: Supervisors are responsible for assessing exposures to silica in their work area or at their jobsite. Once an assessment has been made the appropriate controls from Table 3-1 are to be selected and followed. A re-assessment must be done if new exposures or changes to current job duties are discovered.

1.3 The following activities may cause crystalline silica dust to be present in the air:

- Sawing, hammering, cutting, drilling, grinding, and chipping of concrete or masonry
- Chipping, hammering, and drilling rock
- Dry sweeping or pressurized air blowing of concrete, rock, or sand dust
- Crushing, loading, hauling, and dumping rock
- Sandblasting
- Demolition of concrete and masonry structures
- Concrete mixing
- Working with ceramics, clay, and pottery

2.0 MATERIALS CONTAINING SILICA

2.1 A product that contains silica must be labeled if the product contains more than 0.1% silica that may be hazardous when used.

2.2 The machines used in the operations must be labeled with warning signs indicating silica is being used.

2.3 If a material or product contains crystalline silica in quantities greater than 0.1%, there must be a safety data sheet for it.

3.0 EXPOSURE CONTROL METHODS

Table 3-1 below outlines the engineering controls, work practices, and respiratory protection required for the identified tasks. Employees are to consult this table prior to beginning a task that poses a threat of exposure to silica.

Table 3-1

Equipment/task	Engineering and work practice control methods	Required respiratory protection and minimum assigned protection factor (APF)	
		≤ 4 hours/shift	>4 hours/shift
(i) Stationary masonry saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions	None	None
(ii) Handheld power saws (any blade diameter)	Use saw equipped with integrated water delivery system that continuously feeds water to the blade Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions:		
	-When used outdoors	None	APF 10
	-When used indoors or in an enclosed area	APF 10	APF 10
(iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less)	For tasks performed outdoors only: Use saw equipped with commercially available dust collection system Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency	None	None
(iv) Walk-behind saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions:		
	-When used outdoors	None	None
	-When used indoors or in an enclosed area	APF 10	APF 10
(v) Drivable saws	For tasks performed outdoors only:		
	Use saw equipped with integrated water delivery system that continuously feeds water to the blade Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions	None	None
(vi) Rig-mounted core saws or drills	Use tool equipped with integrated water delivery system that supplies water to cutting surface Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions	None	None

Equipment/task	Engineering and work practice control methods	Required respiratory protection and minimum assigned protection factor (APF)	
		≤ 4 hours/shift	>4 hours/shift
(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills)	Use drill equipped with commercially available shroud or cowling with dust collection system Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism Use a HEPA-filtered vacuum when cleaning holes	None	None
(viii) Dowel drilling rigs for concrete	For tasks performed outdoors only:		
	Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filtercleaning mechanism Use a HEPA-filtered vacuum when cleaning holes	APF 10	APF 10
(ix) Vehicle-mounted drilling rigs for rock and concrete	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector	None	None
	OR		
	Operate from within an enclosed cab and use water for dust suppression on drill bit	None	None
(x) Jackhammers and handheld powered chipping tools	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact:		
	-When used outdoors	None	APF 10
	-When used indoors or in an enclosed area	APF 10	APF 10
	OR		
	Use tool equipped with commercially available shroud and dust collection system		
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions		
	Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism:		
	-When used outdoors	None	APF 10
	-When used indoors or in an enclosed area	APF 10	APF 10

Equipment/task	Engineering and work practice control methods	Required respiratory protection and minimum assigned protection factor (APF)	
		≤ 4 hours/shift	>4 hours/shift
(xi) Handheld grinders for mortar removal (*i.e.*, tuckpointing)	Use grinder equipped with commercially available shroud and dust collection system	APF 10	APF 25
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions		
	Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism		
(xii) Handheld grinders for uses other than mortar removal	For tasks performed outdoors only: Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface	None	None
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions		
	OR		
	Use grinder equipped with commercially available shroud and dust collection system		
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions		
	Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism:		
	-When used outdoors	None	None
	-When used indoors or in an enclosed area	None	APF 10
(xiii) Walk-behind milling machines and floor grinders	Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface	None	None
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions		
	OR		
	Use machine equipped with dust collection system recommended by the manufacturer	None	None
	Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions		
	Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism		
	When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes		

Equipment/task	Engineering and work practice control methods	Required respiratory protection and minimum assigned protection factor (APF)	
		≤ 4 hours/shift	>4 hours/shift
(xiv) Small drivable milling machines (less than half-lane)	Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant	None	None
	Operate and maintain machine to minimize dust emissions		
(xv) Large drivable milling machines (half-lane and larger)	For cuts of any depth on asphalt only: Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust	None	None
	Operate and maintain machine to minimize dust emissions		
	For cuts of four inches in depth or less on any substrate:		
	Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust	None	None
	Operate and maintain machine to minimize dust emissions		
	OR		
	Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant	None	None
	Operate and maintain machine to minimize dust emissions		
(xvi) Crushing machines	Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (e.g., hoppers, conveyers, sieves/sizing or vibrating components, and discharge points)	None	None
	Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions		
	Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station		
(xvii) Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (*e.g.*, hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials	Operate equipment from within an enclosed cab	None	None
	When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions	None	None
(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: Demolishing, abrading, or fracturing silica-containing materials	Apply water and/or dust suppressants as necessary to minimize dust emissions	None	None
	OR		
	When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab	None	None

4.0 HOUSEKEEPING PROGRAM

4.1 Exposed surfaces will be maintained free of accumulation of silica dust. To minimize hazards, the following procedures will be used to clean areas contaminated with dust containing respirable crystalline silica:

- Clean floors with a wet mop, wet pickup vacuum, or a HEPA filtered vacuum cleaner. The most effective method is with a HEPA vacuum cleaner.
- Never dry sweep, dry mop, use compressed air, or use a regular vacuum cleaner. Regular vacuum cleaners are not suitable because they filter out heavy particles, allowing the finer more hazardous particles to pass into the air.
- Clean shelves with a damp sponge or a HEPA vacuum cleaner.
- Used filters should be carefully placed in a double plastic bag and disposed in the regular trash. Wear proper respiratory protection when changing filters.

5.0 AIR MONITORING

5.1 For tasks not listed in the Table 3-1, the Safety Committee will inspect each work operation to determine if employees are exposed to respirable crystalline silica at or above the action level. Indicators that an evaluation of employee exposure should be undertaken include:

- Information or observation which would indicate employee exposure to respirable crystalline silica.
- Employee complaint of symptoms which may be attributed to exposure to respirable crystalline silica.
- Changes which may result in an increase in the airborne concentration of respirable crystalline silica.

5.2 If monitoring results indicate that employee exposure is less than the action level, no further monitoring will be conducted.

5.3 If monitoring results indicate that employee exposure is at or above the action level but at or below the PEL, monitoring will be repeated within six months.

5.4 If monitoring results indicate that employee exposure is above the PEL, monitoring will be repeated within three months.

5.5 Air monitoring information will be made available to workers.

6.0 EXPOSURE LIMITS

6.1 29CFR1926.1153 sets both the action level and the permissible exposure limits for respirable crystalline silica.

6.2 The OSHA action level for respirable crystalline silica is 25µg/m^3 of air, calculated on an 8-hour time-weighted average (TWA_8)

6.3 The OSHA permissible exposure limit (PEL) for respirable crystalline silica is 50 µg/m^3 of air, calculated on an 8-hour time weighted average (TWA_8).

7.0 RESPIRATORY PROTECTION

7.1 For tasks outlined in Table 3-1, respiratory protection will be used when required. However, if the engineering, work practice, and respiratory protection in Table 3-1 is not fully implemented or for tasks not listed a hazard assessment shall be performed by the Safety Committee and additional respiratory protection may be implemented to ensure that employees are not overexposed.

7.2 When respirators are used, the Safety Committee will implement a respiratory protection program that complies with 29CFR1910.134.

7.3 All necessary respirators will be provided by Metropolitan Library System at no charge to the employees.

7.4 Where employees are required to wear respirators 30 or more days per year, medical surveillance outlined in Section 8.0 of this program will be provided at no cost to the employee.

8.0 MEDICAL SURVEILLANCE

8.1 Medical examinations will be made available to employees required to wear respirators 30 or more days per year. An initial (baseline) medical examination will be conducted upon initial assignment by a physician or other licensed healthcare professional (PLHCP) and will include:

- A medical and work history
- A physical examination
- A chest x-ray
- A pulmonary function test
- Testing for latent tuberculosis

8.2 The Safety Committee will obtain and furnish the employee with a written opinion from the examining physician containing the following:

- The date of examination
- A statement that the examination has met the requirements of 29CFR1926.1153
- Any recommended limitations on the employee's use of respirators

8.3 If the employee provides written authorization, the opinion can also contain

- Any recommended limitations on the employees exposure to respirable crystalline silica; and/or
- A statement that the employee should be examined by a specialist if the chest x-ray is classified as 1/0 or higher by the B Reader, or if the referral is otherwise deemed appropriate by the PLHCP.

9.0 TRAINING

9.1 Workers who may be exposed to silica will receive safety training to include the following:

- The health hazards associated with exposure to respirable crystalline silica;
- Specific tasks in the workplace that could result in exposure to respirable crystalline silica;
- Specific measures the employer has implemented to protect employees from exposure to respirable crystalline silica, including engineering controls, work practices, and respirators to be used;
- The contents of this section;
- The identity of the competent person designated by the employer in accordance with paragraph (g)(4) of this section; and
- The purpose and a description of the medical surveillance program required by paragraph (h) of this section. Training will be conducted by the Safety Committee. Training records will be kept in the Human Resources office for three years.

9.2 Training will be performed prior to the employee's assignment to an area where the employee may be exposed to silica. Retraining will be performed if the Safety Committee or supervision believes it is necessary to prevent or reduce exposures.

10.0 RECORDKEEPING

10.1 Training records: each training session will be documented with a student roster signed by both the students and the instructor. The roster will also contain the date, time, and location of the training class. Training rosters will be retained for at least 3 years and until replaced by a more current training session.

10.2 Exposure measurements: records of all exposure measurements and monitoring are to be retained for at least 30 years.

10.3 Medical surveillance: all employee medical records pertaining to exposure to silica are to be retained for the duration of the employee's employment plus 30 years.

10.4 Availability: All records required to be kept by this program including the program itself will be made available to the Assistant Secretary of Labor upon request. Individual medical records must be made available to the employee upon request.

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PURPOSE

This program establishes minimum standards to prevent hazardous electrical exposures to personnel and ensure compliance with regulatory requirements applicable to electrical systems. Working on equipment in a de-energized state is **required** unless de-energizing introduces an increased hazard or is infeasible. This program is designed to help ensure that energized electrical work at job sites and/or facilities is performed safely by qualified electrical workers, who are trained and provided with the appropriate safe work procedures, protective equipment and other controls.

SCOPE

This program applies to all Metropolitan Library System properties and work performed by its employees regardless of job site location.

1.0 GENERAL SAFETY

1.1 Electric Hazards: Electricity-related hazards include electric shock and burns, arc-flash burns, arc-blast impacts, and falls.

- Electric shock and burns. An electric shock occurs when electric current passes through the body. This can happen when touching an energized part. If the electric current passes across the chest or head, death can result. At high voltages, severe burns can result.
- Arc-flash burns. An electric arc flash can occur if a conductive object gets too close to a high-amp current source or by equipment failure (for instance, while opening or closing disconnects). The arc can heat the air to temperatures as high as 35,000^{o} F, and vaporize metal in the equipment. The arc flash can cause severe skin burns by direct heat exposure and by igniting clothing.
- Arc-blast impacts. The heating of air and vaporization of metal creates a pressure wave that can damage hearing and cause memory loss (from concussion) and other injuries. Flying metal parts are also a hazard.
- Falls. Electric shocks and arc blasts can cause falls, especially from ladders or unguarded scaffolding.

1.2 Electrical Safety Principles-Energized Conditions:

- De-energize whenever possible.
- Plan every job. The approach and step-by-step procedures to complete the work at hand must be discussed and agreed upon between all involved employees before beginning. Write down first-time procedures. Discuss hazards and procedures in a job briefing with supervisors and other workers before starting any job. It is the employer's responsibility to have or develop a checklist system for working on live circuits, if such a scenario arises.
- Identify the hazards. Conduct a job hazard analysis. Identify steps that could create electric shock or arc-flash hazards.
- Minimize the hazards. De-energize any equipment, and insulate, or isolate exposed live parts so contact cannot be made. If this is impossible, obtain and wear proper personal protective equipment (PPE) and tools.
- Anticipate problems. If it can go wrong, it might. Make sure the proper PPE and tools are immediately available for the worst-case scenario.
- Obtain training. Make sure all involved employees are a qualified electrical worker with appropriate training for the job.

2.0 RESPONSIBILITIES

2.1 Safety Committee

- Evaluate work being performed and determine compliance with this program.
- Provide or assist in the task of specific training for electrical work qualifications.
- Training recordkeeping.
- Periodically review and update this written program.
- Provide or coordinate general training for work units on the content of this program.
- Evaluate the overall effectiveness of the electrical safety program on a periodic basis.
- Assist work units in the implementation of this program.

2.2 Supervisors

- Promote electrical safety awareness to all employees.
- Ensure employees comply with ALL provisions of the electrical safety program.
- Ensure employees receive training appropriate to their assigned electrical tasks and maintain documentation of such training.
- Develop and maintain a listing of all qualified employees under their supervision.
- Ensure employees are provided with and use appropriate protective equipment.

2.3 Employees

- Follow the work practices described in this document, including the use of appropriate protective equipment and tools.
- Attend all training required relative to this program.
- Immediately report any concerns related to electrical safety to supervision.

3.0 TRAINING

3.1 Requirements: Workers near energized, or potentially energized electrical circuitry of fifty (50) volts to ground or greater, shall be trained in energized electrical safe work practices and procedures and retrained as necessary.

3.2 Qualified Electrical Worker: Employees must receive training in avoiding the electrical hazards associated with working on or near exposed energized parts prior to performing energized electrical work. Such training will be provided when the employee is initially assigned to the job and refresher training will be provided every three years or when conditions change.

The following items are to be included in the training of Qualified Electrical Workers:

- Demonstrate a working knowledge of the National Electrical Code
- The Lockout/Tagout Training Program including safe work practices required to safely de-energize electrical equipment

- Universal electrical safety procedures
- Skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment
- Perform on-the-job training with a qualified electrical worker
- Skills and techniques necessary to determine the nominal voltage of exposed live parts
- The approach distances specified in Table 130.2(C) and 1926.333 table S-5 and the corresponding voltages to which the qualified electrical worker will be exposed. Unqualified employees must maintain a 10 ft. clearance distance.
- Selection and use of proper work practices, personal protective equipment, tools, insulating and shielding materials and equipment for working on or near energized parts
- Qualified Electrical Workers must also be trained in recognizing signs and symptoms of electric shock, heart fibrillation, electric burns, and proper first aid protocols for these conditions. They must have the following training:

  - Basic Cardio Pulmonary Resuscitation (CPR)
  - Automatic External Defibrillator (AED)
  - Contacting emergency personnel and basic first aid

3.3 Documentation of Training and Experience: Documentation of training shall be kept by safety coordinator. Experience received by Qualified Electrical Workers must be maintained for all personnel covered by this program. Documentation is necessary to demonstrate that individuals have met the training and experience requirements for the types of work being performed.

4.0 PORTABLE ELECTRICAL EQUIPMENT AND EXTENSION CORDS

4.1 The following requirements apply to the use of cord-and-plug-connected equipment and flexible cord sets (extension cords):

- Extension cords may only be used to provide temporary power.
- Portable cord-and-plug connected equipment and extension cords must be visually inspected before use on any shift for external defects such as loose parts, deformed and missing pins, or damage to outer jacket or insulation, and for possible internal damage such as pinched or crushed outer jacket. Any defective cord or cord-and-plug-connected equipment must be removed from service and no person may use it until it is repaired and tested to ensure it is safe for use.
- Extension cords must be of the three-wire type. Extension cords and flexible cords must be designed for hard or extra hard usage (for example, types S, ST, and SO). The rating or approval must be visible.
- Job-made extension cords are forbidden per the electrical code.

- Personnel performing work on renovation or construction sites using extension cords or where work is performed in damp or wet locations must be provided, and must use, a ground-fault circuit interrupter (GFCI).
- Portable equipment must be handled in a manner that will not cause damage. Flexible electric cords connected to equipment may not be used for raising or lowering the equipment.
- Extension cords must be protected from damage. Projections must be avoided. Flexible cords may not be run through windows or doors unless protected from damage, and then only on a temporary basis. Flexible cords may not be run above ceilings or inside or through walls, ceilings or floors, and may not be fastened with staples or otherwise hung in such a fashion as to damage the outer jacket or insulation.
- Cords must be covered by a cord protector or tape when they extend into a walkway or other path of travel to avoid creating a trip hazard.
- Extension cords used with grounding-type equipment must contain an equipment-grounding conductor (i.e., the cord must accept a three-prong, or grounded, plug).
- Attachment plugs and receptacles may not be connected or altered in any way that would interrupt the continuity of the equipment grounding conductor. Additionally, these devices may not be altered to allow the grounding pole to be inserted into current connector slots. Clipping the grounding prong from an electrical plug is prohibited.
- Flexible cords may only be plugged into grounded receptacles. The continuity of the ground in a two-prong outlet must be verified before use. It is recommended that the receptacle be replaced with a three-prong outlet. Adapters that interrupt the continuity of the equipment grounding connection may not be used.
- All portable electric equipment and flexible cords used in highly conductive work locations, such as those with water or other conductive liquids, or in places where employees are likely to contact water or conductive liquids, must be approved for those locations.
- Employee's hands must be dry when plugging and unplugging flexible cords and cord-and-plug connected equipment if energized equipment is involved.
- If the connection could provide a conducting path to employees hands (for example, if a cord connector is wet from being immersed in water), the energized plug and receptacle connections must be handled only with insulating protective equipment.
- Locking-type connectors must be properly locked into the connector.
- Lamps for general illumination must be protected from breakage, and metal shell sockets must be grounded.
- Temporary lights must not be suspended by their cords unless they have been designed for this purpose.
- Portable lighting used in wet or conductive locations, such as tanks or boilers, must be operated at no more than 12 volts or must be protected by GFCI’s.

- Extension cords are considered to be temporary wiring, and must also comply with the section on "Requirements for Temporary Wiring" in this program.
- All service technicians will use GFCI "pig tails" on all their equipment when connecting to client's electrical outlets and /or boxes.
- All portable generators will have weatherproof/GFCI outlets.
- All GFCI appliances will be tested before each use.

5.0 REQUIREMENTS FOR TEMPORARY WIRING

5.1 Temporary electrical power and lighting installations 600 volts or less, including flexible cords, cables and extension cords, may only be used during and for renovation, maintenance, repair, or experimental work. The following additional requirements apply:

- Ground-fault protection (e.g. ground-fault circuit interrupters or GFCI) must be provided on all temporary-wiring circuits, including extension cords, used on construction sites.
- In general, all equipment and tools connected by cord and plug must be grounded. Listed or labeled double insulated tools and appliances need not be grounded.
- Feeders must originate in an approved distribution center, such as a panel board, that is rated for the voltages and currents the system is expected to carry.
- Branch circuits must originate in an approved power outlet or panel board.
- Neither bare conductors nor earth returns may be used for the wiring of any temporary circuit.
- Receptacles must be of the grounding type. Unless installed in a complete metallic raceway, each branch circuit must contain a separate equipment-grounding conductor, and all receptacles must be electrically connected to the grounding conductor.
- Flexible cords and cables must be of an approved type and suitable for the location and intended use. They may only be used for pendants, wiring of fixtures, connection of portable lamps or appliances, elevators, hoists, connection of stationary equipment where frequently interchanged, prevention of transmission of noise or vibration, data processing cables, or where needed to permit maintenance or repair. They may not be used as a substitute for the fixed wiring, where run through holes in walls, ceilings or floors, where run through doorways, windows or similar openings, where attached to building surfaces, or where concealed behind building walls, ceilings or floors.
- Suitable disconnecting switches or plug connects must be installed to permit the disconnection of all ungrounded conductors of each temporary circuit.
- Lamps for general illumination must be protected from accidental contact or damage, either by elevating the fixture or by providing a suitable guard. Hand lamps supplied by flexible cord must be equipped with a handle of molded composition or other approved material and must be equipped with a substantial bulb guard.

- Flexible cords and cables must be protected from accidental damage. Sharp corners and projections are to be avoided. Flexible cords and cables must be protected from damage when they pass through doorways or other pinch points.

6.0 WET OR DAMP LOCATIONS

6.1 Work in *wet* or *damp* work *locations* (i.e., areas surrounded or near water or other liquids) should not be performed unless it is absolutely critical. Electrical work should be postponed until the liquid can be cleaned up. The following special precautions must be incorporated while performing work in *damp locations*:

- Only use electrical cords that have Ground Fault Circuit Interrupters (GFCIs)
- Place a dry barrier over any wet or damp work surface
- Remove standing water before beginning work. Work is prohibited in areas where there is standing water
- Do not use electrical extension cords in wet or damp locations
- Keep electrical cords away from standing water

7.0 WORKING ON DE-ENERGIZED EQUIPMENT

7.1 Electrically Safe Condition: The most important principle of electrical safety is to **assume all electric circuits are energized unless each involved worker ensures they are not.** Every circuit and conductor must be tested every time work is done on them. Proper PPE must be worn until the equipment is proven to be de-energized, including:

- Voltage rated gloves and leather protectors
- Electrically insulated shoes
- Approved insulating mats
- Safety glasses
- Any required Arc Flash PPE

The National Fire Protection Association (NFPA) lists six steps to ensure conditions for electrically safe work.

- Identify all sources of power to the equipment. Check applicable up-to-date drawings, diagrams, and identification tags.
- Remove the load current, and then open the disconnecting devices for each power source.
- Where possible, visually verify that blades of disconnecting devices are fully open or that drawout-type circuit breakers are fully withdrawn.
- Apply lockout/tagout devices in accordance with a formal, written policy.
- Test each phase conductor or circuit part with an adequately rated voltage detector to verify that the equipment is de-energized. Test each phase conductor or circuit part

both phase-to-phase and phase-to-ground. Check the voltage detector before and after each test to be sure it is working.

- Properly ground all possible sources of induced voltage and stored electric energy (such as, capacitors) before touching. If conductors or circuit parts that are being de-energized could contact other exposed conductors or circuit parts, apply ground-connecting devices rated for the available fault current.

The process of de-energizing is "live" work and can result in an arc flash due to equipment failure. When de-energizing, follow the procedures described in "Working On or Near Live Equipment."

7.2 Lockout/Tagout: Please refer to the Lockout/Tagout Program.

8.0 VEHICULAR AND MECHANICAL EQUIPMENT

When work must be performed near overhead lines, the lines shall be de-energized and grounded, or other protective measures shall be provided before work is started.

If the lines are to be de-energized, arrangements shall be made with the person or organization that operates or controls the electric circuits involved to de-energize and ground them.

If protective measures, such as guarding, isolating or insulating are provided, these precautions shall prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools or equipment

8.1 Elevated Equipment: Where any vehicle or mechanical equipment structure will be elevated near energized overhead lines, they shall be operated so that the Limited Approach Boundary distance of NFPA table 130.2(C), column 2, is maintained. However, under any of the following conditions, the clearances shall be permitted to be reduced:

- If the vehicle is in transit with its structure lowered, the Limited Approach Boundary distance to the overhead lines in NFPA Table 130.2 (C), column 2, shall be permitted to be reduced by 6 ft. If insulated barriers, rated for the voltages involved, are installed and they are not part of an attachment to the vehicle, the clearance shall be permitted to be reduced to the design working dimensions of the insulating barrier.

- If the equipment is an aerial lift insulated for the voltage involved, and if the work is performed by a qualified person, the clearance (between the un-insulated portion of the aerial lift and the power line) shall be permitted to be reduced to the Restricted Approach Boundary given in NFPA Table 130.2 (C), column 4.

- If work is to be performed near overhead lines, the lines shall be de-energized and grounded, or other protective measures shall be provided before work is started. If

the lines are to be de-energized, arrangements shall be made with the person or organization that operates or controls the electric circuits involved to de-energize and ground them. If protective measures, such as guarding, isolating, or insulating, are provided, these precautions shall prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.

Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines shall be operated so that a clearance of 10 ft. (305 cm) is maintained. If the voltage is higher than 50kV, the clearance shall be increased 4 in. (10 cm) for every 10kV over that voltage.

8.2 Equipment Contact: Employees standing on the ground shall not contact the vehicle or mechanical equipment or any of its attachments, unless either of the following conditions applies:

- The employee is using protective equipment rated for the voltage.
- The equipment is located so that no un-insulated part of the structure (that portion of the structure that provide a conductive path to employees on the ground) can come closer to the line than permitted in NFPA 130.5 (E)(1).

8.3 Equipment Grounding: If any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines is intentionally grounded, employees working on the ground near the point of grounding shall not stand at the grounding location whenever there is a possibility of overhead line contact. Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous ground potentials (step and touch potential), which can develop within a few feet or more outward from the ground point.

9.0 WORKING ON OR NEAR ENERGIZED EQUIPMENT

Working on live circuits means actually touching energized parts. Working near live circuits means working close enough to energized parts to pose a risk even though work is on de-energized parts. Common tasks where there may be a need to work on or near live circuits include:

- Taking voltage measurements
- Opening and closing disconnects and breakers
- Racking breakers on and off the bus
- Removing panels and dead fronts
- Opening electric equipment doors for inspection

Facilities should adopt standard written procedures and training for these common tasks. For instance, when opening and closing disconnects, use the **left-hand rule** when possible (stand to the right side of the equipment and operate the disconnect switch with the left hand).

9.1 Energized Electrical Work Permit for 240 Volts and Higher:

- If live parts are not placed in an electrically safe condition, work to be performed shall be considered energized electrical work and shall be performed by written permit only.
- A copy of the State Energized Electrical Work Permit can be found in the Appendix of this document. The intent of this permit is to ensure that all appropriate safety precautions are taken prior to starting energized electrical work.
- Work related to testing, troubleshooting, and voltage measuring may be completed without a permit provided appropriate safe work practices and PPE are used.
- The permit must be originated by the qualified electrical worker.
- Energized Work Permits shall be submitted to the appropriate supervisor for each facility.
- The permit must be posted in an appropriate location where the energized work is taking place for the duration of the task.

9.2 Approach Distances to Exposed Live Parts: The National Fire Protection Association (NFPA) defines 3 approach distances for shock hazards and one for arc flash.

- The **Limited Approach Boundary** is the distance from an exposed live part within which a shock hazard exists.

- The **Restricted Approach Boundary** is the closest distance to exposed live parts a qualified person can approach with or without proper PPE and tools. Inside this boundary, accidental movement can put a part of the body or conductive tools in contact with live parts or inside the prohibited approach boundary. To cross the restricted approach boundary, the qualified person must:

    1. Have an energized work permit that is approved by the supervisor or manager responsible for the safety plan.
    2. Use PPE suitable for working near exposed lived parts and rated for the voltage and energy level involved.
    3. Be certain that no part of the body enters the prohibited space.
    4. Minimize the risk from unintended movement, by keeping as much of the body as possible out of the restricted space; body parts in the restricted space should be protected.

- The **Prohibited Approach Boundary** is the minimum approach distance to exposed live parts to prevent flashover or arcing. Approaching any closer is comparable to

making direct contact with a live part. To cross the prohibited approach boundary, the qualified person must:

1. Have specified training to work on exposed live parts.
2. Have a permit with proper written work procedures and justifying the need to work that close.
3. Do a risk analysis.
4. Have (2) and (3) approved by the appropriate supervisor.
5. Use PPE appropriate for working near exposed live parts and rated for the voltage and energy level involved.

- The **Flash Protection Boundary** is the approach limit at a distance from exposed live parts within which a person could receive a second degree burn if an electrical arc flash were to occur.

1. Use PPE appropriate for working near exposed live parts and rated for the voltage and energy level involved. De-energized parts are treated as live.
2. For systems of 600 volts and less, the flash protection boundary is 4 feet, based on an available bolted fault current of 50 kA and a clearing time of 6 cycles for the circuit breaker to act, or any combination of fault currents and clearing times not exceeding 300 kA cycles.
3. When working on de-energized parts and inside the flash protection boundary for nearby live exposed parts:

    a. If the parts cannot be de-energized, use barriers such as insulted blankets to protect against accidental contact or wear proper PPE.

9.3 Other Precautions: When working on or near de-energized parts, but still inside the flash protection boundary for nearby live exposed parts:

- If the parts cannot be de-energized, barriers such as insulated blankets must be used to protect against accidental contact or PPE must be worn.
- Employees shall not reach blindly into areas that might contain exposed live parts.
- Employees shall not enter spaces containing live parts unless illumination is provided that allows the work to be performed safely.
- Conductive articles of jewelry and clothing (such as watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, metal headgear, or metal frame glasses) shall not be worn where they present an electrical contact hazard with exposed live parts.
- Conductive materials, tools, and equipment that are in contact with any part of an employee's body shall be handled in a manner that prevents accidental contact with live parts. Such materials and equipment include, but are not limited to long conductive objects such as ducts, pipes, tubes, conductive hose and rope, metal-lined

rules and scales, steel tapes, pulling lines, metal scaffold parts, structural members, and chains.

- When an employee works in a confined space or enclosed spaces (such as a manhole or vault) that contains exposed live parts, the employee shall use protective shields, barriers or insulating materials as necessary to avoid contact with these parts. Doors, hinged panels, and the like shall be secured to prevent them from swinging into employees. Refer to the confined space entry program.

10.0 ENERGIZED ELECTRICAL EQUIPMENT PROGRAM IMPLEMENTATION

10.1 Equipment Labeling: Article 110.16 of the NEC 2002 code requires switchboards, panel boards, industrial control panels, and motor control centers to be field marked to warn workers of potential electric arc flash hazards.

1. The term Industrial Control Panel covers every enclosure that may contain exposed energized conductors or components.
2. Marking is intended to reduce the occurrence of serious injury or death due to arcing faults to workers working on or near energized electrical equipment.
3. Markings (labels) shall be located so they are visible to the personnel before examination, adjustment, servicing, or maintenance of the equipment.
4. Labels shall be either of the 2 examples (or similar) shown in Figure 1 depending on the available resources of the agency.
5. The first DANGER label shall be used when information is not presently available. This is the minimum NEC 110.16 requirement.
6. The DANGER label should remind a qualified worker who intends to open the equipment for analysis or work:

    - Electric arc flash hazard exists
    - Turn off all power before opening
    - Follow all requirements of NFPA 70E for safe work practices and wear appropriate personal protective equipment (PPE) for the specific hazard.

7. The second DANGER label shall be used when a qualified electrical worker or electrical engineer determines the values of the shock and flash protection information.
8. When arc flash and shock data are available for industrial control panels, labels shall include information on flash hazard boundary, the hazard category, required PPE, minimum arc rating, limited approach distances, restricted approach distances and prohibited approach distances.
9. An unqualified person must not be near open energized equipment.

10.2 Implementation Procedures

1. Immediately place danger labels on equipment required to be labeled by NEC 110.16.
2. Until an arc flash hazard analysis can be made, a qualified Electrical Worker using NFPA Table 130.7(C)(9)(a), Hazard/Risk Category Selections, shall for each situation:

    - Determine the hazard/risk category
    - Determine the use of V-rated gloves

        - V-rated gloves are gloves rated and tested for the maximum line-to-line voltage upon work will be done.

    - Determine the use of V-rated tools

        - V-rated tools are tools rated and tested for the maximum line-to-line voltage upon work will be done.

3. The Safety Committee shall complete an arc flash hazard analysis as required by NFPA 70E.

    - The arc flash hazard analysis shall only be completed by a licensed electrical engineer.
    - The arc flash hazard analysis shall be completed on all major electrical system upgrades or renovations.

        - The arc flash hazard analysis is a responsibility of the Safety Committee.

    - The arc flash hazard analysis shall be done for all new electrical system installations.

        - This is a responsibility of the Safety Committee.

    - Site Managers should evaluate the condition of their electrical equipment
    - Safety Committee to conduct the arc flash hazard analysis when considered immediately necessary. Reasons for conducting the analysis include the following:

        - Some equipment may be old, possibly in poor condition creating a greater potential for flashover.
        - Equipment is requiring greater than average maintenance.
        - Frequent use of high hazard/risk category personal protective equipment during the conduct of maintenance. Qualified electrical workers are frequently wearing high hazard/risk PPE.

10.3 Arc Flash Hazard Analysis: An arc flash hazard analysis includes the following:

- Collect data on the facility's power distribution system.
  - Arrangement of components on a one-line drawing with nameplate specifications of every device.
  - Lengths and cross-section area of all cables.
- Contact the electric utility for information including the minimum and maximum fault currents that can be expected at the entrance to the facility.
- Conduct a short circuit analysis followed by a coordination study is performed.
- Feed the resultant data into the NFPA 70E-2000 or IEEE Standard 1584-2002 equations.
  - These equations produce the necessary **flash protection boundary distances** and **incident energy** to determine the minimum PPE requirement.
  - The **flash protection boundary** is the distance at which PPE is needed to prevent incurable burns (2nd degree or worse) if an arc flash occurs. (It is still possible to suffer 1st or 2nd degree burns.)
- For systems of 600 volts and less, the flash protection boundary is 4 feet, based on an available bolted fault current of 50 kA (kiloamps) and a clearing time of 6 cycles (0.1 seconds) for the circuit breaker to act, or any combination of fault currents and clearing times not exceeding 300 kA cycles (5000 ampere seconds).
- For other fault currents and clearing times, *see* NFPA 70E.

11.0 PERSONAL PROTECTIVE EQUIPMENT

11.1 General Requirements:

- Employees working in areas where there are potential electrical hazards must be provided with and use personal protective equipment (PPE) that is appropriate for the specific work to be performed. The electrical tools and protective equipment must be specifically approved, rated, and tested for the levels of voltage of which an employee may be exposed.
- Each facility shall provide electrical protective equipment (Arc Flash Gear) required by this program. Such equipment shall include 11 calorie, and 40 calorie rated Arc Flash apparel (until a full arc flash hazard analysis is made), eye protection, head protection, hand protection, insulated footwear, and face shields where necessary.

Protective Clothing Characteristics

Category	**Cal/cm^2**	**Clothing**

0	1.2	Untreated Cotton
1	5	Flame retardant (FR) shirt and FR pants
2	8	Cotton underwear, FR shirt and FR pants
3	25	Cotton underwear, FR shirt, FR pants and FR coveralls
4	40	Cotton underwear, FR shirt, FR pants and double layer switching coat and pants

- Employees shall wear nonconductive head protection whenever there is a danger of head injury from electric shock or burns due to contact with live parts or from flying objects resulting from an electrical explosion.
- Employees shall wear protective equipment for the eyes whenever there is a danger of injury from electric arcs, flashes, or from flying objects resulting from an electrical explosion.
- Employees shall wear rubber insulating gloves where there is a danger of hand or arm contact with live parts or possible exposure to arc flash burn.
- Where insulated footwear is used as protection against step and touch potential, dielectric overshoes shall be required. Insulated soles shall not be used as primary electrical protection.
- Face shields without arc rating shall not be used for electrical work. Safety glasses or goggles must always be worn underneath face shields.
- Additional illumination may be needed when using tinted face shields as protection during electrical work.
- Electrical Protective Equipment must be selected to meet the criteria established by the American Society of Testing and Materials (ASTM) and by the America National Standards Institute (ANSI).
- Insulating equipment made of materials other than rubber shall provide electrical and mechanical protection at least equal to that of rubber equipment.
- PPE must be maintained in a safe, reliable condition and be inspected for damage before each day's use and immediately following any incident that can reasonably be suspected of having caused damage.
- Employees must use insulated tools and handling equipment that are rated for the voltages to be encountered when working near exposed energized conductors or circuit. Tools and handling equipment should be replaced if the insulating capability is decreased due to damage. Protective gloves must be used when employees are working with exposed electrical parts above fifty (50) volts.

- Fuse handling equipment (insulated for circuit voltage) must be used to remove or install fuses when the fuse terminals are energized. Ropes and hand lines used near exposed energized parts must be non-conductive.
- Protective shields, barriers or insulating materials must be used to protect each employee from shock, burns, or other electrical injuries while that person is working near exposed energized parts that might be accidentally contacted or where dangerous electric heating or arcing might occur.

11.2 Flame-Resistant Apparel & Underlayers:

- FR apparel shall be visually inspected before each use. FR apparel that is contaminated or damaged shall not be used. Protective items that become contaminated with grease, oil flammable liquids, or combustible liquids shall not be used.
- The garment manufacturer's instructions for care and maintenance of FR apparel shall be followed.
- When the apparel is worn to protect an employee, it shall cover all ignitable clothing and allow for movement and visibility.
- FR apparel must cover potentially exposed areas as completely as possible. FR shirt sleeves must be fastened and FR shirts/jackets must be closed at the neck.
- Non-melting, flammable garments (i.e. cotton, wool, rayon, silk, or blends of these materials) may be used as underlayers beneath FR apparel.
- Meltable fibers such as acetate, nylon, polyester, polypropylene, and spandex shall not be permitted in fabric underlayers next to skin. (An incidental amount of elastic used on non-melting fabric underwear or socks shall be permitted).
- FR garments worn as outer layers over FR apparel (i.e. jackets or rainwear) must also be made from FR material.
- Flash suits must permit easy and rapid removal by the user.

11.3 Rubber Insulating Equipment

- Rubber insulating equipment includes protective devices such as gloves, sleeves, blankets, and matting.
- Insulating equipment must be inspected for damage before each day's use and immediately following any incident that could have caused damage.
- An air test must be performed on rubber insulating gloves before each use.
- Insulating equipment found to have defects that might affect its insulating properties must be removed from service until testing indicates that it is acceptable for continued use.
- Where the insulating capability of protective equipment is subject to damage during use, the insulating material shall be protected by an outer covering of leather or other appropriate materials.

- Rubber insulating equipment must be tested according to the schedule supplied by the manufacturer.
- Rubber insulating equipment must be stored in an area protected from light, temperature extremes, excessive humidity, ozone, and other substances and conditions that my cause damage.
- No repairs to rubber insulating equipment shall be attempted without the approval of the safety committee or coordinator.

11.4 Insulated Tools and Materials:

- Only insulated tools and equipment shall be used within the Limited Approach Boundary of exposed energized parts.
- Insulated tools shall be rated for the voltages on which they are used.
- Insulated tools shall be designed and constructed for the environment to which they are exposed and the manner in which they are used.
- Fuse or fuse holder handling equipment, insulated for the circuit voltage, shall be used to removed or install a fuse if the fuse terminals are energized.
- Ropes and hand-lines used near exposed energized parts shall be nonconductive.
- Portable ladders used for electrical work shall have nonconductive side rails.

11.5 Access Limiting Equipment

- Barricades shall be used in conjunction with safety signs to prevent or limit access to work areas containing live parts. Conductive barricades shall not be used where they might cause an electrical hazard. Barricades shall be placed no closer than the Limited Approach Boundary.
- If signs and barricades do not provide sufficient protection, an attendant will be assigned to warn and protect pedestrians. The primary duty of the attendant shall be to keep an unqualified person out of the work area where an electrical hazard exists. The attendant shall remain in the area as long as there is a potential exposure to electrical hazards.

12.0 WORKING SPACE ABOUT ELECTRICAL EQUIPMENT

12.1 Spaces about Electric Equipment

- **Access:** Sufficient access and working space shall be provided and maintained about all electric equipment to permit ready and safe operating and maintenance of such equipment. Enclosures that house electric apparatus and are controlled by lock and key shall be considered accessible to qualified persons.
- **Working Space:** Working space for equipment operating at 600 volts, nominal, or less to ground and likely to require examination, adjustment, service or maintenance while energized shall comply with the dimensions of 70E 400.15(A)(1),

400.15(A)(2), and 400.15(A)(3) or as required or permitted elsewhere in the 70E Standard.

- **Depth of Working Space**. The depth of the working space in the direction of live parts shall be not less than that indicated in Table 400.15(A)(1) unless the requirements of 400.15(A)(1)(a), 400.15(A)(1)(b), or 400.15(A)(1)(c) are met. Distances shall be measured from the exposed live parts if such are exposed or from the enclosure or opening if the live parts are enclosed.

Table 400.15(A)(1) Working Spaces

Nominal Voltage to Ground	**Minimum Clear Distance**		
	Condition 1	**Condition 2**	**Condition 3**
0-150	900mm(3 ft)	900 mm(3 ft)	900mm(3 ft)
151-600	900mm(3 ft)	1m(3-1/2 ft)	1.2 m (4 ft)

Condition 1: Exposed live parts on one side and no live or grounded parts on the other side of the working space, or exposed live parts on both sides effectively guarded by suitable wood or other insulating materials. Insulated wire or insulated busbars operating at not over 300 volts to ground shall not be considered live parts.

Condition 2: Exposed live parts on one side and grounded parts on the other side. Concrete, brick, or tile walls shall be considered as grounded surfaces.

Condition 3: Exposed live parts on both sides of the work space (not guarded as provided in condition 1) with the operator between.

- **Dead-front Assemblies**. Working space shall not be required in the back or sides of assemblies, such as dead-front switchboards or motor control centers, where all connections and all renewable or adjustable parts, such as fuses or switches, are accessible from locations other than the back or sides. Where rear access is required to work on non-electrical parts on the back of enclosed equipment, a minimum horizontal working space of 762mm (30 in) shall be provided.
- **Low Voltage**. Smaller working spaces can be permitted where all uninsulated parts operate at not greater than 30 volts rms, 42 volts peak, or 60 volts dc.
- **Existing Buildings.** In existing buildings were electric equipment is being replaced, Condition 2 working clearance shall be permitted between dead-front switch boards, panel boards, or motor control centers located across the aisle from each other where conditions of maintenance and supervision ensure that written procedures have been adopted to prohibit equipment on bother sides of the aisle from being open at the same time. Qualified electrical workers who are authorized will service the installation.

- **Width of Working Space**. The width of the working space in front of the electrical equipment shall be the width of the equipment or 750 mm (30 in), whichever is greater. In all cases, the work space shall permit at least a 90 degree opening of equipment doors or hinged panels.
- **Height of Working Space**. The workspace shall be clear and extend from the grade, floor, or platform to the height required by 70E 400.15(E). Within the height requirements of this section, other equipment that is associated with the electrical installation and is located above or below the electrical equipment shall be permitted to extend not more than 150 mm (6 in) beyond the front of the electrical equipment.
- **Clear Spaces**. Working space required by the 70E standard shall not be used for storage. When normally enclosed live parts operating at 50 volts or more are exposed for inspection or service, the working space, if in a passageway or general open spaced shall be suitably guarded.

12.2 Access and Entrance to Working Space:

- **Minimum Required**. At least one entrance of sufficient area shall be provided to give access to the working space about electric equipment.
- **Large Equipment**. For equipment rated 1200 amperes or more and over 1.8 m (6ft) wide that contains overcurrent devices, switching devices, or control devices, there shall be one entrance to the required working space not less than 610 mm (24in) wide and 2.0 m (6-1/2 ft) high at each end of the working space. Where the entrance has a personnel door(s) shall open in the direction of egress and be equipped with panic bars, pressure plates, or other devices that are normally latched but open under simple pressures. A single entrance to the required working space shall be permitted where either of the conditions in 400.14(c)(2)(a) or 400.14(c)(2)(b) is met.
- **Unobstructed Exit**. Where the location permits a continuous and unobstructed way of exit travel, a single entrance to the working space shall be permitted.
- **Extra Working Space**. Where the depth of the working space is twice that required by 400.15(A)(1), a singled entrance shall be permitted. It shall be located so that the distance from the equipment to the nearest edge of the entrance is not less than the minimum clear distance specified in Table 400.15(A)(1) for equipment operating at that voltage and in that condition.

12.3 Illumination: Illumination shall be provided for all working spaces about service equipment, switchboards, panel boards, or motor control centers installed indoors. Additional lighting outlets shall not be required where the work space is illuminated by an adjacent light source. In electrical equipment rooms, the illumination shall not be controlled by automatic means only.

12.4 Headroom: The minimum headroom of working spaces about service equipment, switchboards, panel boards, or motor control centers shall be 2.0 m (6-1.2 ft). Where the

electrical equipment exceeds 2.0 m (61/2 ft) in height, the minimum headroom shall not be less than the height of the equipment.

12.5 Dedicated Equipment Space: All switchboards, panel boards, distribution boards, and motor control centers shall be located in dedicated spaces and protected from damage. *Exception: Control equipment that by its very nature or because of other rules of the standard must be adjacent to or within sight of the operating machinery shall be permitted in those locations.*

13.0 CONTRACTOR EMPLOYEES

13.1 Safety programs used by contractors must meet or exceed all applicable guidelines of this Safety Program.

13.2 Contractors are required to comply with applicable Safety and Health regulations such as OSHA, NFPA, and EPA.

13.3 Contractors may be required to submit copies of their safety program to the safety coordinator upon request.

APPENDIX A: APPROACH BOUNDARIES

Table 130.4(C)(a): Approach boundaries to Energized Electrical Conductors or Circuit Parts for Shock Protection for Alternating-Current Systems.

(All dimensions are distance from live part to employee)

	Limited approach boundary			
Nominal system voltage range, phase to phase	**Exposed movable conductor**	**Exposed fixed-circuit part**	**Restricted approach boundary (allowing for accidental movement)**	**Prohibited approach boundary**
0 to 50 volts	Not specified	Not specified	Not specified	Not specified
51 to 300 volts	10 ft. 0 in.	3 ft. 6 in.	Avoid contact	Avoid contact
301 to 750 volts	10 ft. 0 in.	3 ft. 6 in.	1 ft. 0 in.	0 ft. 1 in.
751 to 15 KV KV	10 ft. 0 in.	5 ft. 0 in.	2 ft. 2 in.	0 ft. 7 in.
15.1 kV to 36 KV	10 ft. 0 in.	6 ft. 0 in	2 ft. 7 in.	0 ft. 10 in.
36.1 KV to 46 kV	10 ft. 0 in.	8 ft. 0 in	2 ft 9 in.	1 ft. 5 in.
46.1 KV to 72.5 KV	10 ft. 0 in.	8 ft. 0 in.	3 ft 3 in.	2 ft. 2 in.
72.6 KV to 121 KV	10 ft. 8 in.	8 ft. 0 in.	3 ft. 4 in.	2 ft. 9 in.
138 to 145	11 ft 0 in	10 ft. 0 in.	3 ft. 10 in	3 ft. 4 in.
161 KV to 169 KV	11 ft 8 in.	11 ft. 8 in.	4 ft. 3 in.	3 ft. 9 in.
230 KV to 242 KV	13 ft. 0 in.	13 ft. 0 in.	5 ft. 8 in.	5 ft. 2 in.
345 KV to 362 KV	15 ft. 4 in	15 ft. 4 in.	9 ft. 2 in.	8 ft. 8 in.

Source: From a portion of table 130.4(C)(a), Approach Boundaries to Energized Electrical Conductors or Circuit Parts for Shock Protection for Alternating-Current Systems (NFPA 70E *Standard for Electrical Safety in the Workplaces, 2012 edition*).

FR - flame resistant. ATPV - arc thermal performance exposure value of the clothing in calories/cm2. *Source:* Based on Table F-1 in appendix F of NFPA 70E, *Electrical Safety Requirements for Employee Workplaces*, 2000.

APPENDIX B: WARNING LABELS

The following example label shall be affixed to industrial control panels (every enclosure that may contain exposed energized conductors or components) immediately:

The following label is an example of a label to be affixed to industrial control panels after arc flash hazard analysis has been completed:

Each of the above labels is available through Grainger.

APPENDIX C: JOB PLANNING CHECKLIST

Identify

____ The hazards

____ The voltage levels involved

____ Skills required

____ Any "foreign" (secondary source) voltage source

_____ Any forms of stored energy and, after discharge, can it regain energy

____ Any unusual work conditions (explosive gas, flammable chemicals, water present, etc.)

____ How many people are needed to do the job

____ The shock protection boundaries

____ The available incident energy

____ Potential for arc flash (Conduct a flash-hazard analysis.)

____ The flash protection boundaries

Ask

____ Can the equipment be de-energized?

____ Are backfeeds of the circuits to be worked on possible?

____ Is there a "Two Person" or "Safety Watch" requirement?

Check

____ Job plans

____ Single-line diagrams and vendor prints

____ Status board

____ That information on plant and vendor resources is up to date

____ Safety procedures

____ Vendor information

____ That individuals are familiar with the facility

Know

____ What the job is

____ Who else needs to know—communicate!

____ Who is in charge

Think

____ About the unexpected event...What if?

____ Lock—Tag—Test—Try

____ Test for VOLTAGE—FIRST

____ Use the right tools and equipment, including PPE

____ Install and remove grounds

____ Install barriers and barricades

____ What else...?

Prepare for an emergency

____ Is the standby person CPR trained?

____ Is the required emergency equipment available? Where is it?

____ Where is the nearest telephone?

____ Where is the fire alarm?

____ Is confined space rescue available?

____ What is the exact work location?

____ How is the equipment shut off in an emergency?

____ Are emergency telephone numbers known?

____ Where is the fire extinguisher?

____ Are radio communications available?

APPENDIX D: ENERGIZED ELECTRICAL WORK PERMIT

(For Applications of 240 volts or greater)

1. Work Location: _____
2. Work order/project #: _____
3. Description of the work to be done: _____

_____

_____

_____

4. Check the following considerations when they apply:

- ☐ Work is within the restricted approach boundary and there is a work plan
- ☐ Work is within the prohibited approach boundary, it is very hazardous and there is a work plan
- ☐ Request to shut down equipment was made
- ☐ Conducted a shock hazard analysis
- ☐ Shock protection boundaries have been determined
- ☐ Flash hazard analysis has been made and the results are known
- ☐ Flash protection boundary has been determined
- ☐ Personal protective equipment including tools needed for the job have been determined and are available
- ☐ Unqualified persons are restricted from the work area
- ☐ Safe work practices that need to be employed have been considered
- ☐ Job can be done safely

_____ _____

(Signature, Electrically Qualified Person) (Date)

_____ _____

(Signature, Immediate Supervisor) (Date)

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PURPOSE

It is the policy of Metropolitan Library System to provide all employees with a safe and healthy workplace. A proactive ergonomics program is integrated into our company's written safety and health program.

Records documenting the identification, prevention, and control of employee exposure to ergonomic risk factors will be maintained pursuant to all regulations.

This program is a collaborative effort that includes managers, supervisors, and employees. The Safety Committee is responsible for the program's implementation, management, and recordkeeping requirements.

1.0 INTRODUCTION

Ergonomics is the study of people and their interaction with the elements of their job or task including equipment, tools, facilities, processes, and environment. It is a multidisciplinary field of study integrating industrial psychology, engineering, medicine, and design.

In a more practical sense, ergonomics is the science of human comfort. When aspects of the work or workplace insult the human body, the result is often a musculoskeletal disorder (MSD). To help avoid MSDs, work demands should not exceed the physical capabilities of the worker. MSDs are also known by several other names including:

- CTDs (cumulative trauma disorders)
- RSIs (repetitive stress or repetitive strain injuries)
- RMIs (repetitive motion injuries)
- Overuse syndrome

The most common, recognizable name for MSDs is cumulative trauma disorders or CTDs. Whatever the name used, these injuries belong to a family or group of wear and tear illnesses that can affect muscles, nerves, tendons, ligaments, joints, cartilage, blood vessels or spinal discs of the body. MSDs do not include slips, trips and falls, cuts, motor vehicle accidents or other similar accidents; although a close look at the reasons for acute injuries often reveals design problems that can be corrected.

2.0 ERGONOMICS PROGRAM

The purpose of an ergonomics program is to apply ergonomic principles to the workplace in an effort to reduce the number and severity of MSDs, thus decreasing workers' compensation claims and, where possible, increase productivity, quality, and efficiency. An ergonomically sound work environment maximizes employee comfort while minimizing the risk of undue physical stress.

A proactive approach focuses on making changes when risks have already been identified, as well as to incorporate ergonomics into the design phase of a new facility or process, into purchasing new equipment or tools, and into the contemplation of scheduling changes.

2.1 Management Leadership. The management of Metropolitan Library System is committed to the ergonomics process. Management supports the efforts of the Safety Committee by pledging financial and philosophical support for the identification and control of ergonomic risk factors. Management will support an effective MSD reporting system and will respond promptly to reports. Management will regularly communicate with employees about the program.

2.2 Employee Participation. An essential element to the success of the ergonomics program, employees will be solicited for their input and assistance with identifying ergonomic risk

factors, worksite evaluations, development and implementation of controls, and training. Employee participation in the program will occur only during company time.

2.3 Identification of Problem Jobs. Collecting data that identifies injury and illness trends is called surveillance. Surveillance can be either *passive* or *active*. Conducting a records review is an example of passive surveillance, which looks at existing data such as OSHA logs, workers' compensation claims, trips to the medical facility, and absentee records. Active surveillance uses observations, interviews, surveys, questionnaires, checklists, and formal worksite evaluation tools to identify specific high-risk activities. Metropolitan Library System will be using both passive and active surveillance to identify problem jobs.

2.4 Worksite Evaluations.

- Triggers for a worksite evaluation:
  - When an employee reports an MSD sign or symptom.
  - Jobs, processes, or work activities where work-related ergonomic risk factors have been identified which may cause or aggravate MSDs.
  - Any change of jobs, tasks, equipment, tools, processes, scheduling, or changes in work shift hours (for example, going from a traditional 5-day, 8 hour shift to a compressed 4-day, 10 hour shift).
  - When a safety walk-through or scheduled inspection or survey has uncovered potential MSD hazards.
- Work-related risk factors to be considered in the evaluation process include, but are not limited to:
  - Physical risk factors including force, postures (awkward and static), static loading and sustained exertion, fatigue, repetition, contact stress, extreme temperatures, and vibration.
  - Administrative issues including job rotation/enlargement, inadequate staffing, excessive overtime, inadequate or lack of rest breaks, stress from deadlines, lack of training, work pace, work methods, and pyschosocial issues.
  - Environmental risk factors including noise, lighting, glare, air quality, temperature, humidity, and personal protective equipment and clothing.
  - Combination of risk factor such as, but not limited to, highly repetitive, forceful work with no job rotation or precision work in a dimly lit room.

2.5 Setting Priorities. Worksite evaluations will be scheduled based upon the following:

- Any job, process, operation, or workstation which has contributed to a worker's current MSD;
- A job, process, operation, or workstation that has historically contributed to MSDs; and
- Specific jobs, processes, operations, or workstations that have the potential to cause MSDs.

2.6 Worksite Evaluations Methods. Various methods will be used to evaluate problem jobs including:

- Walk-through and observations
- Employee interviews
- Surveys and questionnaires
- Checklists
- Detailed worksite evaluations

2.7 Control of the Ergonomic Risk Factors. Metropolitan Library System will take steps to identify ergonomic risk factors and reduce hazards by using a three-tier hierarchy of control (in order of preference):

- *Engineering controls*. The most desirable and reliable means to reduce workplace exposure to potential harmful effects. This is achieved by focusing on the physical modifications of jobs, workstations, tools, equipment, or processes.
- *Administrative controls*. This means controlling or preventing workplace exposure to potentially harmful effects by implementing administrative changes such as job rotation, job enlargement, rest breaks, adjustment of pace, redesign of methods, and worker education.
- *Personal protective equipment (PPE)*. Not recognized as an effective means of controlling hazards and does not take the place of engineering or administrative controls. Acceptable forms of PPE include kneepads and various types of gloves including anti-vibration.

- Training. Training is intended to enhance the ability of managers, supervisors, and employees to recognize work-related ergonomic risk factors and to understand and apply appropriate control strategies. Training in the recognition and control of ergonomic risk factors will be given as follows:

  - To all new employees during orientation.
  - To all employees assuming a new job assignment.
  - When new jobs, tasks, tools, equipment, machinery, workstations, or processes are introduced.

- When high exposure levels to ergonomic risk factors have been identified.

The minimum for all managers, supervisors, and employees will include the following elements:

- An explanation of Metropolitan Library System ergonomics program and their role in the program;
- A list of the exposures which have been associated with the development of MSDs;
- A description of MSD signs and symptoms and consequences of injuries caused by work and non-work-related risk factors;
- An emphasis on the importance of early reporting of MSD signs and symptoms and injuries to management, and;
- The methods used by Metropolitan Library System to minimize work and non-work-related risk factors.

Training will be provided in one, or in a combination, of the following formats:

- Oral presentations
- Videos
- Distribution of educational literature
- Hands-on equipment and work practice demonstrations

Trainers will be experienced in delivering training programs that address all work and non-work-related risk factors and be familiar with Metropolitan Library System operations. Training will be provided from one, or a combination, of the sources listed below:

- Internally developed resources
- The workers' compensation carrier
- An outside consultant

All training will be documented:

- All employees will be required to sign a training sign-in roster.

2.8 MSD (Medical) Management and Early Return to Work.

Pursuant to the law, Metropolitan Library System provides medical care to all employees injured at work. Metropolitan Library System maintains a relationship with multiple medical care providers. The employee must choose a provider from the *CompChoice – First Injury Provider List*.

In the event of a work-related injury or illness, the health care provider/professional will:

- provide diagnosis and treatment for Metropolitan Library System employees;
- determine if reported MSD signs or symptoms are work-related;
- refer Metropolitan Library System injured employees to other clinical resources for therapy or rehabilitation and;
- Provide Metropolitan Library System with timely work status reports.

3.0 INDIVIDUAL RESPONSIBILITIES

3.1 Safety Committee. The Safety Committee will report directly to upper management and be responsible for this policy and program. All evaluations, controls, and training will be coordinated under the direction of the Safety Committee in collaboration with Management. The Safety Committee will monitor the results of the program to determine additional areas of focus as needed.

The Safety Committee will:

- ensure that evaluators performing worksite evaluations and training are properly trained;
- ensure that control measures are implemented in a timely manner;
- ensure that a system is in place for employees to report MSD signs or symptoms and suspected work-related risk factors to managers and supervisors;
- ensure that accurate records are maintained and provide documentation upon request;
- schedule manager, supervisor, and employee training and maintain records to include date, name of instructor, topic, and materials used, and;
- monitor the program on a quarterly basis and provide an annual review.

3.2 Managers. Duties of all managers will include:

- accountability for the health and safety of all employees within their departments through the active support of the ergonomics program;
- allocating human and/or financial resources;
- attending ergonomics training to familiarize themselves with the elements of the program, recognition and control of work-related ergonomic risk factors, MSD signs and symptoms, early reporting requirements and procedures, and medical management;
- ensuring that supervisors and employees have received the appropriate training;
- ensuring that ergonomics practices and principles are considered when conducting worksite evaluations, and;
- ensuring that recommended controls are implemented and/or used appropriately.

3.3 Supervisors. Duties of all supervisors will include:

- attending ergonomics training to familiarize themselves with the elements of the program, recognition and control of work-related ergonomics risk factors, MSD signs and symptoms, early reporting requirements and procedures, and medical management;
- ensuring that employees have received the appropriate training;
- ensuring that employees are provided with and use the appropriate tools, equipment, parts, and materials in accordance with ergonomic requirements;
- ensuring that employees understand the MSD signs and symptoms and early reporting system;
- responding promptly to employee reports;
- providing appropriate workers' compensation documentation to employees as required by all regulations;
- seeking clarification from Human Resources when return to work directives from the healthcare provider/professional are unclear, and;
- maintaining clear communication with managers and employees.

3.4 Employees. Every employee of Metropolitan Library System is responsible for conducting himself/herself in accordance with this policy and program. All employees will:

- when provided, use the appropriate tools, equipment, parts, materials, and procedures in the manner established by managers and supervisors;
- ensure that equipment is properly maintained in good condition and when not, reported immediately;
- attend ergonomics training as required and apply the knowledge and skills acquired to actual jobs, tasks, processes, and work activities;
- report MSD signs or symptoms and work-related MSD hazards to the supervisor as early as possible to facilitate medical treatment and proactive interventions, and;
- take responsibility in their personal health and safety.

4.0 ANNUAL PROGRAM REVIEW

The Safety Committee will conduct an annual program review to assess the progress and success of the program. The review will consider the following:

- Evaluation of all training programs and records.
- The need for retraining of managers, supervisors, and employees.
- The jobs, processes, or operations which have produced a high incidence rate of work-related MSDs.
- The length of time between a request for an ergonomic evaluation and the actual evaluation.

- The length of time between the point at which the results of the evaluation are known and when implementation of controls begins.
- The length of time between the beginning and completion of implementation of controls.
- The program's success based upon comparison to previous years using the following criteria:

  - Number and type of lost workdays associated with OSHA recordable cases.
  - Cost of workers' compensation cases.
  - Employee feedback through direct interviews, walk-through observations, written surveys and questionnaires, and reevaluations.

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PURPOSE

Falls from elevations continue to be a leading cause of death at U.S. construction sites. Metropolitan Library System takes all practical measures possible to prevent employees from being injured by falls from heights. We will take necessary steps to eliminate, prevent, and control fall hazards and we will comply fully with the PEOSH Fall Protection standard (CFR 1926, Subpart M, Fall Protection).

SCOPE

Metropolitan Library System primarily engages in construction activities. Therefore, fall protection will be implemented at heights of 6 feet or greater.

This program does not apply when individuals are making an inspection, investigation or assessment of workplace conditions prior to the start of construction work or after construction work has been completed, unless the employee or supervisor deems it necessary.

The following fall hazards are **not** covered under the scope of this program:

- Stairways, portable ladders, and fixed ladders less than 20 feet in height
- Construction of electric transmission and distribution lines and equipment
- Steel erection
- Cranes and derricks as noted in 29 CFR 1926 subpart CC
- Scaffolding
- Retrieval Equipment for Confined Spaces

Fall protection requirements regarding these situations are found in the specific programs for these subjects.

1.0 RESPONSIBILITIES

1.1 Safety Committee Responsibilities: The Safety Committee of Metropolitan Library System will retain responsibility for proper attention and use of these regulations and forms. The Safety Committee will ensure the following are given proper attention:

- Maintaining separate written site Fall Protection Plans with instructions for specific areas requiring fall protection.
- Delegation of sufficient authority to the respective department heads needed to implement the plan.
- Maintain a list of all reported injuries related to falls from elevated surfaces involving employees and visitors. Investigate these injuries where necessary and implement changes as needed.

1.2 Supervisor or Foreman Responsibilities: The supervisors and foreman will assure that employees covered by this program receive the necessary training, coordinate annual re-training, and:

- Identify the activities and locations where fall hazards exist
- Assure that all necessary fall protection equipment is provided and maintained in a good state of repair
- Enforce the Fall Protection Program

1.3 Employee Responsibilities:

- Participating in all training
- Reporting any malfunctions or concerns to their supervisor
- Abide by all rules and apply to the fullest extent possible the safety and health precautions specified in the program
- Maintain his or her fall protection equipment in a safe and sanitary condition
- Ensure that no other individuals are exposed to fall hazards based on the operations being conducted

All employees who are exposed to a fall hazard as defined by this plan shall follow the program and any safety training requiring fall protection. If there is a question regarding a specific fall protection situation, PLEASE consult your immediate supervisor. Failure to follow the basic guidelines of the Fall Protection Program may result in disciplinary action.

2.0 FALL HAZARD IDENTIFICATON

The following are common examples of situations were fall protection would be needed. This listing is by no means complete, and there are many other situations where a fall of 6 feet or more is possible.

2.1 Holes: Personal fall arrest systems, covers, or guardrail systems are required around holes (including skylights) that are more than 6 feet above lower levels. Also, covers are required for holes less than 6 feet.

2.2 Leading Edges: Each employee who is constructing a leading edge 6 feet or more above lower levels must use a guardrail system, a safety net system, or a personal fall arrest system.

2.3 Excavations: Each employee at the edge of an excavation 6 feet or more deep shall be protected from falling by guardrail systems, fences, barricades, or covers when the excavation is readily seen due to a visual barrier. Employees working around wells, pits, and shafts must be protected by guardrails, fences, barricades, or covers.

2.4 Formwork and Reinforcing Steel: For employees, while moving vertically and/or horizontally on the vertical face of rebar assemblies built in place, fall protection is not required when employees are moving at heights below 24 feet. OSHA considers the multiple hand holds and foot holds on rebar assemblies as providing similar protection as that provided by a fixed ladder. However, a positioning device system must used when workers are stationary.

2.5 Hoist Areas: Each employee in a hoist area shall be protected from falling 6 feet or more by guardrail systems or personal fall arrest systems. If guardrail systems (or chain gate or guardrail) or portions thereof must be removed to facilitate hoisting operations, as during the landing of materials, and a worker must lean through the access opening or out over the edge of the access opening to receive or guide equipment and materials, that employee must be protected by a personal fall arrest system.

2.6 Pre-cast Concrete Erection and Residential Construction: Each employee who is 6 feet or more above lower levels while erecting pre-cast concrete members and related operations such as grouting of pre-cast concrete members and each employee engaged in residential construction, shall be protected by guardrail systems, safety net systems, or personal fall arrest systems.

2.7 Ramps, Runways, and Other Walkways: Each employee using ramps, runways, and other walkways shall be protected from falling 6 feet or more by guardrail systems.

2.8 Low-slope Roofs: Each employee working on low-slope roofs with unprotected sides and edges 6 feet or more above lower levels shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems.

2.9 Steep Roofs: Each employee on a steep roof with unprotected sides and edges 6 feet or more above lower levels shall be protected by guardrail systems with toe boards, safety net systems, or personal fall arrest systems.

2.10 Wall Openings: Each employee working on, at, above, or near wall openings (including those with chutes attached) where the outside bottom edge of the wall opening is 6 feet or more above lower levels and the inside bottom edge of the wall opening is less than 39 inches above the walking/working surface must be protected from falling by the use of a guardrail system, a safety net system, or a personal fall arrest system.

2.11 Overhand Bricklaying and Related Work: Each employee performing overhand bricklaying and related work 6 feet or more above lower levels shall be protected by guardrail systems, safety net systems, or personal fall arrest systems, or shall work in a controlled access zone. All employees reaching more than 10 inches below the level of a walking/working surface on which they are working shall be protected by a guardrail system, safety net system, or personal fall arrest system.

3.0 FALL PROTECTION SYSTEMS

3.1 Guardrail Systems: When used, guardrail system must meet the criteria set forth below.

3.1.1 Materials requirements: Top-rails and mid-rails of guardrail systems must be at least one-quarter inch nominal diameter or thickness to prevent cuts and lacerations. If wire rope is used for top-rails, it must be flagged at not more than 6 feet intervals with high-visibility material. Steel and plastic banding cannot be used as top-rails or mid-rails. Manila, plastic, or synthetic rope used for top-rails or mid-rails must be inspected as frequently as necessary to ensure strength and stability. Guardrail systems shall be surfaced to protect workers from punctures or lacerations and to prevent clothing from snagging.

3.1.2 Dimensions: The top edge height of top-rails, or (equivalent) guardrails, must be 42 inches plus or minus 3 inches above the walking/working level. When workers are using stilts, the top edge height of the top rail, or equivalent member, must be increased by an amount equal to the height of the stilts.

Screens, mid-rails, mesh, intermediate vertical members, or equivalent intermediate structural members must be installed between the top edge of the guardrail system and the walking/working surface at least 21 inches high.

- When mid-rails are used, they must be installed at a height midway between the top edge of the guardrail system and the walking/working level.
- When screens and mesh are used, they must extend from the top rail to the walking/working level and along the entire opening between top rail supports.
- Intermediate members, such as balusters, when used between posts, shall not be more than 19 inches apart.

- Other structural members, such as additional mid-rails and architectural panels, shall be installed so that there are no openings in the guardrail system more than 19 inches.

3.1.3 Strength requirements: The guardrail system must be capable of withstanding a force of at least 200 pounds applied within 2 inches of the top edge in any outward or downward direction. When the 200 pound test is applied in a downward direction, the top edge of the guardrail must not deflect to a height less than 39 inches above the walking/working level.

Mid-rails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members shall be capable of withstanding a force of at least 150 pounds applied in any downward or outward direction at any point along the mid-rail or other member.

3.1.4 Additional requirements:

- The ends of top rails and mid-rails must not overhang terminal posts, except where such overhang does not constitute a projection hazard.
- When guardrail systems are used at hoisting areas, a chain, gate or removable guardrail section must be placed across the access opening between guardrail sections when hoisting operations are not taking place.
- At holes, guardrail systems must be set up on all unprotected sides or edges. When holes are used for the passage of materials, the hole shall have not more than two sides with removable guardrail sections. When the hole is not in use, it must be covered or provided with guardrails along all unprotected sides or edges.
- If guardrail systems are used around holes that are used as access points (such as ladder ways), gates must be used or the point of access must be offset to prevent accidental walking into the hole.

3.2 Personal Fall Arrest Systems: See section 4.0 of the Fall Protection Program

3.3 Safety Net Systems: Safety nets must be installed as close as practicable under the walking/working surface on which employees are working and never more than 30 feet below such levels. Defective nets shall not be used. Safety nets shall be inspected at least once a week for wear, damage, and other deterioration. Safety nets shall be installed with sufficient clearance underneath to prevent contact with the surface or structure below.

Items that have fallen into safety nets including—but not restricted to, materials, scrap, equipment, and tools—must be removed as soon as possible and at least before the next work shift.

3.4 Positioning Device Systems: A body belt or body harness system is to be used so that a free-fall of no farther than 2 feet is possible. Workers shall be secured to an anchorage capable of supporting a least twice the potential impact load of a person's fall or 3,000 pounds, whichever is greater.

3.5 Covers: Covers located in roadways and vehicular aisles must be able to support at least twice the maximum axle load of the largest vehicle to which the cover might be subjected. All other covers must be able to support at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time. To prevent accidental displacement resulting from wind, equipment, or workers' activities, all covers must be secured. All covers shall be color-coded or bear the markings "HOLE" or "COVER."

4.0 PERSONAL FALL ARREST SYSTEMS (PFAS)

4.1 General Information: Personal Fall Arrest Systems consist of an anchorage, connectors, and a body harness and may include a deceleration device, lifeline, or suitable combinations. If a personal fall arrest system is used for fall protection, it must do the following:

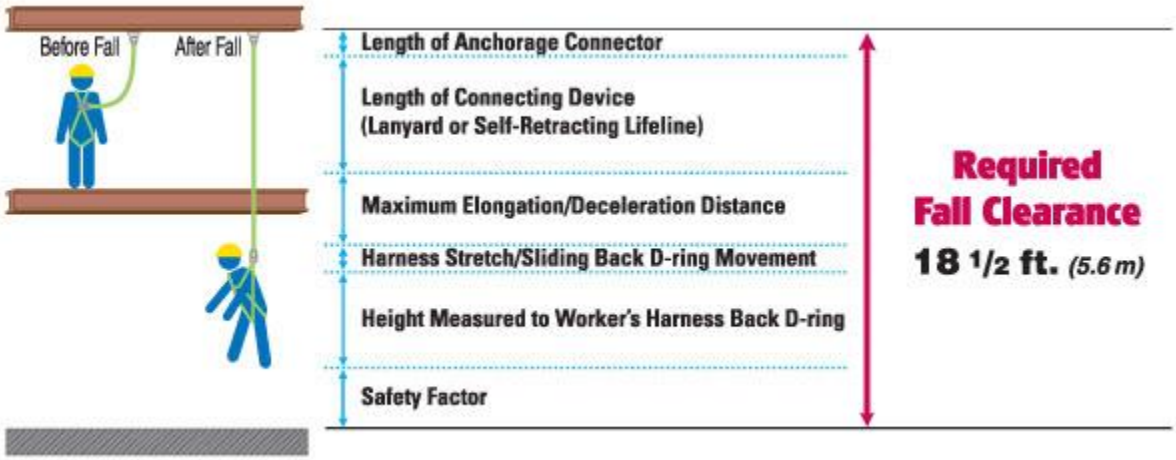
- Limit maximum arresting force on an employee to 900 pounds when used with a body belt
- Limit maximum arresting force on an employee to 1,800 pounds when used with a body harness
- Be rigged so that an employee can neither free fall more than 6 feet nor contact any lower level
- Bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet
- Have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet or the free fall distance permitted by the system, whichever is less
- Personal fall arrest systems must be inspected prior to each use for wear damage, and other deterioration. Defective components must be removed from service.

PFASs are only allowed to be used by employees specifically trained in their use. All PFASs must meet the ANSI A10.32 standard for fall protection equipment used in construction.

4.2 Compatibility: Personal fall arresting equipment should be purchased from a single manufacturer. The equipment is tested as a system and substitution of equipment from another manufacturer of personal fall protection equipment could result in a component or system failure. It is important to realize that components from a single manufacturer may not be compatible for all types of fall protection equipment. Personal fall arresting

equipment shall be used only for this purpose. Personal fall arresting equipment and associated system components are designed for a combined weight (employee plus tools, etc.) of 310 lbs. If the combined weight exceeds 310 lbs., system modifications may be necessary.

4.3 Fall Distance Calculation: Free-fall distances shall be kept to a minimum. In no case shall the free-fall distance exceed six feet. Free falls in excess of this distance can result in system failure and/or injury. In most situations the anchor point should be located near or above shoulder level. See diagram below for calculation of fall clearance using a standard six foot lanyard.



4.4 Equipment care: Consideration should be given to conditions that could affect the performance of the equipment selected. The following is a short list of conditions that could adversely affect the equipment being used:

- temperature extremes
- use of corrosive substances (solids, liquids or gases)
- welding/torch cutting
- abrasive blasting
- high moisture
- grease/oil
- chemicals

4.5 Anchor Points: Anchor points must be capable of supporting 5,000 lbs per attached employee. A competent individual must determine the adequacy of an anchor point. Where there is doubt about the strength of an anchor point an engineer must be consulted. Permanently installed anchor points should be provided for fall hazards that are routinely encountered. Anchor points used for fall protection and exposed to corrosive conditions (acids, bases, moisture) should be corrosion-resistant.

5.0 EQUIPMENT INSPECTION

5.1 Maintenance: Equipment shall be maintained in accordance with the manufacturer's guidelines and inspected prior to each use. The following should be checked:

- Dee-rings - cracks, distortion, pitting, corrosion or excessive wear.
- Buckles - distortion, sharp edges or cracks.
- Body harnesses - burns, damaged due to chemicals, cuts, abrasion to the material.
- Broken stitches - one of the best ways to check the material is to hold sections of the material between the hands and bend the material into a U-shape to look for damage.
- Keepers and snap locks - make sure they operate correctly. Do not rely on the sound of the latches they must be connected.
- Retractable lines - they should operate smoothly. The rope or cable should not be damaged. A quick pull of the line should cause the line to lock. The retractable lifeline assemblies shall be returned to the factory for re-certification as specified by the manufacturer. In most cases, the manufacturer specifies an annual inspection. Check the date on the unit for the last certification.
- Lanyard (rope, webbed or cable) - look for cuts, frayed parts, damaged fibers, and the condition of connections. There should be no knots in the line. A knot can result in a substantial reduction in strength.
- Shock Absorber - check for ripped stitches, signs of impact loading and connections.

5.2 Removal from service: Any component that is found to be defective must be removed from service immediately. Personal Fall Arresting Equipment (Body Harness, Lanyard, Carabineer, etc.) that has been subjected to a fall shall be discarded.

6.0 ADDITIONAL CONSIDERATIONS

6.1 Posting of Fall Hazards: Fixed (non-transient) fall hazards that are routinely encountered should be posted with signs stating "Fall Protection Required." The sign(s) shall be posted at a location where the fall hazard is first encountered. If there are multiple entry points where the fall hazard is encountered, each location should be posted. The department that has control of the fall hazard shall post the signs.

6.2 Provisions for Rescue: Provisions shall be made for the prompt rescue of employees who have fallen into a net or are suspended by their personal fall arresting equipment. Such provisions shall take the form of ladders, lifts, ropes, combined fall arresting/retrieval body harnesses, etc. If the rescue is likely to endanger the individual who has fallen, or the rescuers, call emergency personnel to initiate the rescue process.

6.3 Head Protection: The Fall Protection Program is based on individuals working at least six feet above a lower level. It is presumed that the potential for head injuries exists for

any person(s) at the lower level. All individuals, including visitors, on a job where a fall hazard exists, should don hardhats.

6.4 Fall Protection Considerations for New Construction and Renovations: All new construction must provide fall protection in accordance with applicable building codes. One factor that may be overlooked is the provision for fall protection during building maintenance (e.g. roofing). Provisions should be incorporated into building design and construction for fall protection. Anchor points and cable or rails system for fixed ladders are two examples of overlooked features.

7.0 SITE SPECIFIC FALL PROTECTION PLAN

Where fall protection cannot be provided for leading edge work due to infeasibility or because it creates a greater hazard, a Site Specific Fall Protection Plan shall be provided. This option is available only in situations involving leading edge work, pre-cast concrete erection, and residential construction where it is infeasible to use other fall protection measures. Residential construction generally implies wood frame construction, including brick veneer, up to four stories in height. A fall protection plan shall be developed by a qualified person for each site and must be kept up to date.

7.1 Incident Investigations: Any fall or near miss will be investigated to evaluate the fall protection plan. Updates to work practices, procedures, and/or training will be made to prevent reoccurrence.

7.2 Changes: A qualified person must approve changes to this plan and a copy of the plan must be kept on site.

8.0 TRAINING

8.1 Who and What: Employees who are exposed to potential fall hazards will be trained in the following areas:

- nature of fall hazards in the work area
- correct procedures for erecting, maintaining, disassembling, and inspecting fall protection systems
- use and operation of controlled access zones and guardrail, personal fall arrest, safety net, warning line, and safety monitoring systems
- role of each employee in the safety monitoring system when the system is in use
- limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs
- correct procedures for equipment and materials handling and storage and the erection of overhead protection
- employees' role in fall protection plans

8.2 Recordkeeping: A written certification shall be kept for each employee who completes the training. Only the most recent (up-to-date) certificate need be kept.

8.3 Retraining: Retraining (refresher) training shall be provided when any one of the following exists:

1. Changes in the workplace or fall protection equipment that render previous training obsolete
2. If the individual demonstrates a lack of knowledge regarding the basic components of the Fall Protection Program
3. At intervals deemed acceptable by the supervisor

Table of Contents

PURPOSE

Fire prevention measures propose to reduce the incidence of fires by eliminating opportunities for ignition of flammable materials.

1.0 FIRE SAFETY

1.1 Substitution: Relatively safe materials sometimes may substitute flammable liquids in order to reduce the risk of fires. Any substituted material should be stable and nontoxic, and should either be nonflammable or have a high flashpoint.

1.2 Storage: Flammable and combustible liquids require careful handling at all times. The proper storage of flammable liquids within a work area is very important in order to protect personnel from fire and other safety and health hazards.

1.3 Cabinets: Not more than 120 gallons of Class I, Class II, and Class IIIA liquids may be stored in a storage cabinet. Of this total, not more than 60 gallons may be Class I and II liquids. Not more than three such cabinets (120 gallons each) may be located in a single fire area except in an industrial area. Cabinets are to be labeled with "Flammable – Keep Fire Away" or similar language.

Table 1: Maximum Allowable Capacity of Containers and Portable Tanks

	Flammable Liquids		**Combustible Liquids**		
Container	**1A**	**1B**	**1C**	**II**	**III**
Glass or approved plastic1	1 pt[2]	1 qt[2]	1 gal	1 gal	1 gal
Metal (Other than DOT drums)	1 gal	5 gal	5 gal	5 gal	5 gal
Safety Cans	2 gal	5 gal	5 gal	5 gal	5 gal
Metal drums (DOT specifications)	60 gal	60 gal	60 gal	60 gal	60 gal
Approved portable tanks	660 gal	660 gal	660 gal	660 gal	660 gal

(1) Nearest metric size is also acceptable for the glass and plastic
(2) One gallon or nearest metric equivalent size may be used if metal and labeled with their contents.

1.4 Containers: The capacity of flammable and combustible liquid containers will be in accordance with Table 1.

1.5 Storage Inside Buildings: Where approved storage cabinets or rooms are not provided, inside storage will comply with the following basic conditions:

- The storage of any flammable or combustible liquid shall not physically obstruct a means of egress from the building or area.
- Containers of flammable or combustible liquids will remain tightly sealed except when transferred, poured or applied. Remove only that portion of liquid in the storage container required to accomplish a particular job.
- If a flammable and combustible liquid storage building is used, it will be a one-story building devoted principally to the handling and storing of flammable or combustible

liquids. The building will have 2-hour fire-rated exterior walls having no opening within 10 feet of such storage.

- Flammable paints, oils, and varnishes in 1 or 5-gallon containers, used for building maintenance purposes, may be stored temporarily in closed containers outside approved storage cabinets or room if kept at the job site for less than 10 calendar days.

1.6 Ventilation: Every inside storage room will be provided with a continuous mechanical exhaust ventilation system. To prevent the accumulation of vapors, the location of both the makeup and exhaust air openings will be arranged to provide, as far as practical, air movement directly to the exterior of the building and if ducts are used, they will not be used for any other purpose.

1.7 Elimination of Ignition Sources: All nonessential ignition sources must be eliminated where flammable liquids are used or stored. The following is a list of some of the more common potential ignition sources:

- Open flames, such as cutting and welding torches, furnaces, matches, and heaters-these sources should be kept away from flammable liquids operations. Cutting or welding on flammable liquids equipment should not be performed unless the equipment has been properly emptied and purged with a neutral gas such as nitrogen.
- Chemical sources of ignition such as motors, switched, and circuit breakers-these sources should be eliminated where flammable liquids are handled or stored. Only approved explosion-proof devices should be used in these areas.
- Mechanical sparks-these sparks can be produced as a result of friction. Only non-sparking tools should be used in areas where flammable liquids are stored or handled.
- Static sparks-these sparks can be generated as a result of electron transfer between two contacting surfaces. The electrons can discharge in a small volume, raising the temperature to above the ignition temperature. Every effort should be made to eliminate the possibility of static sparks. Also, proper bonding and grounding procedures must be followed when flammable liquids are transferred or transported.

- Smoking is prohibited in areas where flammable/combustible liquids are used and/or stored.

1.8 Removal of Incompatibles: Materials that can contribute to a flammable liquid fire should not be stored with flammable liquids. Examples are oxidizers and organic peroxides, which, on decomposition, can generate large amounts of oxygen.

1.9 Flammable Gases: Generally, flammable gases pose the same type of fire hazards as flammable liquids and their vapors. Many of the safeguards for flammable liquids also apply to flammable gases, other properties such as toxicity, reactivity, and corrosivity also

must be taken into account. Also, a gas that is flammable could produce toxic combustion products.

1.10 Fire Extinguisher: A portable fire extinguisher is a "first aid" device and is very effective when used while the fire is small. The use of fire extinguisher that matches the class of fire, by a person who is well trained, can save both lives and property. Portable fire extinguishers must be installed in workplaces regardless of other firefighting measures. The successful performance of a fire extinguisher in a fire situation largely depends on its proper selection, inspection, maintenance, and distribution.

1.11 Fire Safety Inspections/Housekeeping: Building maintenance personnel and the Safety Committee are responsible for conducting work site surveys at least annually. These surveys should include observations of worksite safety and housekeeping issues and should specifically address proper storage of chemicals and supplies, unobstructed access to fire extinguishers, and emergency evacuation routes. Also, they should determine if an emergency evacuation plan is present in work areas and that personnel are familiar with the plan. Spills are to be cleaned up immediately by the user.

1.12 Emergency Egress: Every exit will be clearly visible, or the route to it conspicuously identified in such a manner that every occupant of the building will readily know the direction of escape from any point. At no time will exits be blocked.

Any doorway or passageway which is not an exit or access to an exit but which may be mistaken for an exit will be identified by a sign reading "Not an Exit" or a sign indicating its actual use (i.e., "Storeroom"). Exits and accesses to exits will be marked by a readily visible sign. Each exit sign (other than internally illuminated signs) will be illuminated by a reliable light source providing not less than 5 foot-candles on the illuminated surface.

2.0 EMERGENCIES INVOLVING FIRES

2.1 Fire Alarms: In the event of a fire emergency, a fire alarm will sound for the building.

2.2 Evacuation Routes and Plans: Each facility shall have an emergency evacuation plan. All emergency exits shall conform to NFPA standards. Should evacuation be necessary, go to the nearest exit or stairway and proceed to an area of refuge outside the building. Do not use elevators. Should the fire involve the control panel of the elevator or the electrical system of the building, power in the building may be cut and you could be trapped between floors. Also, the elevator shaft can become a flue, lending itself to the passage and accumulation of hot gases and smoke generated by the fire.

2.3 Emergency Coordinators: Safety Representatives will assist in verifying personnel have evacuated from their assigned areas.

2.4 If You Discover a Fire:

- Activate the nearest fire alarm.
- Notify the fire department by dialing 911. Give your location, the nature of the fire, and your name.
- Notify the location manager.

2.5 If You Hear a Fire Alarm:

- Evacuate the area and close doors as you leave.
- Leave the building and move away from exits and out of the way of emergency operations.
- Assemble in a designated area.
- Report to the Safety Representatives so he/she can determine that all personnel have evacuated your area.
- Remain outside until competent authority (Physical Security, Office of Health and Safety, or your supervisor) states that it is safe to re-enter.

2.6 Evacuation Routes:

- Learn at least two escape routes, and emergency exits from your area.
- Never use an elevator as part of your escape route.
- Learn to activate a fire alarm.
- Learn to recognize alarm sounds.
- Take an active part in fire evacuation drills.

3.0 FIRE BASICS

3.1 Fire Components: Three things must be present at the same time to produce fire:

1. Enough Oxygen to sustain combustion
2. Enough Heat to reach ignition temperature
3. Some Fuel or combustible material

Together, they produce the chemical reaction that is fire. Take away any of these things and the fire will be extinguished.

3.2 Fuel Classifications: Fires are classified according to the type of fuel that is burning. If you use the wrong type of extinguisher on the wrong class of fire, you might make matters worse. It is very important to understand the four different fire (fuel) classifications:

Class A: Wood, paper, cloth, trash, plastics—solids that are not metals.

Class B: Flammable liquids—gasoline, oil, grease, acetone. Includes flammable gases.

Class C: Electrical—energized electrical equipment. As long as it is "plugged in."

Class D: Metals—potassium, sodium, aluminum, magnesium. Requires Metal-X, foam, and other special extinguishing agents.

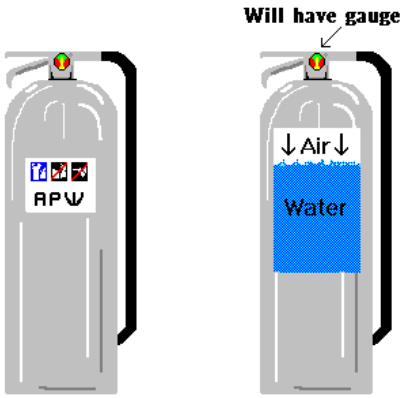
3.3 Labeling: Most fire extinguishers will have a pictograph label telling you which types of fire the extinguisher is designed to fight.

For example, a simple water extinguisher might have a label like this, which means it should only be used on Class A fires.

4.0 FIRE EXTINGUISHERS

Different types of fire extinguishers are designed to fight different classes of fire. The three most common types of fire extinguishers are:

4.1 Water (APW): These are large, silver fire extinguishers that stand about 2 feet tall and weigh about 25 pounds when full.



APW stands for "Air-Pressurized Water." Filled with ordinary tap water and pressurized air, they are essentially large squirt guns. APW's extinguish fire by taking away the "Heat" element of the Fire Triangle. APW's are designed for Class A fires **only**: wood,

paper, and cloth. Here are a couple of reasons you need to be careful about which extinguisher you use:

- Using water on a flammable liquid fire could cause the fire to spread.
- Using water on an electrical fire increases the risk of electrocution. If you have no choice but to use an APW on an electrical fire, make sure the electrical equipment is unplugged or de-energized.

APW's will be found in older buildings, particularly in public hallways. They will also be found in computer laboratories. It is important to remember, however, that computer equipment must be disconnected from its electrical source before using a water extinguisher on it.

4.2 Carbon Dioxide (CO2): CO_2 cylinders are red. They range in size from 5 pounds to 100 pounds or larger. On larger sizes, the horn will be at the end of a long, flexible hose. CO_2's will frequently be found in laboratories, mechanical rooms, kitchens, and flammable liquid storage areas. Carbon dioxide is a non-flammable gas that takes away the oxygen element of the Fire Triangle. CO_2 is very cold as it comes out of the extinguisher, so it cools the fuel as well. A CO_2 may <u>not</u> be very effective in extinguishing a Class A fire because it may not be able to displace enough oxygen to successfully put the fire out. Class A materials may also smolder and re-ignite.

4.3 Dry Chemical (ABC, BC, DC): Dry chemical extinguishers put out fire by coating the fuel with a thin layer of dust. This separates the fuel from the oxygen in the air. The powder also works to interrupt the chemical reaction of fire. These extinguishers are very effective at putting out fire. Dry chemical extinguishers come in a variety of types. You may see them labeled:

- DC (for dry chemical)
- ABC (can be used on Class A, B, or C fires)
- BC (designed for use on Class B and C fires)

It is extremely important to identify which types of dry chemical fire extinguishers are located in your area. Dry chemical extinguishers with powder designed for Class B and C fires ("BC" extinguishers) may be located in places such as commercial kitchens and areas with flammable liquids.

4.4 Selection of Extinguishers: Extinguishers will be selected according to the potential fire hazard, the construction and occupancy of facilities, hazard to be protected, and other factors pertinent to the situation.

4.5 Location and Marking of Extinguishers: Extinguishers will be conspicuously located and readily accessible for immediate use in the event of fire. They will be located along

normal paths of travel and egress. Wall recesses and/or flush-mounted cabinets will be used as extinguisher locations whenever possible.

Extinguishers will be clearly visible. In locations where visual obstruction cannot be completely avoided, directional arrows will be provided to indicate the location of extinguishers and the arrows will be marked with the extinguisher classification.

If extinguishers intended for different classes of fire are located together, they will be conspicuously marked to ensure that the proper class extinguisher selection is made at the time of a fire. Extinguisher classification markings will be located on the front of the shell above or below the extinguisher nameplate. Markings will be of a size and form to be legible from a distance of 3 feet.

4.6 Condition: Portable extinguishers will be maintained in a fully charged and operable condition. They will be kept in their designated locations at all times when not being used. When extinguishers are removed for maintenance or testing, a fully charged and operable replacement unit will be provided.

4.7 Mounting of Extinguishers: Extinguishers will be installed on hangers, brackets, in cabinets, or on shelves. Extinguishers having a gross weight not exceeding 40 pounds will be so installed that the top of the extinguisher is not more than 3-1/2 feet above the floor.

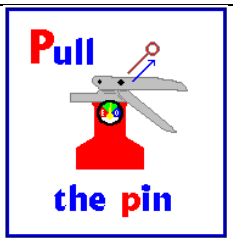
Extinguishers mounted in cabinets or wall recesses or set on shelves will be placed so that the extinguisher operating instructions face outward. The location of such extinguishers will be made conspicuous by marking the cabinet or wall recess in a contrasting color, which will distinguish it from the normal decor.

4.8 Distribution of Fire Extinguishers: Extinguishers must be distributed in such a way that the amount of time needed to travel to their location and back to the fire does not allow the fire to get out of control. OSHA requires that the travel distance for Class A and Class D extinguishers not exceed 75 feet. The maximum travel distance for Class B extinguishers is 50 feet because flammable liquid fires can get out of control faster than Class A fires. There is no maximum travel distance specified for Class C extinguishers, but they must be distributed on the basis of appropriate patterns for Class A and B hazards.

4.9 Inspection and Maintenance: Portable extinguishers or hose shall be visually inspected monthly. The employer shall assure that portable fire extinguishers are subjected to an annual maintenance check. Stored pressure extinguishers do not require an internal examination. The employer shall record the annual maintenance date and retain this record for one year after the last entry or the life of the shell, whichever is less. The record shall be available to the Assistant Secretary upon request.

5.0 FIRE EXTINGUISHER USE

5.1 The PASS Method: It is easy to remember how to use a fire extinguisher if you remember the acronym, "PASS."

Pull **Aim** **Squeeze** **Sweep**	
Pull the pin **This will allow you to discharge the extinguisher.**	
Aim at the base of the fire **Hit the fuel…if you aim at the flames, the extinguishing agent will pass right through and do no good.**	
Squeeze the top handle **This depresses a button that releases the pressurized extinguishing agent.**	
Sweep from side-to-side until the fire is completely out. **Start using the extinguisher from a safe distance away and then slowly move forward. Once the fire is out, keep an eye on the area in case it re-ignites.**	

5.2 Rules for Fighting Fires: Fires can be very dangerous and you should always be certain that you will not endanger yourself or others when attempting to put out a fire. For this reason, when a fire is discovered:

- Assist any person in immediate danger to safety if it can be accomplished without risk to yourself.
- Call 911 or activate the building fire alarm. The fire alarm will notify the fire department as well as other building occupants and shut off the air handling system to prevent the spread of smoke.
- If the fire is small (and only after having done these two things), you may attempt to use an extinguisher to put it out.

5.3 Additional Rules: Before deciding to fight the fire, keep these things in mind:

- Know what is burning. If you don't know what is burning, you won't know what kind of extinguisher to use.
- Even if you have an ABC fire extinguisher, there might be something in the fire that is going to explode or produce toxic fumes.
- Chances are you will know what is burning, or at least have a pretty good idea, but if you don't, let the fire department handle it.
- Is the fire spreading rapidly beyond the point where it started? The time to use an extinguisher is at the beginning stages of the fire.
- If the fire is already spreading quickly, it is best to simply evacuate the building.

Do not fight the fire if:

- You don't have adequate or appropriate equipment. If you don't have the correct type or large enough extinguisher, it is best not to try fighting the fire.
- You might inhale toxic smoke. When synthetic materials such as the nylon in carpeting or foam padding in a sofa burn, they can produce hydrogen cyanide, acrolein, and ammonia in addition to carbon monoxide. These gases can be fatal in very small amounts.
- Your instincts tell you not to. If you are uncomfortable with the situation for any reason, just let the fire department do their job.

The final rule is to always position yourself with an exit or means of escape at your back before you attempt to use an extinguisher to put out a fire. In case the extinguisher malfunctions, or something unexpected happens, you need to be able to get out quickly. You don't want to become trapped.

6.0 TRAINING

6.1 Content: Fire protection and extinguisher training will included the following: the fire triangle, types of fires, emergency egress, and procedures; and fire extinguisher training will include types of extinguishers, general rules, and the PASS method.

6.2 Frequency: After initial or “on hire” training, the training will be done annually or when new a hazard is introduced.

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PURPOSE

The purpose of the Fire Safety program is to prevent injury and property loss resulting from fire.

SCOPE

This program covers all employees and contractor on job sites and facilities.

1.0 DEFINITIONS

COMBUSTIBLE DUST: Dust that when suspended in the air and ignited will burn. These include agricultural dust, carbonaceous dust, chemicals, drugs, dyes, pigments, metals, alloys, and plastics.

FLAMMABLE GAS: Any gas which will burn in the normal concentration of oxygen in the air.

COMBUSTIBLE LIQUID: Liquids with a flash point at or above 100°F.

FLAMMABLE LIQUID: Liquids have flash points below 100°F and vapor pressures not exceeding 40 PSIA at 100°F.

FLASH POINT: The lowest temperature at which the vapor pressure is sufficient to produce a flammable mixture above the lower flammable limit.

VENTILATION: In this program, ventilation is considered adequate if it is sufficient to prevent accumulation of significant quantities of vapor-air mixtures in concentration over one-fourth of the lower flammable limit.

2.0 FLAMMABLE AND COMBUSTIBLE MATERIALS

2.1 Storage:

- Flammable and combustible liquids must be stored in a flammable storage cabinet or a flammable storage room when the volume exceeds an established threshold. The threshold limit depends on the flash point of the liquid.
- Liquids used for building maintenance, painting, or other similar infrequent maintenance purposes shall be permitted to be stored temporarily in closed containers outside of storage cabinets or inside liquid storage areas, if limited to an amount that does not exceed 10-day supply at anticipated rates of use.

2.2 Room:

- Flammable and combustible liquids in excess of 2 gallons per 100 ft^2 of space (not to exceed 5 gallons total) must be stored in a flammable storage cabinet.

2.3 All other facilities:

- Flammable and combustible liquids in excess of 10 gallons with the flammable portion not to exceed 5 gallons must be stored in a flammable storage cabinet.

2.4 Substitution:

- Flammable liquids sometimes may be substituted by relatively safe materials in order to reduce the risk of fires. Any substituted material should be stable and nontoxic and should either be nonflammable or have a high flash point.

2.5 Ventilation:

- Every inside storage room will be provided with a continuous mechanical exhaust ventilation system. To prevent the accumulation of vapors, the location of both the makeup and exhaust air openings will be arranged to provide, as far as practical, air movement directly to the exterior of the building and if ducts are used, they will not be used for any other purposes.
- Ventilation for storage buildings (pesticide storage buildings) does not need to be continuous. The electrical components inside the storage building need to be installed for Class 1 Division 1 atmospheres and the fan run for 15 minutes prior to person entry.

2.6 Ignition sources:

- All hot work needs to be done in accordance with the Hot Work and Confined Space Program.
- All nonessential ignition sources must be eliminated where flammable and combustibles are used or stored.

2.7 Flammable Gases:

- Generally, flammable gases pose the same type of fire hazards as flammable liquids and their vapors. Many of the safeguards for flammable liquids also apply to flammable gases, other properties such as toxicity, reactivity, and corrosiveness also must be taken into account. Also, a gas that is flammable could produce toxic combustion products.
- Flammable gas cylinders must be secured in an upright position at all times. Flammable gas cylinders must be separated from oxidizers by 20 feet or a fire-resistant barrier at least 5 feet high having a fire resistance rating of at least one-half hour.

2.8 Incompatibilities:

- Materials that can contribute to a flammable liquid fire should not be stored with flammable liquids. Examples are oxidizers and organic peroxides, which, on decomposition, can generate large amounts of oxygen.
- Review a chemical compatibility chart when storing chemicals.

2.9 Location and marking:

- Fire extinguishers placement is subject to the types of fire hazards present. If you have any questions about the spacing or location of your extinguishers, contact the Health, Safety and Environmental Coordinator, or the Division of Public Safety.
- Fire extinguishers need to be readily identifiable. This can be done by signs, painting, or reflective tape. The method chosen should be consistent throughout the facility.

2.10 Inspection and maintenance:

- Fire extinguishers need to be inspected monthly and annually. Inspections procedures are located in the General Safety Procedures Section, Inspections.

2.11 Alarm Systems and Automatic Fire Suppression Systems:

- Alarm systems and automatic fire suppression systems need to be inspected annually. The Division of Public Safety inspects alarms, emergency lights, fire extinguishers, and fire suppression equipment. Off-Campus locations may contract the inspections to a certified inspector, or have an employee trained to conduct the inspections.

3.0 FIRE PREVENTION

3.1 Housekeeping:

- Do not place boxes, paper or other items in the exit corridor while waiting for the custodial staff to discard them. Keep these materials in a room and inform the custodial staff to discard them. You may also write the word "trash" on the item(s) to be discarded by the custodial staff. Please recycle.
- Exits, exit signs, fire alarm pull stations, fire department hose cabinets, sprinkler heads, smoke detectors, fire extinguishers, emergency lights, and related safety equipment must not be obstructed from view, encroached upon, or made inaccessible at any time.

3.2 Emergency Egress:

- Emergency egress routes need to be unobstructed. This includes hallways, stairways, and around exit doors. Movable items in hallways must not reduce corridor width to less than 44 inches. This includes items such as furniture, plants vending machines, trash cans, and recycling containers.
- Movable items within 10 feet of an exit door are prohibited. This includes items such as butt cans and displays.
- Do not store any items under stairs or in stair wells.

4.0 TRAINING:

Employees are required to attend a course on fire prevention that covers the use of fire extinguishers.

5.0 REFERENCES:

NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals, 2000 Edition.

NFPA 30, Flammable and Combustible Liquids Code, 2000 Edition.

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INTRODUCTION

Electrical energy and power is almost everywhere in the work place and because it is so powerful you need to be extremely careful with it. On the average about 150 workers die from electrocution every year and many more are injured. The reasons are almost always carelessness, a faulty tool, or a lack of knowledge about how electricity really works.

To help avoid being part of the statistics it is necessary to understand how electricity works. When you pull the power trigger on a power saw you complete the circuit which allows current to flow from the generating source, through conductors, to the area of demand or load. Electrical current is always trying to get to the ground or anything that will conduct electricity. Metals are very good conductors because they offer very little resistance to the flow of electric current. The human body is also an excellent conductor of electricity. If a tool is faulty or has an exposed wire, for example, the current may try to find another path to the ground. If that path happens to be through your body, it could kill you. Possible results of electric shock are death, internal bleeding, and could destroy muscles, nerves, and organs. It depends on what current flows through your body, what path it takes, and how long your body is part of the electric circuit. That's why electrical systems should always be grounded. A safe path to ground is away from your body and confined within whatever piece of electrical equipment you're using.

1.0 EXTENSION CORDS

Extension cords are the most common electrical equipment you'll find on the job. They are also the most misused. Electrical cords must always be kept in good condition.

If an extension cord is worn or frayed don't use it. It is against PEOSH regulations to use electrical tape to repair an extension cord. The problem with doing so is that it can change the cords original flexibility and lead to internal damage. The best thing to do with a damaged extension cord is to remove from service until repaired or permanently discard of it.

Removing the equipment ground prong is against PEOSH regulations as it could end up killing somebody because the path to ground is lost. If you see a cord missing its ground prong take it out of service.

Only certain types of extension cords should be used on the job. These are cords that are designed for hard service or extra hard service. The cords should be marked with the following designations: S, SJ, ST, SJO, SO, SJT, STO, SJTO.

When using extension cords be sure to keep the areas where people work and walk clear of them so they don't create a hazard by moving them side to side.

Extension cords must be removed immediately when you're done using them. The proper way to disconnect or "unplug" power cords is to hold each by the plug and pull them away from each other or the wall outlet **by the plug**. When you pull on the cord you are likely to eventually damage the cords by pulling the insulation away from the plug.

2.0 GROUNDING OPTIONS

The most common electrical hazard at the workplace is a ground-fault electrical shock. It happens when a hot electrical wire contacts a grounded enclosure. Most portable electric tools have a grounding conductor, and many are double insulated – these methods are not 100% safe. A grounding wire could break, or a cord could become defective. Any defective equipment, extension cords or GFCI outlets will be tagged and taken out of service. PEOSH requires construction sites to have either Ground-fault Circuit Interrupters (GFCI) on electrical outlets or an Assured Equipment Grounding Conductor Program.

Metropolitan Library System employees must use GFCI equipment on all electrical cords and generators. The GFCI is a fast-acting circuit breaker that pops open as soon as it senses current leakage to the ground. It won't protect you from line to line contact hazards, but it does provide protection if grounding wire breaks or a cord becomes effective.

Electric equipment should be inspected daily. The equipment also has to be tested before its first use and after any suspected damage. Upon failure of test, competent person will fill out an incident form at that time.

3.0 LOCK-OUT-TAG-OUT

The lockout / tagout program protects you and your co-workers from accidental exposure to energized equipment or circuits on the jobsite. Lockout is turning off all and locking out the flow of electricity from a power source to a piece of equipment or circuit. This is done by installing a lockout device at the power source and placing a tag that warns others not to restore the energy. Lockout / tagout is a full program with its own section within this manual. The full lockout-tag-out program is addressed within that section.

When you see a lock and tag it's your warning that maintenance work is being done. Only the person that locked and tagged the equipment can turn it back on. Never ignore or try to remove the locks and tags of other workers when you come across them on a jobsite.

A lot of the responsibility to work safely around electricity lies with you. You have to have a healthy respect for what electricity can do for you and you need to always use safe work practices:

1. De-energize and ground equipment and circuits before you work near any part of an electrical power circuit. It you can't de-energize the equipment; it needs to be guarded by insulation or some other method.
2. Only use tools that are in good working condition. Inspect tools, cords, GFCIs, and accessories on a regular basis.
3. Use safety features like 3-prong plugs, double insulated tools, safety switches, keep machine guards in place, and follow its safety rules.
4. Use the PPE required for the job.
5. Watch out for overhead and underground power lines. This is very important because every year hundreds of workers are killed when their power tools or equipment comes in contact with power lines. Before digging or drilling make sure you know the exact location of power lines. If you're going to work near overhead power lines, these lines must either be de-energized and grounded or insulated barriers must be set up before you start. Unqualified employees and mechanical equipment must stay <u>at least 10 feet away</u> from overhead power lines. For voltages over 50,000 volts, the clearance should be increased by 4 inches for additional 10,000 volts.

If an accident should happen, never touch an electrocution victim until the power is turned off and don't try to drag the person to safety with a stick or board because you might also be electrocuted.

4.0 WET OR DAMP LOCATIONS

Work in *wet* or *damp* work *locations* (i.e., areas surrounded or near water or other liquids) should not be performed unless it is absolutely critical. Electrical work should be postponed

until the liquid can be cleaned up. The following special precautions must be incorporated while performing work in *damp locations*:

- Place a dry barrier over any wet or damp work surface;
- Remove standing water before beginning work. Work is prohibited in areas where there is standing water;
- Do not use electrical extension cords in wet or damp locations; and
- Keep electrical cords away from standing water.

5.0 LABELING OF EQUIPMENT

Equipment Labeling: Article 110.16 of the NEC 2002 code requires switchboards, panel boards, industrial control panels, and motor control centers to be field marked to warn workers of potential electric arc flash hazards.

1. The term Industrial Control Panel covers every enclosure that may contain exposed energized conductors or components.
2. Marking is intended to reduce the occurrence of serious injury or death due to arcing faults to workers working on or near energized electrical equipment.

Markings (labels) shall be located so they are visible to the personnel before examination, adjustment, servicing, or maintenance of the equipment.

6.0 REQUIREMENTS FOR TEMPORARY WIRING

Temporary electrical power and lighting installations 600 volts or less, including flexible cords, cables and extension cords, may only be used during and for renovation, maintenance, repair, or experimental work. The following additional requirements apply:

- Ground-fault protection (e.g., ground-fault circuit interrupters or GFCI) must be provided on all temporary-wiring circuits, including extension cords, used on construction sites.
- In general, all equipment and tools connected by cord and plug must be grounded. Listed or labeled double insulated tools and appliances need not be grounded.
- Feeders must originate in an approved distribution center, such as a panel board, that is rated for the voltages and currents the system is expected to carry.
- Branch circuits must originate in an approved power outlet or panel board.
- Neither bare conductors nor earth returns may be used for the wiring of any temporary circuit.
- Receptacles must be of the grounding type. Unless installed in a complete metallic raceway, each branch circuit must contain a separate equipment-grounding conductor, and all receptacles must be electrically connected to the grounding conductor.

- Flexible cords and cables must be of an approved type and suitable for the location and intended use. They may only be used for pendants, wiring of fixtures, connection of portable lamps or appliances, elevators, hoists, connection of stationary equipment where frequently interchanged, prevention of transmission of noise or vibration, data processing cables, or where needed to permit maintenance or repair. They may not be used as a substitute for the fixed wiring, where run through holes in walls, ceilings or floors, where run through doorways, windows or similar openings, where attached to building surfaces, or where concealed behind building walls, ceilings or floors.
- Suitable disconnecting switches or plug connects must be installed to permit the disconnection of all ungrounded conductors of each temporary circuit.
- Lamps for general illumination must be protected from accidental contact or damage, either by elevating the fixture or by providing a suitable guard. Hand lamps supplied by flexible cord must be equipped with a handle of molded composition or other approved material and must be equipped with a substantial bulb guard.
- Flexible cords and cables must be protected from accidental damage. Sharp corners and projections are to be avoided. Flexible cords and cables must be protected from damage when they pass through doorways or other pinch points.

7.0 WORKING ON DE-ENERGIZED EQUIPMENT

The most important principle of electrical safety is to **assume all electric circuits are energized unless each involved worker ensures they are not.** Every circuit and conductor must be tested every time work is done on them. Proper PPE must be worn until the equipment is proven to be de-energized.

- Voltage rated gloves and leather protectors must be worn
- Electrically insulated shoes should be worn
- Approved insulating mats
- Safety glasses must be worn
- The required Arc Flash PPE must also be worn

The National Fire Protection Association (NFPA) lists six steps to ensure conditions for electrically safe work.

1. Identify all sources of power to the equipment. Check applicable up-to-date drawings, diagrams, and identification tags.
2. Remove the load current, and then open the disconnecting devices for each power source.
3. Where possible, visually verify that blades of disconnecting devices are fully open, or that draw-out type circuit breakers are fully withdrawn.
4. Apply lockout/tag-out devices in accordance with a formal, written policy.
5. Test each phase conductor or circuit part with an adequately rated voltage detector to verify that the equipment is de-energized. Test each phase conductor or circuit part both phase-

to-phase and phase-to-ground. Check the voltage detector before and after each test to be sure it is working.

6. Properly ground all possible sources of induced voltage and stored electric energy (such as, capacitors) before touching. If conductors or circuit parts that are being de-energized could contact other exposed conductors or circuit parts, apply ground-connecting devices rated for the available fault current.

The process of de-energizing is "live" work and can result in an arc flash due to equipment failure.

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PURPOSE

To ensure the proper and safe use of all hand and power tools

SCOPE

The hand and power tools safety program provides guidelines to all employees for the safe use of hand and power tools.

1.0 GENERAL REQUIREMENTS

1.1 Power controls: All hand-held powered tools must be equipped with a positive on/off control or other controls such as:

- A constant pressure switch or control ("dead man's switch") that will shut off the power when the pressure is released (i.e., portable circular saws, portable power drills, and disc sanders with discs greater than 2 inches);
- A constant pressure throttle that will shut off the power when the pressure is released (i.e., gasoline powered chain saws);
- A lock-on control that allows the power to be discontinued by a single motion of the same finger or fingers that turned it on.

The operating control on hand-held power tools must be located as to minimize the possibility of its accidental operation, if such accidental operation would constitute a hazard to employees.

1.2 Electrical Connections: Before using portable power tools, inspect wiring to ensure it is not broken, loose, or frayed. If such is found, equipment must be removed from service immediately and repaired. Only low voltage electrically powered tools are authorized for use in tanks and wet areas and only explosion proof electrically powered tools are authorized for use in environments where flammable gases, highly volatile liquids, and other explosive substances are stored or used. Electrically powered tools must be powered by an electrical source that is continuously grounded. Extension cords must be properly sized to the wattage of the power tool. Electrical defects or minor shocks must be reported to the supervisor. Electric cords should not be placed where individuals may trip on them or cause the power tools they serve to be displaced from the operator's hands, resulting in injury to the operator.

1.3 Condition: All hand and power tools and similar equipment, whether furnished by the employer or the employee, shall be maintained in a safe condition. Any tool not in adequate condition is to be removed from service and tagged "Do Not Use."

2.0 GUARDING

2.1 All power-driven tools that are designed to accommodate guards must have their guards installed per the manufacturer's instructions.

2.2 Saws: Portable, power driven saws with a blade diameter greater than 2 inches must be equipped with guards above and below the base plate or shoe. These guards must cover the saw to the depth of the teeth. When the tool is withdrawn from the work, the lower guard must automatically return to the covering position.

2.3 Abrasive wheels and grinders: Portable abrasive wheels and portable grinders must be guarded on top, sides, and bottom of the wheel. The guards must be secured by a fastening in excess of the strength of the guard and the guard must be properly aligned with the wheel at all times during use. Scratch brushes used on portable power tools should be permanently guarded in the same manner as grinding wheels.

2.4 Powder Actuated Tools: Fastening tools that are actuated by explosive charges must be guarded at the muzzle end. The guard should be at least 3.5 inches in diameter and completely shield the barrel.

2.5 General: Other appropriate guards must be provided to protect the operator and other employees from hazards such as exposed belts, exposed rotating parts, flying chips, and sparks. No employee shall operate and/or cause to be operated any portable power tool without the prescribed protective devices in place.

3.0 PERSONAL PROTECTIVE EQUIPMENT

3.1 Employees using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases shall be provided with the particular personal protective equipment necessary to protect them from the hazard. All personal protective equipment shall meet the ANSI standard and be maintained according.

3.2 Eyes: Appropriate eye protection must be worn by all operators and helpers where the operation of the tools may produce flying objects or dust.

3.3 Hearing: Hearing protection must be utilized for jobs that involve the risk of loss of hearing.

3.4 Clothing: Personnel must not wear loose fitting clothing, long hair, or jewelry when working with power tools with revolving parts such as drills, saws, and grinders.

3.5 Footwear: Safety shoes are recommended for wear by those who use power tools of significant weight that may injure the operator if the tool should fall or be dropped.

3.6 Fall protection: When power tools are used in overhead places, the operator should wear a safety belt or harness to minimize the danger of falling should the tool break suddenly or shock the operator.

4.0 HOUSEKEEPING

4.1 Metal slivers, sawdust, and other debris should be cleaned from the machine using a brush or rag. NEVER use bare hands for the task. NEVER clean a machine while it is in motion. Compressed air may be used for cleaning purposes only where reduced to less

than 30 P.S.I. Eye Protection must be worn while using compressed air to clean equipment.

5.0 TRAINING

5.1 The operators of portable power tools must be thoroughly trained in the safe operation of the tools. All manufacturers' manuals and diagrams should be kept by the shop supervisor and made available to employees responsible for operating the tools. The shop supervisor should contact the manufacturers in writing or contact the Safety Committee if insufficient information on the tools could result in their unsafe operation.

5.2 Procedures for the care, inspection, and safe use of all power tools shall be established and the supervisor is responsible for implementing a program whereby all employees using tools follow these procedures.

6.0 SPECIFIC REQUIREMENTS

6.1 Portable power tools are divided into five primary groups according to the power source: electric, pneumatic, gasoline, hydraulic, and explosive (power actuated). Several types of tools, such as saws, drills, and grinders, are common to the first three groups. Hydraulic tools are mainly for compression work. Explosive tools are used exclusively for penetration work, cutting, and compression.

6.2 Electrically Powered Tools

6.2.1 Electric drills: Electric drills cause injuries in several ways. A part of the drill may be pushed into the hand, the leg, or other parts of the body. Although no guards are available for drill bits, some protection is afforded if drill bits are carefully chosen for the work to be done. The operator should select drill bits necessary to do the particular job. Oversized bits must not be ground down to fit a small drill.

6.2.2 Soldering irons: Soldering irons should have insulated, noncombustible holders to prevent fire or burns from accidental contact. Ordinary metal covering on wood tables is not sufficient because heat conducted by the metal may ignite the wood. Harmful quantities of fumes from lead soldering must not be allowed to accumulate. Ventilation may be necessary.

6.3 Air Powered Tools

6.3.1 Air hoses: An air hose presents the same tripping or stumbling hazard as cords on electric tools. Persons or materials accidentally hitting the hose may unbalance the operator or cause the tool to fall from an overhead place. Air hoses should be protected from trucks and pedestrians by runways or planks laid on either side of the hose. Do not disconnect an air hose from the tool being used, and use that air

hose for cleaning purposes. Air should be cut off before attempting to disconnect the air hose from the line. Air pressure in the hose should also be cleared before disconnecting. Eye protection is required when operating air power tools. Safety-check valves are recommended to automatically shut off air supply if a crack or leak occurs. Most pneumatic impact tools, such as jackhammers, are similar in that the proper tool is fitted into the gun and receives its impact from a rapidly moving reciprocating piston driven by compressed air at about 90 PSI pressure. Noise levels from pneumatic tools should be measured to determine if hearing protection devices for workers are necessary to comply with state and federal standards. Never operate an air hammer until the tool is resting on the work surface. Never point pneumatic equipment at other personnel. All workers in the vicinity of air hammer operations must wear eye protection and, if necessary, protective clothing. Pneumatic impact tools should have an automatic closing value actuated by a trigger located inside the handle. A retaining device must hold the tool in place so that it cannot be fired accidentally from the barrel. Jackhammer operators should wear safety shoes and jackhammers should have heavy rubber grips to reduce operator fatigue.

6.4 Gasoline Powered Tools

6.4.1 Operators must be trained on their proper operation according to the manufacturer's instructions. Operators must be familiar with fuel hazards. When five or more gallons of fuel are kept, a fire extinguisher must be readily available.

6.5 Powder Actuated Tools

6.5.1 Supervisors should evaluate materials to be penetrated by explosive actuated tools. They should ensure that correct size and strength of explosive charges and thoroughly train employees using them. These devices must be designed in accordance with American National Standards Institute A-10.3. Fasteners should not be driven into masonry closer than 3 inches to a corner or edge unless jigs or special guards are used to stop flying particles. Fasteners should not be fired into steel closer than 1/2 inch to an edge, corner, or joint. Proper eye protection must be worn during these operations. These devices must never be activated in explosive or flammable atmospheres. Tools and explosive charges must be stored in separate containers that are locked or otherwise protected from use by unauthorized individuals.

APPENDIX A: CHECKLIST

The following checklist is intended to assist the reader in determining the degree of compliance, within his/her operation, with the requirements of this procedure. Any "no" answer should be cause for concern and correction action.

General Requirements	Yes	No
Power Controls		
Are all hand held powered tools equipped with a positive on-off control, such as:		
A constant pressure switch or control ("dead man's switch") which will shut off the power when the pressure is released?	☐	☐
A constant pressure throttle which will shut off the power when the pressure is released (i.e., gasoline powered chain saws)?	☐	☐
A lock-on control which allows the power to be discontinued by a single motion of the same finger or fingers which turned it on?	☐	☐
Is the operating control on hand-held power tools located so as to minimize the potential of its accidental operation, if such accidental operation presents a hazard to employees?	☐	☐
Safe Electrical Connections		
Are employees required, before using portable power tools, to inspect the wiring to ensure that it is not broken, loose or frayed?	☐	☐
Are electrical hazards repaired immediately upon identification?	☐	☐
If not, is the equipment deadlined until repairs can be effected?	☐	☐
Are employees required to use only low voltage power tools which are authorized for use in tanks or wet areas, if such work is required?	☐	☐
Are explosion proof electrically powered tools available for use in environments where flammable gases, highly volatile liquids, and other explosive substances are stored or used?	☐	☐
Are all electrical sources for power tools continuously grounded?	☐	☐
If extension cords are necessary, is it ensured that they are properly sized to the wattage of the tool?	☐	☐
Do employees routinely report defects or minor shocks to the supervisor? Does the supervisor immediately effect repairs or deadline the defective equipment?	☐	☐
Is the area constantly surveyed to ensure that power cords do not become a tripping hazard, or that operating equipment cannot be jerked from the hands of the operator?	☐	☐
Guarding		
Are all portable, power-driven saws with a blade diameter greater than 2 inches equipped with guards above and below the base plate of the shoe?	☐	☐
Are all portable abrasive wheels and portable grinders permanently guarded on top, both sides, and bottom of the wheel?	☐	☐
Are scratch brushes used on portable power tools permanently guarded in the same manner as are grinding wheels?	☐	☐
Are fastening tools actuated by explosive charges guarded at the muzzle end?	☐	☐

Have all portable tools been inspected to ensure that the operator and other employees are protected with appropriate guarding from hazards such as exposed belts, exposed rotating parts, flying chips and sparks?	☐	☐
Have all tools without the appropriate guarding been deadlined until guarding can be effected?	☐	☐
Personal Protective Equipment		
Is appropriate personal protective equipment provided all operators and helpers, and its use required, where tools may produce flying objects or dust?	☐	☐
Has suitable hearing protection been provided and its use required for jobs which may involve the risk of hearing loss?	☐	☐
Is the wearing of loose fitting clothing, long loose hair or jewelry prohibited by employees working with power tools with revolving parts?	☐	☐
Are safety shoes provided and their use required for employees who use portable power tools of significant weight which may injure the feet should the tool fall or be dropped?	☐	☐
If power tools are used in overhead places, is the operator required to wear a safety belt or shoulder harness to minimize the danger of falling, should the tool break suddenly or shock the operator?	☐	☐
Are suitable respirators provided, their use required, and the affected employees trained in such use, when performing jobs where harmful dusts may be produced, such as buffing, grinding, sanding or mixing jobs?	☐	☐
Housekeeping		
Are brushes or rags provided to clean metal slivers, sawdust or other debris from machines? Are employees instructed to never use bare hands for this task?	☐	☐
Are employees trained to never attempt to clean a machine which is turned on?	☐	☐
If compressed air is used for cleaning tools, is the pressure 30 P.S.I or less?	☐	☐
If compressed air is used, is suitable eye protection provided and it use required while tools are being pressure cleaned?	☐	☐
Safety Procedures and Training		
Have all operators of portable power tools been thoroughly and tested in the safe operation of the tools?	☐	☐
Have all manufacturer's manuals and diagrams on file in the shop and available to employees operating the tools for reference?	☐	☐
If these materials are not on hand, has the supervisor contacted the manufacturers or worked through Environmental Health and Safety to obtain the necessary information to ensure safe operation of the machines?	☐	☐
Has the supervisor established procedures for the care, inspection and safe use of all power tools in the shop?	☐	☐
Specific Recommendations for Safe Use of Portable Power Tools		
Electrically Powered Tools		
Are employees who may use electric drills trained to:		
Carefully choose the correct drill for the job?	☐	☐
Never ground down an oversized bit to fit a small drill?	☐	☐
Are employees who may use soldering irons trained to:		
Ensure that soldering irons have insulated, noncombustible holders, and to never place the hot iron down on tables or workbenches?	☐	☐

Appropriately exhaust the area, should they be soldering lead that may create harmful quantities of fumes?	☐	☐
Are employees who may use air hoses trained to:		
Remember that the air hoses present a tripping hazard, to make every effort to warn co-workers of the location of the hose or otherwise minimize its potential to cause falls or unbalance materials?	☐	☐
Place planks on either side of the hose to protect it from vehicle and pedestrian traffic?	☐	☐
Never disconnect the air hose from the tool being used in order to use the hose for cleaning purposes?	☐	☐
To turn off air prior to attempting to disconnect the hose from the line, and clear the air pressure from the hose before disconnecting?	☐	☐
To use eye protection at all times when using the air hose?	☐	☐
Ensure the safety-check valve is operating to automatically shut off air supply should a crack or leak occur?	☐	☐
Are pneumatic impact tool operators trained to:		
Never operate an air hammer until the tool is resting on the work surface?	☐	☐
Never point pneumatic equipment at other people?	☐	☐
Ensure that all workers in the vicinity of air hammer operations wear eye protection and, if necessary, protective clothing?	☐	☐
Use pneumatic impact tools with an automatic closing valve actuated by a trigger located inside the handle where it is safe from accidental operation?	☐	☐
Ensure that the machine has a retaining device to hold the tool in place so that it cannot be fired accidentally from the barrel?	☐	☐
Wear safety shoes when operating jackhammers and ensure that the jackhammers have heavy rubber grips to reduce operator fatigue?	☐	☐
Gasoline-Powered Tools		
Are operators of gasoline powered tools trained the safe handling of fuel?	☐	☐
Explosive Actuated Tools		
Does the supervisor evaluate materials to be penetrated by explosive actuated tools to ensure that the correct size and strength of explosive charges is implemented?	☐	☐
Are employees thoroughly trained by the supervisor on this equipment prior to their using it?	☐	☐
Are all explosive devices designed in accordance with American National Standards Institute A-10.3?	☐	☐
Are employees trained that fasteners should not be driven into masonry closer than 3 inches from a corner or edge unless jigs or special guards are used to stop flying particles?	☐	☐
Are they trained that fasteners should not be fired into steel closer than 1/2 inch from an edge, corner or joint?	☐	☐
Is appropriate eye protection provided and its use required?	☐	☐
Is the activation of these devices prohibited in explosive or flammable atmospheres?	☐	☐
Are tools and explosive charges stored in separate containers, which are locked or otherwise protected from use by an unauthorized individual?	☐	☐

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PURPOSE

The purpose of this program is to ensure that all Metropolitan Library System employees, working in outdoor places of employment or in other areas when environmental risk factors for heat illness are present, are protected from heat illness and are knowledgeable of heat illness symptoms, methods to prevent illness, and procedures to follow if symptoms occur. The most common physical factors that can contribute to heat related illness are type of work, level of physical activity and duration, and clothing color, weight and breathability.

SCOPE

The Heat Illness Prevention Program applies to all employees that may be at risk of heat illness and applies to all indoor and outdoor places of employment where environmental risk factors for heat illness are present.

1.0 DEFINITIONS

Acclimatization - The temporary adaptation of the body to work in the heat that occurs gradually when a person is exposed to it. Acclimatization peaks in most people within four to fourteen days of regular work for at least two hours per day in the heat.

Heat Illness - A serious medical condition resulting from the body's inability to cope with a particular heat load, and includes heat cramps, heat exhaustion, heat syncope and heat stroke.

Environmental risk factors for heat illness - Working conditions that create the possibility that heat illness could occur, including air temperature, relative humidity, radiant heat from the sun and other sources, conductive heat sources such as the ground, air movement, workload severity and duration, protective clothing and personal protective equipment worn by employees.

Personal risk factors for heat illness - Factors such as an individual's age, degree of acclimatization, health, water consumption, alcohol consumption, caffeine consumption, and use of prescription medications that affects the body's water retention or other physiological responses to heat.

Preventative recovery period - A period of time, at least five minutes, used to recover from the heat in order to prevent further heat illness.

Shade - Blockage of direct sunlight. Canopies, umbrellas and other temporary structures or devices may be used to provide shade. One indicator that blockage is sufficient is when objects do not cast a shadow in the area of blocked sunlight. Shade is not adequate when heat in the area of shade defeats the purpose of shade, which is to allow the body to cool. For example, a car sitting in the sun does not provide acceptable shade to a person inside it, unless the car is running with air conditioning.

2.0 RESPONSIBILITIES

2.1 Employees

- Awareness and compliance with all appropriate heat illness prevention procedures while performing assigned duties
- Employees are ultimately responsible for drinking adequate amounts of hydrating fluids when the environmental risk factors for heat illness are present
- Ensure access to a shaded area is available to recover from heat related symptoms
- Inform their supervisor if shade and/or water is inadequate
- Report symptoms of heat related illness promptly to their supervisor
- Call 911 to request emergency medical services in the event medical assistance is required

2.2 Supervisors

- Identify and maintain records of all tasks/employees that are required to work outdoors where potential heat illness could occur
- Require all affected employees receive proper training on heat illness prevention and comply with all appropriate procedures
- Ensure that adequate water and shade are available at the job site when the environmental risk factors for heat illness are present
- Encourage employees to drink water frequently
- Call 911 to request emergency medical services in the event medical assistance is required
- Consider personal factors before assigning work where there is possible exposure to heat related injury

2.3 Safety Committee

- Establish and update the written Heat Illness Prevention Program
- Provide consultation/training to departments who fall within the scope of the program
- Assist departments in determining when, where, and how water and shade is provided

3.0 PROGRAM

The following elements of Metropolitan Library System program for heat illness provide specific information for departments and supervisors complying with the program:

3.1 Provision of Water: Whenever environmental risk factors for heat illness exist, supervisors are responsible to ensure that clean, fresh, and cool potable water is readily available to employees.

Where unlimited drinking water is not immediately available from a plumbed system, supervisors must provide enough water for every employee to be able to drink one quart of water per hour for the entire shift (at least 2 gallons per employee for an 8-hour shift). Smaller quantities of water may be provided at the beginning of the shift if there are effective procedures for replenishing the water supply during the shift as needed.

The program requires not only that water be provided, but that supervisors encourage employees to drink frequently. Employees must be understand that thirst is not an effective indicator of a persons need for water and it is recommended that individuals drink one quart of water, or four 8-ounce cups, per hour when working in hot environments.

Crews shall take one or more of the following steps to ensure employees have access to drinking water:

- Provide access to drinking fountains
- Supply water cooler/dispenser and single service cups
- Supply sealed one time use water containers

Drinking water and water dispensers shall meet the following requirements:

- All sources of drinking water shall be maintained in a clean and sanitary condition
- Drinking water must always be kept cool. When temperatures exceed 90° F it is recommended that ice be provided to keep the water cool.
- Potable drinking water dispensers used to provide water to more than one person shall be equipped with a spigot or faucet
- Any container used to store or dispense drinking water shall be clearly marked as to the nature of its contents and shall not be used for any other purpose
- Dipping or pouring drinking water from containers, such as barrels, pails or tanks, is prohibited regardless of whether or not the containers are fitted with covers
- The use of shared cups, glasses or other vessels for drinking purposes is prohibited
- Non-potable water shall not be used for drinking
- Outlets for non-potable water shall be posted in a manner understandable to all employees that the water is unsafe for drinking

3.2 Access to Shade: Supervisors are responsible to ensure that employees have access to a shaded area. Shaded areas should be large enough to accommodate 25 percent of the employees on a shift and allow employees to sit in the shade without touching each other.

The nearest shaded area must be as close as practicable. Usually this will mean that shade must be reachable within a 2 1/2 minute walk, but in no case more than 1/4-mile or a five minute walk away, whichever is shorter.

Canopies, umbrellas or other temporary structures may be used to provide shade, provided they block direct sunlight. Trees and dense vines can provide shade if the canopy of the trees is sufficiently dense to provide substantially complete blockage of direct sunlight. Areas shaded by artificial or mechanical means, such as by a pop-up canopy as opposed to a tree, must provide means for employees to avoid contact with bare soil.

The interior of a vehicle may be used to provide shade if the vehicle is air-conditioned and the air conditioner is operating.

If the National Weather Service, as of 5 p.m. the previous day, forecasts the temperature to be over 85° F, shade structures must be available at the beginning of the shift and present throughout the day. Regardless of predicted temperatures, supervisors must always have the capability to provide shade promptly if it is requested by an employee.

If the temperature exceeds 90° F, shade must actually be present regardless of the previous day's predicted temperature high.

3.3 Acclimatization: Supervisors are required to acclimatize employees and allow time to adapt when temperatures rise suddenly and employee risks for heat illness increase. Acclimatization may also be required for new employees, employees working at temperatures to which they haven't been exposed for several weeks or longer, or employees assigned to new jobs in hot environments.

Generally, about four to fourteen days of daily heat exposure is needed for acclimatization. Heat acclimatization requires a minimum daily heat exposure of about two hours of work. Gradually increase the length of work each day until an appropriate schedule adapted to the required activity level for the work environment is achieved. This will allow the employee to acclimate to conditions of heat while reducing the risk of heat illness.

It should be noted that new employees are among those most at risk of suffering the consequences of inadequate acclimatization. Supervisors with new employees should be extra-vigilant during the acclimatization period and respond immediately to signs and symptoms of possible heat illness.

3.4 Preventive Recovery Periods: The purpose of the recovery period is prevention of heat illness. The supervisor is required to provide access to shade for employees who believe they need a preventive recovery period from the effects of heat and for any who exhibit indications of heat illness.

Access to shade must be allowed at all times, and employees must be allowed to remain in the shade for at least five minutes.

The purpose of the preventive recovery period is to reduce heat stress on the employee. The preventive recovery period is not a substitute for medical treatment.

3.5 Emergency Procedures: If an employee has any symptoms of heat illness, first-aid procedures should be initiated without delay. Common early signs and symptoms of heat illness include headache, muscle cramps, and unusual fatigue. However, progression to more serious illness can be rapid, and can include loss of consciousness, seizures, mental confusion, unusual behavior, nausea or vomiting, hot dry skin, or unusually profuse sweating.

Any employee exhibiting any of the above-mentioned symptoms requires immediate attention. Even the initial symptoms may indicate serious heat exposure. If medical personnel are not immediately available onsite and serious heat illness is suspected, emergency medical personnel should be immediately contacted and on-site first aid

undertaken. No employee with symptoms of possible serious heat illness should be left unattended or sent home without medical assessment and authorization.

All Supervisors and employees must be trained to recognize and respond to symptoms of possible heat illness.

If any employee exhibits signs or symptoms of heat stroke emergency medical services must be contacted. Supervisors must be able to provide clear and precise directions to the worksite and should carry cell phones or other means of communication to ensure that emergency services can be called.

4.0 HOT WEATHER HEALTH EMERGENCIES

Even short periods of high temperatures can cause serious health problems. Doing too much on a hot day, spending too much time in the sun or staying too long in an overheated place can cause heat-related illnesses. Know the symptoms of heat disorders and overexposure to the sun, and be ready to give first aid treatment.

4.1 Heat Stroke: Heat stroke occurs when the body is unable to regulate its temperature. The body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. Body temperature may rise to 106°F or higher within 10 to 15 minutes. Heat stroke can cause death or permanent disability if emergency treatment is not provided.

- Recognizing Heat Stroke: Warning signs of heat stroke vary but may include the following:

  - An extremely high body temperature (above 103°F, orally)
  - Red, hot, and dry skin (no sweating)
  - Rapid, strong pulse
  - Throbbing headache
  - Dizziness
  - Nausea
  - Confusion
  - Unconsciousness

- What to Do: If you see any of these signs, you may be dealing with a life-threatening emergency. Have someone call for immediate medical assistance while you begin cooling the victim. Do the following:

  - Get the victim to a shady area.
  - Cool the victim rapidly using whatever methods you can. For example, immerse the victim in a tub of cool water; place the person in a cool shower; spray the victim with cool water from a garden hose; sponge the person with cool water; or

if the humidity is low, wrap the victim in a cool, wet sheet and fan him or her vigorously.

- Monitor body temperature, and continue cooling efforts until the body temperature drops to 101-102°F.
- If emergency medical personnel are delayed, call the hospital emergency room for further instructions.
- Do not give the victim fluids to drink.
- Get medical assistance as soon as possible.

Sometimes a victim's muscles will begin to twitch uncontrollably as a result of heat stroke. If this happens, keep the victim from injuring himself, but do not place any object in the mouth and do not give fluids. If there is vomiting, make sure the airway remains open by turning the victim on his or her side.

4.2 Heat Exhaustion: Heat exhaustion is a milder form of heat-related illness that can develop after several days of exposure to high temperatures and inadequate or unbalanced replacement of fluids. It is the body's response to an excessive loss of the water and salt contained in sweat. Those most prone to heat exhaustion are elderly people, people with high blood pressure, and people working or exercising in a hot environment.

- Recognizing Heat Exhaustion: Warning signs of heat exhaustion include the following:

  - Heavy sweating
  - Paleness
  - Muscle cramps
  - Tiredness
  - Weakness
  - Dizziness
  - Headache
  - Nausea or vomiting
  - Fainting

  The skin may be cool and moist. The victim's pulse rate will be fast and weak, and breathing will be fast and shallow. If heat exhaustion is untreated, it may progress to heat stroke. Seek medical attention immediately if any of the following occurs:

  - Symptoms are severe
  - The victim has heart problems or high blood pressure

  Otherwise, help the victim to cool off, and seek medical attention if symptoms worsen or last longer than 1 hour.

- What to Do: Cooling measures that may be effective include the following:

  - Cool, nonalcoholic beverages
  - Rest
  - Cool shower, bath, or sponge bath
  - An air-conditioned environment
  - Lightweight clothing

4.3 Heat Cramps: Heat cramps usually affect people who sweat a lot during strenuous activity. This sweating depletes the body's salt and moisture. The low salt level in the muscles may be the cause of heat cramps. Heat cramps may also be a symptom of heat exhaustion.

- Recognizing Heat Cramps: Heat cramps are muscle pains or spasms—usually in the abdomen, arms, or legs—that may occur in association with strenuous activity. If you have heart problems or are on a low-sodium diet, get medical attention for heat cramps.

- What to Do: If medical attention is not necessary, take these steps:

  - Stop all activity and sit quietly in a cool place.
  - Drink clear juice or a sports beverage.
  - Do not return to strenuous activity for a few hours after the cramps subside, because further exertion may lead to heat exhaustion or heat stroke.
  - Seek medical attention for heat cramps if they do not subside in 1 hour.

4.4 Sunburn: Sunburn should be avoided because it damages the skin. Although the discomfort is usually minor and healing often occurs in about a week, a more severe sunburn may require medical attention.

- Recognizing Sunburn: Symptoms of sunburn are well known: the skin becomes red, painful, and abnormally warm after sun exposure.

- What to Do: Consult a doctor if the sunburn affects an infant younger than 1 year of age or if these symptoms are present:

  - Fever
  - Fluid-filled blisters
  - Severe pain

  Also, remember these tips when treating sunburn:

  - Avoid repeated sun exposure.
  - Apply cold compresses or immerse the sunburned area in cool water.

- Apply moisturizing lotion to affected areas. Do not use salve, butter, or ointment.
- Do not break blisters.

4.5 Heat Rash: Heat rash is a skin irritation caused by excessive sweating during hot, humid weather. It can occur at any age but is most common in young children.

- Recognizing Heat Rash: Heat rash looks like a red cluster of pimples or small blisters. It is more likely to occur on the neck and upper chest, in the groin, under the breasts, and in elbow creases.

- What to Do: The best treatment for heat rash is to provide a cooler, less humid environment. Keep the affected area dry. Dusting powder may be used to increase comfort.

  Treating heat rash is simple and usually does not require medical assistance. Other heat-related problems can be much more severe.

5.0 REPORTING REQUIREMENTS

5.1 Reporting: Employees may report any safety concerns to their supervisor or the Safety Committee.

5.2 Warnings: Supervisors may issue warnings to employees and implement disciplinary actions up to and including termination for failure to follow the guidelines of this program.

6.0 TRAINING REQUIREMENTS AND COMPETENCY ASSESSMENT

6.1 Training Provisions: Training shall be provided by the Safety Committee for all potentially impacted employees, and their supervisors, working where environmental risk factors for heat illness are present. Training information shall include, but not be limited to:

- Environmental and personal risk factors for heat illness
- Procedures for identifying, evaluating, and controlling exposure to environmental risk factors for heat illness
- The importance of frequent consumption of hydrating fluids, up to 1 quart (4 cups of water) per hour, when environmental risk factors for heat illness are present. Particularly when employee is excessively sweating during the exposure
- The importance of acclimatization
- Different types of heat illness and the common signs and symptoms of heat illness
- The importance of immediately reporting symptoms or signs of heat illness, in themselves or in co-workers, to their supervisor

- Understanding the procedures for contacting emergency medical services, and if necessary, for transporting employees to a point where they can be reached by emergency medical service
- Procedures for ensuring that, in the event of an emergency, clear and precise direction to the work site can and will be provided to emergency responders

6.2 Supervisor Training: Supervisors shall receive training on the following topics prior to being assigned to supervise outdoor employees.

- The training information required of the employees, detailed above
- Procedures supervisors are to follow to implement the provisions of this program
- Procedures the supervisor shall follow when an employee exhibits symptoms consistent with possible heat illness, including emergency response procedures

6.3 Retraining: Retraining will be required under any of the following conditions:

- Changes in the workplace render previous training obsolete
- Inadequacies in an employee's knowledge of heat illness prevention indicate that the employee has not retained the required training

6.4 Record Retention: Training records shall be maintained by EH&S for a minimum of 3 years.

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PURPOSE

The Ladder Safety Program is intended to guide Metropolitan Library System employees in the safe use, care, and maintenance of ladders.

SCOPE

This program applies to any employee who uses a portable ladder.

1.0 RESPONSIBILITIES

1.1 Safety Committee: The Safety Committee is responsible for the following:

- Implementation of this program
- Ensuring that all employees who use ladders are trained
- Ensuring that that frequent and annual inspections are performed

1.2 Employees: Employees are required to:

- Comply with this program at all times
- Report any unsafe ladders to the Safety Committee
- Only use ladders for their intended purpose.

2.0 WORK PRACTICES

2.1 Ladder Selection: Ladders should be chosen based on the type of work to be done, intended load to be applied, and height needed to be accessed. Ladders must meet PEOSH/ANSI specifications.

2.2 Selection Based on Type of Work: The type of work should be taken into consideration when selecting a ladder. For example, metal ladders should be avoided for work on or around energized electrical components. Assess the work area to determine the best type of ladder for the situation.

2.3 Selection Based on Intended Load: Ladders are available with a variety of load ratings. The load ratings range from 200lbs to more than 350lbs. The user, required tools, and materials should all be taken into account when choosing the properly rated ladder.

2.4 Selection Based on Height: Different ladders are available for different height applications. While step ladders often offer better stability, they are limited to 20 feet in height. To access heights greater than 20 feet, a multi-section extension ladder can be used. Extension ladders can reach up to 48 feet.

2.5 Ladder Placement: Ladders should be placed using the following guidelines:

- Always check for potential electrocution hazards before positioning any kind of ladder.
- When setting up a ladder, maintain a proper angle by placing the base a distance from the vertical wall equal to one-fourth the working length of the ladder.
- Set the ladder base section on a secure footing that is firm, level, and free of debris and other materials. Do not use a ladder that wobbles or leans to the left or right of center. Do not place ladders on top of boxes or other unstable bases to gain additional height. Ladders placed on uneven footing must be secured against displacement.

- Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet are not a substitute for care in placing, lashing, or holding a ladder that is used on a slippery surface.
- Ladders that must be placed in doorways, halls, or other locations where they can be displaced by workplace activities or traffic shall be secured to prevent accidental displacement. Lock the door, have someone stand guard, or erect a barricade around the work area to keep the activities and traffic away from the ladder.
- The top of a non-self-supporting ladder shall be placed with the two rails supported equally, unless it is equipped with a single support attachment.
- When using a ladder to access a high landing, extend the top of the ladder at least three feet above the edge of the landing. If this is not possible, then the top of the ladder must be secured to a rigid support that will not deflect and a grabrail or other device provided to help the user get on and off the ladder.
- Do not try to move, shift or extend a ladder while it is in use.
- Do not use a ladder as a horizontal platform, runway or scaffold, or for any purpose other than that for which the ladder is designed.

2.6 Ladder Climbing: Rules for climbing ladders:

- Always face the ladder when climbing up or down.
- Do not get on or off a ladder from the side or back.
- Allow only one person at time on a ladder.
- Maintain a three-point contact by keeping both hands and one foot or both feet and one hand on the ladder at all times when climbing up or down.
- Do not carry any object or load that could cause you to fall or lose your balance.
- When performing work on a ladder, keep your body aligned with the center of the steps/rungs to avoid extreme reaching or side loading. Do not lean backwards.

2.7 Additional Guidelines for Step Ladders:

- Keep all four legs of the ladder in contact with the footing support.
- Never close a step ladder and lean it against something to use it in that position.
- Check that the spreaders are locked in the fully opened position.
- Do not use the rear braces as steps unless they have been specifically designed to be used as steps by the manufacturer.
- Do not stand or climb on the top two steps.

3.0 INSPECTION AND MAINTENANCE

3.1 Inspection Frequency: Ladders are required to be inspected by a competent person on a periodic basis. What is considered periodic will be determined by the amount of use the ladder receives.

- Light use (less than once per week): Inspect monthly
- Medium use (several time per week): Inspect weekly
- Heavy use (every day): Inspect daily

3.2 Inspection Criteria: A ladder inspection should include:

- Wooden parts shall be free of sharp edges, splinters, cracks, or decay. Metal ladders shall be free of slivers or dents that would compromise structural integrity. Fiberglass ladders should be free of cracks and splits and excessive UV damage.
- Joints between the steps/rungs and sides must be tight. Rungs should not move when twisted by hand.
- Hardware and fittings shall be securely attached.
- Moveable parts must operate freely (lubricate, if necessary), but without undue play.
- Rope, if present, must be replaced if frayed or badly worn.
- Safety feet shall be in place and unbroken. Metal ladders must have insulating, non-slip foot pads.
- Rungs/steps shall be free of grease, oil, or other slippery substances. Remove any buildup of dirt or mud, as well. Rungs on metal ladders must be corrugated, knurled, dimpled, or coated with a slip-resistant material.
- No rungs/steps shall be missing or defective.
- Ladders may not be painted or coated with any material that might hide defects. Labels should be placed on only one face of side rails.
- Step ladders must have a metal spreader or locking device of sufficient size and strength to securely hold the ladder in an open position. Any sharp points on the spreader must be covered or removed.

3.3 Removal from Service: Any ladder found to be defective in any way must be removed from service immediately. Any ladder taken out of service needs to be marked “Do Not Use.”

3.4 Ladder Repair: Ladders that are capable of being repaired must be restored to a condition meeting its original design criteria.

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PURPOSE

Control of hazardous energy is the purpose of the Lockout/Tagout Program. This plan establishes the requirements for isolation of both kinetic and potential energy – electrical, chemical, thermal, hydraulic and pneumatic, and gravitational energy prior to equipment repair, adjustment, or removal.

SCOPE

The requirements of the Lockout/Tagout Program apply to all Metropolitan Library System employees. For the purposes of this standard and the procedures outlined in this manual, employees will be divided into three distinct categories when a lockout procedure is performed — *authorized*, *affected*, and *other*. These roles are defined in Section 1.0.

1.0 EMPLOYEES

If an employee falls into more than one category, the more stringent category (i.e., affected rather than other, authorized rather than affected or other) shall apply.

1.1 Authorized employee: The personnel responsible for removing power from a machine or piece of equipment (by disengaging a circuit breaker, utilizing a safety mechanism, etc.), securing such changes, and repairing or performing necessary maintenance on the piece of equipment. Only authorized employees are allowed to perform the lockout/tagout procedures, and any person or persons assisting this employee are required to be trained to the level of authorized employee. These employees must be fully knowledgeable in the forms of hazardous energy and proper procedures for lockout/tagout; they are responsible for overseeing the entire lockout/tagout procedure.

1.2 Affected employee: Any employee working in the same general area as the authorized employee and/or the machinery/piece of equipment being serviced is said to be an affected employee. Affected employees must be fully knowledgeable in the purpose and application of the lockout/tagout procedures, i.e. they must be thoroughly familiar with all the concepts of lockout/tagout operation.

1.3 Other employee: Employees that may, on occasion, come into contact with the lockout/tagout operation. They must know what a lockout/tagout operation is and know not to tamper with a lock or tag. The primary difference between an affected employee and another employee is that an affected employee is one working in close proximity to an authorized employee, while another employee will contact the lockout tagout operation only coincidentally.

2.0 APPLICATION OF THE STANDARD

2.1 Requirement for Lockout/Tagout: A lockout/tagout procedure must be in place for any machine or other piece of equipment at for which the potential for injury to an employee is present, the item is unintentionally energized, or otherwise experiences a release of energy. These procedures are to be followed any time service, maintenance, or repair procedures are being applied to the piece of equipment in question. Normal operations on and minor adjustments to the machine are covered as follows:

2.2 Lockout/tagout procedures must be followed if:

- An employee is required to remove or bypass any safety device on the machine when performing an adjustment (see possible exception below).
- An employee is required to place any part of his/her body into an area on the piece of equipment where work is actually performed on the material being processed (see possible exception below).

2.3 Lockout/tagout procedures do not apply if:

- Minor tool changes, adjustments, and other incidental servicing activities taking place during normal operating procedures are not covered by the lockout/tagout standard if:
  (a) such actions are routine, repetitive, and integral to the normal use of the equipment.
  (b) the action is performed using an alternate, effective form of protection.
  (c) testing or positioning of machines, equipment, or components is taking place.
- The danger of unexpected startup or energize of the piece of equipment in question is controlled solely by a power cord/plug, and that plug is under the exclusive control of the person performing the maintenance procedure.
- Hot tap operations involving the distribution of gas, steam, water, or petroleum products in pressurized pipelines are not covered, provided it can be shown the following three conditions apply:

  - Service continuity is essential;
  - Shutting down the system is not practical;
  - Other documented safety procedures are followed and all employees involved in the process utilize special safety equipment with proven effectiveness.

3.0 RESPONSIBILITIES

3.1 Safety Committee

- Evaluate work being performed and determine compliance with this program.
- Provide or assist in the task of specific training for work qualifications.
- Training recordkeeping.
- Periodically review and update this written program.
- Provide or coordinate general training for work units on the content of this program.
- Evaluate the overall effectiveness of the electrical safety program on a periodic basis.
- Assist work units in the implementation of this program.

3.2 Supervisors

- Promote safety awareness to all employees.
- Ensure employees comply with ALL provisions of the safety program.
- Ensure employees receive training appropriate to their assigned tasks and maintain documentation of such training.
- Develop and maintain a listing of all qualified employees under their supervision.
- Ensure employees are provided with and use appropriate protective equipment.

3.3 Employees

- Follow the work practices described in this document, including the use of appropriate protective equipment and tools.
- Attend all training required relative to this program.
- Immediately report any concerns related to safety to supervision.

4.0 TRAINING

4.1 Training: It is the employer's responsibility to ensure that all employees are trained to the appropriate level according to their level of exposure. This training will be performed by a qualified trainer, who will familiarize each person with:

- The information contained in this manual
- Basic lockout/tagout procedures specific to each machine, as applicable

4.2 Testing: Employees will be tested by the instructor to ensure they are fully competent in the lockout/tagout procedures. Only after successfully completing this test will an employee be deemed "trained."

4.3 Documentation: The Safety Committee will maintain a file with all lockout/tagout training documentation. All training documents must be signed and certified. Supervisors must document every lock, hasp, and tag assigned to an individual employee. This documentation will enable management to identify employees involved in lockout/tagout procedures.

4.4 Retraining: Employees will be retrained when there is a change:

- In their job assignment
- In the machines
- In the energy control procedures

Retraining will also take place if a new hazard is introduced.

5.0 PHYSICAL REQUIREMENTS OF LO / TO DEVICES

Characteristic	***Lockout Device***	***Tagout Device***
Durability	All lockout devices used must be capable of withstanding the environment into which they will be placed for the maximum expected period of time the exposure will last.	All tagout devices used must: ➢ Be capable of withstanding the environment into which they will be placed for the maximum expected period of time the exposure will last. ➢ Be of a nature that will prevent weather or moisture from making the message on the tag illegible. ➢ Be constructed so as to not deteriorate if used in corrosive environments, such as areas where acids are stored.
Standardization	All lockout devices must be standardized by color, shape, and/or size.	All tagout devices in a facility must be standardized in the print and format used, as well as at least one of the following criteria: ➢ Color ➢ Shape ➢ Size
Substance	All lockout devices must be substantial enough to prevent removal without the use of excessive means, such as bolt cutters, welding torch, or the like.	All tagout devices (and their means of attachment) must be substantial enough to prevent inadvertent or accidental removal. They should be of a single-use type, attachable by hand, self-locking, and non-releasable, with a minimum unlocking strength of at least 50 pounds. They should follow the same general design and characteristics of a one-piece, all environment-tolerant, nylon, cable tie.
Identifiable	All lockout devices should carry the identity of the person applying the device.	All tagout devices should carry the identity of the person applying the device. They should also include a legend such as “Do Not Start”, “Do Not Operate”, etc.

6.0 WET OR DAMP LOCATIONS

Work in *wet* or *damp* work *locations* (i.e., areas surrounded or near water or other liquids) should not be performed unless it is absolutely critical. Electrical work should be postponed until the liquid can be cleaned up.

6.1 Precautions: The following special precautions must be incorporated while performing work in *damp locations*:

- Only use electrical cords that have Ground Fault Circuit Interrupters (GFCIs).
- Place a dry barrier over any wet or damp work surface.
- Remove standing water before beginning work. Work is prohibited in areas where there is standing water.
- Do not use electrical extension cords in wet or damp locations.
- Keep electrical cords away from standing water.

6.2 Testing: Before any contact with wet or damp location, employees will test the location's surfaces for the presence of an electrical charge.

7.0 LOCKOUT / TAGOUT PROCEDURES

7.1 Preparation for Shutdown: Before an authorized or affected employee turns off a machine or equipment, the employee shall have knowledge of the type of energy (kinetic or potential), the hazards of the energy, and the method or means to control the energy. All affected employees in the area must be notified of the intended lockout /tagout procedure.

7.2 Machine or Equipment Shutdown: The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. Employees must utilize proper shutdown to avoid any additional or increased hazard(s) to employees as a result of powering down the equipment in an unauthorized manner.

7.3 Machine or Equipment Isolation: All energy isolating devices needed to control the flow of energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).

7.4 Lockout/Tagout Device Application:

- Each authorized employee must use their own unique lock and tagout when isolating device.
- Lockout/tagout devices shall be affixed to each energized isolating device by authorized employees and will contain the name of the employee affixing the device.
- Lockout devices, where used, shall be affixed in a manner that will hold the energy-isolating device in a "safe" or "off" position.
- Tagout devices, where used, shall be fastened at the same point as the lockout device.

- Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.

7.5 Stored Energy Isolation: Following the application of lockout/tagout devices to energy isolating devices, all potential hazardous stored energy shall be relieved, bled, blocked, braced, restrained, or otherwise rendered safe. If there is a possibility of re-accumulation of stored energy to a hazardous level, verification of isolation shall be continued until servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

7.6 Verification of Isolation: Prior to starting work on machines or equipment that have been locked out, the authorized employee shall:

- Verify isolation and de-energization of the machine or equipment was accomplished.
- Remove all affected personnel from the area first.
- Double-check the locks and tags to prevent the energy isolating devices from complete movement.
- Check any circuit panels with voltmeters to ensure locked out energy is with the correct circuit.
- Try to start up the machinery or equipment through normal starting procedures.
- Return all buttons and switches to their OFF or NEUTRAL positions.

7.7 Group Lockout/Tagout: Group lockout/tagout devices shall be used in accordance with the procedures required including, but not necessarily limited to, the following specific requirements:

- Primary responsibility is vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device (such as an operations lock);
- Provision for the authorized employee to ascertain the exposure status of individual group members with regard to the lockout or tagout of the machine or equipment.
- When more than one crew, craft, department, etc. is involved, assignment of overall job-associated lockout or tagout control responsibility to an authorized employee designated to coordinate affected work forces and ensure continuity of protection; and
- Each authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and the employee shall remove those devices when he or she stops working on the machine, or when equipment is being serviced or maintained.

7.8 Maintenance: When service and/or maintenance is performed by a crew, craft, department, or other group, they shall utilize a procedure which affords the employees a

level of protection equivalent to that provided by the implementation of a personal lockout or tagout device. Basic steps to be taken:

1. Ensure energy isolation point is guarded while doing maintenance.
2. Look for all possible and unforeseen hazards that might have been overlooked while applying lockout/tagout.
3. Don't bypass or eliminate lockouts if installing new piping or electrical wiring and creating a new circuit or energy flow.
4. On shift changes, employees will give a status report, exchange energy controlling devices (locks), and check and fill out paperwork.
5. Testing or positioning of machines, equipment, or components thereof. In situations in which lockout or tagout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment, or component thereof, the following sequence of actions shall be followed:

   - Clear the machine or equipment of tools and materials.
   - Remove employees from the machine or equipment area.
   - Energize and proceed with testing or positioning.
   - De-energize all systems and reapply energy control measures to continue the servicing and/or maintenance.

7.9 Lockout/Tagout Removal: Before lockout/tagout devices are removed and energy is restored to the machine or equipment, authorized employee(s) shall:

1. Inspect the work area to ensure nonessential items and tools were removed and machine or equipment components are operationally intact.
2. Check the work area to ensure all employees were safely positioned or removed.
3. Notify affected employees before lockout/tagout devices were removed and, before machines or equipment are energized, that the lockout/tagout devices were removed.
4. Notify affected employees after lockout/tagout devices were removed and, before a machine or equipment is started, that the lockout/tagout device(s) were removed.

Each lockout/tagout device shall be removed from each energy-isolating device by the employee who applied the device, with one exception: When the authorized employee who applied the lockout/tagout device is not available to remove it, that device may be removed under the direction of Facilities Maintenance supervision, provided that specific procedures and training for such removal have been developed, documented, and incorporated into the specific shop Lockout/Tagout Program. Facilities Maintenance shall demonstrate the specific procedure contains the following elements:

- Verification by the operations supervisor that the authorized employee who applied the device is not at the facility.

- Reasonable effort is made to contact the authorized employee to inform them their lockout/tagout device was removed.
- Insurance the authorized employee has this knowledge before they resume work at the facility.

7.10 Lockout/Tagout Worksheets: All machines subject to the lockout/tagout regulation must have a lockout/tagout worksheet detailing specific procedures to be followed. One copy of this worksheet should be maintained either on the machine itself or in as near proximity as is feasible. A second copy should be maintained in the Safety Committee's files. This Lockout/Tagout Worksheet is the "blueprint" which should be followed for all lockout/tagout operations. Refer to the Appendix A for a sample of the Lockout/Tagout Worksheet.

8.0 AUDIT PROCEDURE

8.1 Audits: Periodic audits will be performed to ensure lockout/tagout standards are maintained. These audits will be done at least once a year (or more often if there has been a significant change in the machinery/equipment maintained or repaired since the last audit and/or training class). Components of this audit include:

- Random quizzing of employees to test knowledge and familiarity with lockout/tagout procedures.
- Spot checks of machines to ensure a lockout/tagout worksheet is completed and readily accessible for each machine.
- A check of the training records to ensure employees received the necessary training and certification.
- Documentation, signed by the auditor, that audit was performed.

APPENDIX A: FORMS

FORM A: LOCKOUT/TAGOUT WORKSHEET #_____

Page 1 of 5

Machine:_____

Serial #:_____ Location:_____

Answer "True" or "False" for each of the following conditions, as they apply to the machine in question:

_____The machine has no potential for stored or residual energy or the re-accumulation of stored energy following its shutdown.

_____The machine has a single energy source, which is readily identifiable, and can be easily isolated (e.g., a power cord).

_____The isolation of that energy source will completely deactivate the machine.

_____During the course of maintenance/repair, that energy source is completely isolated/locked out.

_____A single lockout device will achieve a lockout condition.

_____The lockout device is under the sole control of the authorized employee performing the servicing.

_____The servicing/maintenance operation does not pose any sort of hazard for other employees.

_____The facility has had no accidents involving the unexpected re-energization or activation of the machine or equipment during maintenance/servicing.

If all of the above statements are true, mark "N/A" for the question on Page 2 and proceed to Page 3 of the Worksheet.

- ☐ All of the above statements are True.
- ☐ At least one of the above statements is False.

_____ _____ _____

Name of Evaluator Signature Date

FORM A (CONT): LOCKOUT/TAGOUT WORKSHEET #_____

De-energization Process

In the space below, describe fully and completely the process used to de-energize the machine. If the machine or piece of equipment came with an owner's manual which describes the de-energization process satisfactorily, you may indicate such in the space below, provided you also give detailed instructions on how this manual can be obtained, and it can be shown the manual is generally accessible during normal operating procedures.

In the space below, describe exactly where and how the lockout/tagout device should be applied to the machine in question.

FORM A (CONT): LOCKOUT/TAGOUT WORKSHEET #_____

Page 3 of 5

Re-energization Process

Are the steps for re-energizing the machine the exact opposite of those necessary for de-energizing the machine?

- ☐ Yes—skip the rest of this page and proceed to Page 4
- ☐ No—continue to work on this page

In the space below, describe the steps necessary to properly re-energize the machine once all maintenance procedures have been completed. Once again, if the piece of equipment came with an owner's manual satisfactorily describing the re-energization process, you may reference it under the same conditions as noted above.

FORM A (CONT): LOCKOUT/TAGOUT WORKSHEET #_____

Authorized and Affected Personnel

Refer to the Definitions section for clarification on what constitutes authorized and affected employees.

Authorized Employees	Affected Employees

Note it is the employer's responsibility to ensure the employees listed above have received the applicable training.

FORM A (CONT): LOCKOUT/TAGOUT WORKSHEET #_____

Page 5 of 5

Lockout/Tagout Log Sheet

In the space below, employees need to log any and all lockout/tagout operations undertaken involving this piece of equipment. For authorized personnel, list the lead authorized employee only, unless there is an accident or incident involved. In the latter case, list all personnel involved in the action.

Date	**Reason LOTO Procedure Performed**	**Authorized Personnel**

Insert additional sheets as needed.

FORM B: LOCKOUT/TAGOUT AUDIT SHEET

Page 1 of 3

Person Performing Audit:_____

Worksheet Inspections

An audit of the equipment at the facility should be performed, and the presence, accuracy, and accessibility of the Lockout/Tagout Worksheet noted. When feasible, all machines should be inspected; when this is not possible, a representative sampling should be taken.

Machine#	**Inspection Notes**	**Employee Audited**

FORM B: LOCKOUT/TAGOUT AUDIT SHEET

Employee Interviews

For the following section, list the employee(s) interviewed and how well they demonstrated knowledge of the lockout/tagout procedures. Note any deficiencies and document the steps taken to correct these.

Name	**Position**	**Evaluation**	**Notes**
		☐ Good ☐ Fair ☐ Poor	
		☐ Good ☐ Fair ☐ Poor	
		☐ Good ☐ Fair ☐ Poor	
		☐ Good ☐ Fair ☐ Poor	
		☐ Good ☐ Fair ☐ Poor	
		☐ Good ☐ Fair ☐ Poor	
		☐ Good ☐ Fair ☐ Poor	
		☐ Good ☐ Fair ☐ Poor	
		☐ Good ☐ Fair ☐ Poor	
		☐ Good ☐ Fair ☐ Poor	
		☐ Good ☐ Fair ☐ Poor	

FORM B: LOCKOUT/TAGOUT AUDIT SHEET

Training Records

Do training records reflect all employees received the appropriate level(s) of training?

- ☐ Y
- ☐ N

If there are more than one (1) set of training records, do the two sets of training records match?

- ☐ Y
- ☐ N

Additional Comments

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____ _____

Signature of Person Performing Audit Date

FORM C: LOCKOUT/TAGOUT TRAINING CERTIFICATION

Trainer: One of the following training logs will be completed for each training session performed. The trainer will fill out all sections except for the signature line which indicates the level of training obtained for each person.

Employee: By signing next to your name below, you are indicating you completed training in the lockout/tagout safety procedures.

Trainer:_____ Training Date:_____

Employee Name	Auth/Affect/Other			Signature

APPENDIX B: AUTHORIZED EMPLOYEE LIST

LOCKOUT/TAGOUT PROGRAM

Shop:_____ Supervisor:_____

	NAME	PID	LOCK ID#	COMBO	HASP	TAG
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

APPENDIX C: SUPERVISOR REVIEW

SUPERVISOR REVIEW OF EMPLOYEE LOCKOUT/TAGOUT

PROGRAM COMPLIANCE

Employee:_____ Supervisor:_____

Date:_____ Equipment being serviced:_____

_____Was the equipment serviced prior to initiating task? (Yes or No)

_____Is employee familiar with all types of energy associated with equipment?

_____Were employees associated with the equipment notified of lockout/tagout occurrence?

_____Was equipment shut down following normal stopping procedure, if applicable?

_____Were all hazardous sources of energy isolated from the equipment?

_____Were lockout/tagout devices secured to all energy isolating devices?

_____Was all residual energy dissipated, if applicable?

_____Was the elimination of all energy sources verified?

_____Was the elimination of all energy courses verified when the task was completed?

_____Were all tools and equipment used during servicing removed?

_____Were all guards replaced, if applicable?

_____Were employees associated with the equipment notified of the termination of the lockout/tagout?

_____Were all lockout/tagout devices removed?

_____Was the equipment verified to be operationally intact prior to start-up?

If "No" to any of the above, indicate proposed corrective action.

_____

_____

Signatures:

Employee:_____ Supervisor:_____

APPENDIX D: ABANDONDED LOCK REMOVAL

EMPLOYEE LOCK REMOVAL AUTHORIZATION FORM

Note: Only supervisors can remove abandoned locks.

Name of Person whose lock must be removed:_____

Has an attempt been made to contact him or her?

- ☐ YES
- ☐ NO

Why is it critical to remove this lock now?

_____

_____

_____

Are you sure it is safe to remove this lock?

- ☐ YES
- ☐ NO

Supervisor's Name:_____

Signature:_____ Date:_____

Safety Officer:_____

Signature:_____ Date:_____

APPENDIX E: SAFETY CHECKLIST

LOCKOUT/TAGOUT PROCEDURE/SAFETY CHECKLIST

Perform lockout/tagout procedures in this specific order:

1. _____Identify the energy type, the energy hazards, and control devices.
2. _____Inform affected employees of planned lockout.
3. _____Turn off machine or equipment through normal procedures.
4. _____Locate and isolate all energy sources; release any stored energy.
5. _____Place a lock and/or tag on the energy controls (circuit breaker, switch, and valve).
6. _____Test operating controls, ON or START, and then, return controls to the OFF or NEUTRAL position.
7. _____Perform the service or maintenance.

Before re-energizing the equipment:

1. _____Inform affected employees of planned start up.
2. _____Make sure employees are safely away from equipment.
3. _____Remove tools from machine or equipment.
4. _____Reinstall any machine guards or other safety devices.
5. _____Authorized employee(s), who installed lockout devices, remove lockout devices.
6. _____Turn on energy and notify other employees, including affected employees.

Exceptions:

When a group performs service or maintenance, one employee has primary responsibility, and all team members apply their own lock or tag.

If energy needs to be established in order to test or reposition equipment during maintenance or repair, follow all lockout removal steps first. After testing or repositioning the equipment, follow all lockout steps to establish energy control.

Warning:

- ALWAYS lock or tag machine energy sources before maintenance or repair.
- ALWAYS use lockout whenever possible; tagout is just a warning.
- NEVER remove, ignore, or bypass locks or tags on machinery.
- Alert workers in the area BEFORE you initiate lockout/tagout.
- NEVER remove another employee's lock or tag.

Table of Contents

1.0 GENERAL REQUIREMENTS

This policy describes specific elements required by PEOSH when guarding machinery. The primary focus is to safeguard the employee from inadvertently coming in contact with the point of operation or other hazards associated with operating the piece of equipment through awareness, training, and mechanical features.

The following elements are to be implemented and followed:

- Hazard Warning Signs: Each machine must be equipped with a warning sign indicating the hazards associated with operating the piece of equipment. The warning sign must be visible, legible, and protected from damage.
- Permanently Fixed Machinery: Machinery must be permanently anchored (for example to the floor or sturdy support), unless it is classified as portable. This is to prevent the machine from walking or moving while being operated. The power supply to the permanently fixed machines and equipment must be hardwired.
- Emergency Stop Button or Control: Each machine must be equipped with an emergency STOP button or control. The button control must be conveniently located for easy accessibility and red in color for easy visibility.
- Point of Operation: The operator must be guarded from hazardous exposure at the point of operation. This is to prevent the operator from inadvertently coming in contact with hazards at the point(s) where work is being done by the machinery or equipment. There exist many ways of guarding a piece of equipment (i.e. fixed guarding, adjustable, two hand controls, etc.). Each machine must be evaluated to ensure the appropriate guarding system was selected and maintained to protect employees from the point of operation hazards.
- Guarding External Hazards: Hazards located outside of the point of operation (i.e. pulleys, flywheels, pistons, etc.) must also be guarded against to ensure the safety of the operator. It is important to perform a complete and comprehensive inspection of each machine to ensure operators' safety while operating the piece of equipment.
- Control of Hazardous Energy Sources: It is imperative to have an effective control of hazardous energy (lockout/tagout) program that will ensure the safety of employees when working on the machinery or in cases where the operator changes dies, tooling, etc. It is vital to the entire program each and every employee who operates or performs maintenance (preventative maintenance or repairs) must be trained and certified in understanding how the equipment functions, energy source locations and associated hazard, and the approved practices for safely controlling them.

2.0 CALCULATING AND MEASURING SAFETY DISTANCE

There are three sections in the Mechanical Power Press Standard where safety distances appear:

1. Section 1910.217 (C) (3) (iii) (e),
2. Section 1910.217 (C) (3) (vii) (c), and
3. Section 1910.217 (C) (3) (viii) (c).

There are two basic formulas that cover three essentially different situations:

1. Presence sensing on partial-revolution clutch machines,
2. Two-hand control on partial-revolution clutch machines, and
3. Two-hand trip on full-revolution clutch machines.

All formulas establish minimum safety distances from the safety device to the point of operation. They are normally, but not exclusively, used in hand-feed situations where it is necessary to enter the point of operation. The various terms used in the formulas are not identical, and the units or input data must be appropriate to the situation under study.

Section 1910.217 (C) (3) (iii) (e)

All formulas in this section apply to the required safety distance where presence-sensing devices are used. It can only be used on partial-revolution clutch machines. This formula gives the minimum distance from the sensing field to the point of operation.

Ds = (63 inches/second) x (Ts seconds)

Where Ds = minimum safety distance in inches
63 inches/second = hand speed constant
Ts = stopping time of the press, in seconds measured at approximately the 90-degree position of crankshaft rotation. (At this moment, the slide will be moving at its maximum speed.)

The formula is simple and only requires the substitution of a single value, “Ts”. The increments of time dealt with on most mechanical power press applications are extremely small (probably milliseconds); they are not numbers that can be established by eye and the use of a stopwatch. It will be necessary to use fairly sophisticated equipment to measure the stopping time. The equipment can be either rented or purchased. However, many manufacturing operations may have technical skills within their own operations permitting them to devise their own equipment for this purpose.

Section 1910.217 (C) (3) (vii) (c)

The formula in this section is identical to that in 1910.217 (C) (3) (iii) (e) except that it applies to the safety distance requirements between two-hand control devices and the point of operation. It can only be used on partial revolution clutch machines. This formula gives the

minimum distance from each two-hand control device to the point of operation. (Each multiple control station on any machine must comply.) It should be noted that, "two-hand controls shall be fixed in position so that only a supervisor or someone from the safety department are capable of relocating the controls." Refer to OSHA section 1910.217 (E) (3) (vii) (d).

The difficulties associated with measuring the stopping time, "Ts", are the same as previously mentioned. The formula is:

Ds = (63 inches/second) x (Ts seconds)

Section 1910.217 (C) (3) (viii) (c)

The formula in this section applies only to full-revolution clutch machines. It is similar to those previously discussed, at least in form. There are, however, some important distinctions. The various components of the formula have different subscripts Dm vs. Ds and Tm vs. Ts. The Dm vs. Ds is of no significance; the difference between Ts vs. Tm, however, is important.

First, Tm is a number calculated based on known crankshaft speeds or measured by use of a tachometer. Secondly, its value is affected by the number of engaging points in the clutch.

The following formal definition of Tm is from the Federal Register: (Tm) is the maximum time the press takes for the die closure after it is tripped (time is in seconds). For full-revolution clutch presses with only one engaging point, Tm is equal to the time necessary for one and one-half revolutions of the crankshaft.

Tm = (1.5 revolutions) x (time in seconds of 1 revolution of crankshaft)

For full-revolution clutch presses with more than one engaging point, Tm should be calculated as follows:

$$Tm = \left(\frac{1}{2} + \frac{1}{\text{No. of engaging points}}\right) \times (\text{time in seconds of 1 revolution of crankshaft})$$

Sample Calculations

The following assumed conditions will be used in the sample calculations:

- Crankshaft speed @ 60 RPM
- Stopping time for partial revolution clutch machine: .080 seconds (in actual practice, the user must measure the "real time" required to stop the slide on each individual press.)

Engaging dogs for full-revolution clutch machines (examples are shown for 1, 2, and 4 engaging dogs.)

Presence-Sensing and Two-Hand Controls

Refer to section 1910.217 (C) (3) (iii) (e) for presence sensing and section 1910.217 (C) (3) (vii) (c) for two-hand controls.

Speed = 60 revolutions/minute divide 60 seconds/minute = 1 revolution/second
Stopping time = Ts
Ts = .080 seconds for the brake to stop the slide
Minimum Safety Distance = Ds
Ds = (63 inches/second) x (Ts) = (63 inches/second) x (.080 seconds) = 5.040 inches

For the assumed condition used in this example, the safety distance for presence-sensing devices and two-hand control (as spelled out in the two sections involved) is 5.040 inches.

Full-Revolution Clutch Machines

Refer to section 1910.217 (C) (3) (viii) (c) for full-revolution clutch machines.

Assumed speed = 60 revolutions/minute divided 60 seconds/minute
= 1 revolution/second = 1 second/revolution

A. For one engaging point or dog @ 60 RPM:
Stopping time = Ts
Tm = (1.5 revolutions) x (time of 1 revolution of crankshaft)
= (1.5 revolutions) x (1 second/revolution) = 1.5 seconds
Minimum Safety Distance = Dm
Dm = (63 inches/seconds) x (Tm) = (63 inches/seconds x (1.5 seconds) = 94.5 inches
(minimum safety distance for 60 RPM and one engaging point)

The calculated minimum safety distance arrived at in this example warrants comment because of the assumed values used. In an actual situation, it might be an unrealistic solution to locate the two-hand trip at this distance. It would indicate the methods, as well as product and safety approaches, be revised to arrive at a better solution.

B. For two engaging points or two dogs @ 60 RPM:
Stopping time = Tm
Tm = (1/2 + _____1_____) x (time of 1 revolution of crankshaft
No. of engaging pts.
= (1/2 + _____1_____) x (1 second/revolution) = (1) x (1) = 1 second
No. of engaging pts.
Minimum Safety Distance = Dm
Dm = (63 inches/second) x (Tm) = (63 inches/second x (1 second)
= (63 inches minimum safety distance for 60 RPM and two engaging points)

C. For engaging points for four dogs @ 60 RPM:
Stopping time = Tm

Tm = (1/2 + _____1_____) x time of 1 revolution of crankshaft)
No. of engaging pts.
= (1/2 + _____1_____) x (1 second/revolution = (3/4) x (1 second/revolution)
No. of engaging pts.

= .75 seconds
Minimum safety distance = Dm
Dm = (63 inches/second) x (Tm) = (63 inches/second) x (.75 seconds)
= 47.25 inches (minimum safety distance)

The numbers used in these examples are for illustrative purposes only. Each user must establish the facts in his or her own plant based on the speed, type of machine, etc.

3.0 REPORTING OF MECHANICAL POWER PRESS POINT OF OPERATION INJURY

The employer shall, within 30 days of the occurrence, report to either the Director of the Directorate of Safety Standards Programs, PEOSH, U.S. Department of Labor, Washington, D.C. 20210, or the State agency administering a plan approved by the Assistant Secretary of Labor for Occupational Safety and Health, all point of operation injuries to operators or other employees.

The following information shall be included in the report:

1. Employer's name, address, and location of the workplace (establishment),
2. Employee's name, injury sustained, and the task being performed (operation, set-up, maintenance, or other),
3. Type of clutch used on the press (full revolution, part revolution, or direct drive),
4. Type of safeguard(s) being used (two hand control, two hand trip, pull-outs, sweeps, or other). If the safeguard is not described in this section, give a complete description,
5. Cause of the accident (repeat of press, safeguard failure, removing stuck part or scrap, no safeguard provided, no safeguard in use, or other),
6. Type of feeding (manual with hands in dies or with hands out of dies, semiautomatic, automatic, or other),
7. Means used to actuate press stroke (foot trip, foot control, hand trip, hand control, or other), and
8. Number of operators required for the operation and the number of operators provided with controls and safeguards.

4.0 DRILL PRESS

One of the major causes of drill press accidents is poor judgment. The drill press is considered a rather simple piece of equipment, and most personnel feel they can operate it safely. However, inexperienced and experienced operators can be severely injured, and they should be properly trained to follow certain basic safety rules.

- **Hazards:** The principle drill-press hazards are body injuries caused by:

  - Contact with moving machine parts or tools,
  - Being caught between work and machine,
  - Flying chips entering the body, e.g., the eye, and
  - Material falling on fingers or toes.

- **Guarding:** Guarding at the point of operation is difficult because of the nature of the drilling process. A spring safety guard can be attached to a small drill press and, as the head descends, the spring compresses and contains the metal slivers and chips. Brackets of various lengths can be used, depending upon the depth of the hole being drilled.

  Larger drill presses used in production work can have a simple sleeve guard or other barrier installed to protect the operator from contact with the spindle. The tool itself can be protected by a telescoping guard that covers the end of the tool, leaving only enough of it exposed to allow easy placement into the piece being worked.

  Where a variety of non-uniform pieces are handled, it may not be possible to provide point of operation or barrier guards. Operator training is of utmost importance in such circumstances.

Safety Procedures for Drill Presses

1. All cases, power gears, sprockets, and chains should be enclosed.
2. The machine table should be equipped with a drill-press vise, or clamps, to hold the work in place.
3. Push-button controls must be shrouded, and an emergency shut-off switch installed near the equipment.
4. All drill press operators and set-up employees should be trained in the safe use of equipment and components parts.
5. Automatic machines and high production equipment should use barricades or enclosures to separate the worker from the entire drilling machine.
6. Drill press operators must be required to wear safety glasses to prevent eye injuries.
7. The floor around a drill press should be kept free of obstruction which creates tripping hazards.
8. Operators must not wear finger rings, aprons, or loose or torn clothing. Foot protection should be worn to prevent injuries from falling objects. Operators with long hair must wear a tight-fitting cap or hairnet to prevent catching their hair in the spindle.
9. Operators shall not drill material unless it is held in a drill press vise, clamped to the table, or held in some other safe manner. The operator should never attempt to hold the work with his/her hand or try to tighten the vise or clamp while the machine is in motion.

10. Chips should not be removed from the table or work by hand, nor should they be blown off with compressed air. These are two of the most common causes of hand injuries.
11. The table should be kept free of tools and other loose materials which may fall or cause injury.

5.0 METAL WORKING LATHES

Lathes in general are rarely guarded at the point of operation. This results in exposed, rotating components and stock, hot and sharp chip generation, coolant splashing, and moving cutting tool holders and devices. Unbalanced, rotating stock can add other hazards. Although these hazards are found on most lathes, automatic machines, such as tracer lathes and screw machines, are more easily adapted for guards to protect the operator. Simple guards, safe procedures, and operator training will help eliminate injuries caused by these machines.

Safe Procedures

1. Operators must always wear safety glasses while operating a lathe.
2. Chips and shavings must not be removed by hand. Chip breaker cutting tools should be considered as a means of reducing the hazards.
3. Operators must keep the lathe centers true, sharp, and clean.
4. Machines are not to be left running unattended.
5. The rotating chuck must be at least partly enclosed by a hinged guard, because of the hazards of rotating stock, splashing coolant, and flying chips.
6. The floor around the lathe should be non-skid to prevent slipping.
7. Tools such as chucks, tool holders and chuck wrenches should be properly stored near the lathe.
8. Chuck wrenches should not be left in the chuck. Spring loaded wrenches will eliminate this hazard.
9. Automatic machines must have point of operation enclosures interlocked with the control circuit. These enclosures should be easy to open for access to the work and tooling.
10. Operating controls on the lathe should be protected against accidental starting by shrouding the push buttons and by identifying levers and hand controls with bright colors.
11. Each lathe should have an emergency disconnect switch in the proximity of the operator.
12. Where power transmission belt drives are exposed to allow speed changes, a push stick, or similar device should be used.
13. Power transmission devices must be fully enclosed, and the access doors should be adequately latched and interlocked, so that the machine will not operate when the guard is in the “open” position.

6.0 MECHANICAL POWER PRESS GUARDING

To outline a few guidelines that must be followed when working with full and part revolution mechanical presses. Most injuries occur when employees unintentionally place their hand or other portions of their body into the point-of-operation after the press is activated.

Machines Using Full Revolution Positive Clutches

- Machines using full revolution clutches shall incorporate a single-stroke mechanism.
- If the single-stroke mechanism is dependent upon spring action, the spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, and designed to prevent interleaving of the spring coils in event of breakage.
- Pedal mechanism shall be protected to prevent unintended operation from falling or moving objects or by accidental stepping onto the pedal.
- A pad with a non-slip contact area shall be firmly attached to the pedal.
- The pedal return spring(s) shall be of the compression type, operating on a rod or guided within a hole or tube, or designed to prevent interleaving of spring coils in event of breakage.
- If pedal counterweights are provided, the path of the travel of the weight shall be enclosed.
- Hand-lever-operated power presses shall be equipped with a spring latch on the operating lever to prevent premature or accidental tripping.
- The operating levers on hand-tripped presses having more than one operating station shall be interlocked to prevent the tripping of the press except by the "concurrent" use of all levers.
- A two-hand trip shall have the individual operator's hand controls protected against unintentional operation and have the individual operator's hand controls arranged by design and construction and/or separation to require the use of both hands to trip the press and use a control arrangement requiring concurrent operation of the individual operator's hand controls.
- Two-hand trip systems on full revolution clutch machines shall incorporate an anti-repeat feature.
- If two-hand trip systems are used on multiple operator presses, each operator shall have a separate set of controls.

Machines Using Part Revolution Clutches.

- The clutch shall release, and the brake shall be applied when the external clutch engaging means is removed, deactivated, or de-energized.
- A red color stop control shall be provided with the clutch/brake control system. Momentary operation of the stop control shall immediately deactivate the clutch and apply the brake. The stop control shall override any other control, and reactivation of the clutch shall require use of the operating (tripping) means which has been selected.
- A means of selecting Off "Inch," Single Stroke, and Continuous (when the continuous function is furnished) shall be supplied with the clutch/brake control

to select type of operation of the press. Fixing of selection shall be by means capable of supervision by the employer.

- The "Inch" operating means shall be designed to prevent exposure of the workers hands within the point of operation by:

  - Requiring the concurrent use of both hands to actuate the clutch, or
  - Being a single control protected against accidental actuation and so located that the worker cannot reach into the point of operation while operating the single control.

- Two-hand controls for single stroke shall conform to the following requirements:

  - Each hand control shall be protected against unintended operation and arranged by design, construction, and/or separation so that the concurrent use of both hands is required to trip the press.
  - The control system shall be designed to permit an adjustment which will require concurrent pressure from both hands during the die closing portion of the stroke.
  - The control system shall incorporate an anti-repeat feature.
  - The control systems shall be designed to require release of all operators' hand controls before an interrupted stroke can be resumed. This requirement pertains only to those single-stroke, two-hand controls manufactured and installed on or after August 31, 1971.

- Controls for more than one operating station shall be designed to be activated and deactivated in complete sets of two operator's hand controls per operating station by means capable of being supervised by the employer. The clutch/brake control system shall be designed and constructed to prevent actuation of the clutch if all operating stations are bypassed.
- Those clutch/brake control systems which contain both single and continuous functions shall be designed so that completion of continuous circuits may be supervised by the employer. The initiation of continuous run shall require a prior action or decision by the operator in addition to the selection of Continuous on the stroking selector, before actuation of the operating means will result in continuous stroking.
- If foot control is provided, the selection method between hand and foot control shall be separate from the stroking selector and shall be designed so that the selection may be supervised by the employer.
- Foot operated tripping controls, if used, shall be protected so as to prevent operation from falling or moving objects, or from unintended operation by accidental stepping onto the foot control.
- The control of air-clutch machines shall be designed to prevent a significant increase in the normal stopping time due to a failure within the operating value mechanism, and to inhibit further operation if such failure does occur. This requirement shall apply only to those clutch/brake air-valve controls manufactured and installed on or after August 31, 1971 but shall not apply to machines intended only for continuous, automatic feeding applications.

- The clutch/brake control shall incorporate an automatic means to prevent initiation or continued activation of the Single Stroke or Continuous functions unless the press drive motor is energized and in the forward direction.
- The clutch/brake control shall automatically deactivate in event of failure of the power or pressure supply for the clutch engaging means. Reactivation of the clutch shall require restoration of normal supply and the use of the tripping mechanism(s).
- The clutch/brake control shall automatically deactivate in event of failure of the counterbalance(s) air supply. Reactivation of the clutch shall require restoration of normal air supply and use of the tripping mechanism(s).
- Selection of bar operation shall be by means capable of being supervised by the employer. A separate push-button shall be employed to activate the clutch, and the clutch shall be activated only if the driver motor is de-energized.

General Electrical Procedures

- A main power disconnect switch capable of being locked only in the Off position shall be provided with every power press control system.
- The motor start button shall be protected against accidental operation.
- All mechanical power press controls shall incorporate a type of drive motor starter that will disconnect the drive motor from the power source in event of control voltage or power source failure, and require operation of the motor start button to restart the motor when voltage conditions are restored to normal.
- All a/c. control circuits and solenoid value coils shall be powered by not more than a nominal 120-volt a/c. supply obtained from a transformer with an isolated secondary. Higher voltages that may be necessary for operation of machine or control mechanisms shall be isolated from any control mechanism handled by the operator, but motor starters with integral Start-Stop buttons may utilize line voltage control. All d.c. control circuits shall be powered by not more than a nominal 240-volt d.c. supply isolated from any higher voltages.
- All clutch/brake control electrical circuits shall be protected against the possibility of an accidental ground in the control circuit causing false operation of the press.
- Electrical clutch/brake control circuits shall incorporate features to minimize the possibility of an unintended stroke in the event of the failure of a control component to function properly, including relays, limit switches, and static output circuits.

Brake System Monitoring

- If an operator is required to feed or remove parts by placing one or both hands in the point of operation, and a two hand control, presence sensing device of Type B gate or movable barrier (on a part revolution clutch) is used for safeguarding, the brake monitor shall meet the following requirements:

    - Be so constructed as to automatically prevent the activation of a successive stroke if the stopping time or braking distance deteriorates to a point where the safety distance being utilized does not meet the requirements set forth in

paragraph (c)(3)(iii)(e) and (c)(3)(vii)(c), reference policy 7.6.2 Calculating and Measuring Safety Distances.

- The brake monitor used with the Type B gate or movable barrier device shall be installed in a manner to detect slide top-stop overrun beyond the normal limit reasonably established by the employer.

- Must be installed on a press such that it indicates when the performance of the braking system has deteriorated.
- Must be constructed and installed in a manner to monitor brake system performance on each stroke.

General Requirements for Safeguarding the Point of Operation: FMC site locations are responsible for providing and ensuring the usage of "point of operation guards" or properly applied and adjusted point of operation devices on every operation performed on a mechanical power press in accordance with Table O-10.

Table O-10: [In inches]

Distance of opening from point of operation hazard	Maximum width of opening
1/2 to 1 1/2	1/4
1 1/2 to 2 1/2	3/8
2 1/2 to 3 1/2	1/2
3 1/2 to 5 1/2	5/8
5 1/2 to 6 1/2	3/4
6 1/2 to 7 1/2	7/8
7 1/2 to 12 1/2	1 1/4
12 1/2 to 15 1/2	1 1/2
15 1/2 to 17 1/2	1 7/8
17 1/2 to 31 1/2	2 1/8

NOTE: This table shows the distances that guards shall be positioned from the danger line in accordance with the required openings. The requirement shall not apply when the point of operation opening is one-fourth inch or less.

7.0 PRESS BRAKE OPERATIONS

To highlight requirements that govern the operation of power presses.

General

1. PEOSH requires that machines covered by 29 CFR Subpart O must be guarded by a physical barrier, physical device and by maintaining a safe distance when operating or servicing machinery.
2. Power press brakes must not be energized when the point of operation is not guarded, unless the employee is trained to maintaining a "safe distance" when performing minor services covered by 1910.147 (a) (2) (ii) (B) which states minor tool changes, adjustments and minor service activities that are routine, repetitive and integral to the use of the equipment and 1910.147 (f) which states that during testing or positioning of equipment are not covered by this standard. In most cases, the equipment must be locked out and tagged out per 1910.147 requirements.
3. During normal production operations, the operators need to ensure they are safeguarded against the point of operation, as well as other hazards associated with operating the power press.
4. Due to certain constraints imposed by the manufacturing or fabrication processes, safeguarding by maintaining a safe distance from the point of operation may be expectable but **ONLY** when safeguarding by physical barrier or physical devices **is not feasible**.

Safe Distance: "Safe Distance" means the clearance between an employee (typically his or her fingers holding and supporting a piece part) and the power press brake point of operation.

Safeguarding by maintaining a "safe distance" is acceptable if the employer:

1. Demonstrates that physical barriers and devices are not feasible to guard the power press brake point of operation.
2. Demonstrates power press brake point of operation guarding by maintaining a safe distance is limited to one-time only fabrication of made-to-order or custom-made piece parts. A "small quantity run" means fabrication of more than one of the same piece parts over a continuous timeframe of no more than four (4) hours per month. High volume piece part rates of production are not covered by this provision. ***NOTE:*** When physical guards or devices are not feasible for small quantity runs as outlined above, safeguarding by maintaining a safe distance as described in this policy is an alternative to power press brake replacement or major renovation which otherwise could provide employee protection.
3. Establishes a safety program which includes safe work procedures, training and supervision to ensure that work is performed using "safe distance" alternative measures.
4. Has a workplace history of operating power press brakes safely by maintaining a safe distance from the point of operation. Such a history is characterized by absence of injuries related to failure to maintain a safe distance.
5. The operating employee and helping employee(s) must not approach closer than necessary and in no case, closer than 4 inches to the power press brake point of

operation. The minimum safe distance of 4 inches shall be measured from the exterior point of contact of the power press brake die closest to an employee.

"Safe Distance" Safeguarding Program: If an FMC facility adopts "safe distance" protection, they must have (and be prepared to demonstrate to PEOSH) an effective program. This can be achieved by having employees follow an exposure prevention procedure, training and enforcement of the following procedures:

1. Exposure Prevention Program: The program must be developed, documented and utilized by affected employees. The procedure must include provisions for maintaining a minimum safe distance as outlined in 6 above.
2. Training: Employees must be trained to follow the exposure prevention procedures and the following elements:
   - The need for a safety oriented working relationship between the operator and when required, his or her helper.
   - The function and purpose of operating controls; operating mode controls; die space height adjustment positions; and other brake controls.
   - The hazards of placing any parts of the body within the point of operation.
   - The hazards and potential exposure related to each specific piece part bending operation particularly with respect to the piece part itself (for example, whipping) and to tooling (including loading and unloading).
   - The function and purpose of hand-feeding tools.
   - The danger of unsafe work practices, inattention, horseplay and misuse of equipment.
   - Instruct operators to immediately report malfunctions or damage to their supervisor.

The effectiveness of the training can be evaluated by having employees perform applicable exposure preventative procedures proficiently.

Retraining must occur whenever a periodic inspection is performed (annually) of the safe distance" prevention program and identifies deviations or inadequacies in performing the work. Also, retraining should occur whenever the supervisor identifies deficiencies in the employees' work habits. The supervisor is responsible for ensuring that the appropriate employees receive training and must perform periodic inspection to ensure safe work practices.

Periodic Inspections: The supervisor must conduct a periodic inspection of the "safe distance" exposure prevention procedure at least annually. The supervisor or the designee other than the operator needs to be trained in performing these inspections. The inspections are to be documented and signed by the employees conducting the annual inspections.

Power Press Brake Injuries: Compliance officers are required to investigate power press brake related injuries that have occurred. The following information will be requested: name, type of establishment, address and type of accident site, date of the incident, type of work being performed, make and model of the power press brake and a description of the safeguarding being used in the workplace at the time of the incident.

8.0 DIE SETTING

An important element in a power press safety program is die setting and feeding. This policy outlines the requirements that must be followed when using dies.

Locations using dies in their machining process must ensure their safety program covers the following:

1. All dies and operating methods are designed to control or eliminate hazards to operating personnel.
2. Furnish and enforce the use of hand tools for freeing and removing stuck work or scrap pieces from the die. This is to eliminate employees from reaching into the point of operation.
3. Provide means for handling scrap from roll feed or random length stock operations. Scrap cutters used in conjunction with scrap handling systems shall comply with safeguarding the point-of-operation.
4. Hazards created by a guide post (when it is located in the immediate vicinity of the operator) when separated from its bushing by more than one-fourth inch shall be considered as a point of operation hazard.
5. If unitized tooling is used, the opening between the top of the punch holder and the face of the slide, or striking pad, shall comply with the requirements of safeguarding the point-of-operation.
6. All dies must be properly identified with the following information:
   - stamped with the tonnage and stroke requirements, or have these characteristics recorded if these records are readily available to the die setter;
   - stamped to indicate upper die weight when necessary for air counterbalance pressure adjustment; and
   - stamped to indicate complete die weight when handling equipment may become overloaded.
7. Die fastening shall be made in both the upper and lower shoes for securely mounting the die to the bolster and slide. Where clamp caps or setscrews are used in conjunction with punch stems, additional means of securing the upper shoe to the slide shall be used.
8. Handling equipment attach points shall be provided on all dies requiring mechanical handling.
9. A procedure must be in place to address die setting and safeguarding the point-of-operation, as well as: (see Die Setting Checklist 7.6.8.1)
   - Lockout and tagout the source of power to the machine. The die setter must retain the key until the press is ready for operation.
   - Provide and enforce the use of safety blocks for use whenever dies are being adjusted or repaired in the press.
   - Make sure safeguards are clear of any danger that may arise during the die setting procedure.
   - Make sure the slide adjustment is high enough to properly clear the die set.

- Provide die stops or other means to prevent losing control of the die while setting or removing dies in presses which are inclined.
- Provide spring-loaded turnover bars for presses designed to accept such turnover bars.
- Before inching or cycling the slide, inspect the press and the press area to make certain the press is ready to run, and employees or visitors are free from danger.
- Before cycling the press, perform all necessary adjustments during and after die installation. Be sure slide height adjusting shaft clamps are tight.
- Reset counterbalance air pressure to compensate for the weight of the upper die.
- Position the safeguard(s) and make certain it is properly secured to the press and adjust to the safe-distance requirements.

NOTE: Provide brushes, swabs, lubricating rolls, and automatic or manual pressure guns so that operators and die setters shall not be required to reach into the point of operation or other hazard areas to lubricate material, punches, or dies.

9.0 MECHANICAL FORGING PRESSES

9.1 General Requirements

1. The safety requirements apply to lead casts or other use of lead in the forge shop or die shop.
2. Thermostatic control of heating elements shall be provided to maintain proper melting temperature and prevent overheating.
3. Fixed or permanent lead pot installations shall be exhausted.
4. Portable units shall be used only in areas where good, general room ventilation is provided.
5. Personal protective equipment (gloves, goggles, aprons, and other items) shall be worn.
6. A covered container shall be provided to store dross skimmings.
7. Equipment shall be kept clean, particularly from accumulations of yellow lead oxide.

9.2 Inspection and Maintenance: It shall be the responsibility of the employer to maintain all forge shop equipment in a condition which will insure continued safe operation. This responsibility includes:

1. Establishing periodic and regular maintenance safety checks and keeping certification records of these inspections which include the date of inspection, the signature of the person who performed the inspection and the serial number, or other identifier, for the forging machine which was inspected.
2. Scheduling and recording the inspection of guards and point of operation protection devices at frequent and regular intervals. Recording of inspections shall be in the form of a certification record which includes the date the inspection was performed, the signature of the person who performed the inspection and the serial number, or other identifier, of the equipment inspected.

3. Training personnel for the proper inspection and maintenance of forging machinery and equipment.
4. All overhead parts shall be fastened or protected in such a manner that they will not fly off or fall in event of failure.

9.3 Hammers and Presses:

1. All hammers shall be positioned or installed in such a manner that they remain on or are anchored to foundations sufficient to support them according to applicable engineering standards.
2. All presses shall be installed in such a manner that they remain where they are positioned, or they are anchored to foundations sufficient to support them according to applicable engineering standards.
3. The ram shall be blocked when dies are being changed or other work is being done on the hammer. Blocks or wedges shall be made of material the strength and construction of which should meet or exceed the specifications and dimensions shown in Table below:

TABLE O-11 - STRENGTH AND DIMENSIONS FOR WOOD RAM PROPS

Size of timber, inches (1)	Square inches cross section	Minimum allowable crushing strength parallel to grain, p.s.i.(2)	Maximum static load within short column range(3)	Safety factor	Maximum recommended weight of forging hammer for timber used	Maximum allowable length of timber, inches
4 X 4	16	5,000	80,000	10	8,000	44
6 X 6	36	5,000	180,000	10	18,000	66
8 X 8	64	5,000	320,000	10	32,000	88
10 X 10	100	5,000	500,000	10	50,000	100
12 X 12	144	5,000	720,000	10	72,000	132

Footnotes:

1. Actual dimension.
2. Adapted from U.S. Department of Agriculture Technical Bulletin 479. Hardwoods recommended are those whose ultimate crushing strengths

in compression parallel to grain are 5,000 p.s.i. (pounds per square inch) or greater.

3. Slenderness ratio formula for short columns is L/d=11, where L=length of timber in inches and d=least dimension in inches; this ratio should not exceed 11.

4. Means shall be provided for disconnecting the power to the machine and for locking out or rendering cycling controls inoperable.
5. Tongs shall be of sufficient length to clear the body of the worker in case of kickback and shall not have sharp handle ends.
6. Oil swabs, or scale removers, or other devices to remove scale shall be provided. These devices shall be long enough to enable a man to reach the full length of the die without placing his hand or arm between the dies.
7. Material handling equipment shall be of adequate strength, size, and dimension to handle die setting operations safely.
8. A scale guard of substantial construction shall be provided at the back of every hammer, so arranged as to stop flying scale.
9. A scale guard of substantial construction shall be provided at the back of every press, so arranged as to stop flying scale.

9.4 Hammers, General

1. Die keys and shims shall be made from a grade of material that will not unduly crack or splinter.
2. All foot operated devices (i.e., treadles, pedals, bars, valves, and switches) shall be substantially and effectively protected from unintended operation.
3. All manually operated valves and switches shall be clearly identified and readily accessible.

9.5 Power-Driven Hammers

1. Every steam or air hammer shall have a safety cylinder head to act as a cushion if the rod should break or pull out of the ram.
2. Steam hammers shall be provided with a quick closing emergency valve in the admission pipeline at a convenient location. This valve shall be closed and locked in the off position while the hammer is being adjusted, repaired, or serviced, or when the dies are being changed.
3. Steam hammers shall be provided with a means of cylinder draining, such as a self-draining arrangement or a quick-acting drain cock.
4. Steam or air piping shall conform to the specifications of American National Standard ANSI B31.1.0-1967, Power Piping with Addenda issued before April 28, 1971.

9.6 Gravity Hammers

1. Air-lift hammers shall have a safety cylinder head.
2. Air-lift hammers shall have an air shutoff valve.

3. Air-lift hammers shall be provided with two drain cocks: one on main head cylinder, and one on clamp cylinder.
4. Air piping shall conform to the specifications of the ANSI B31.1.0-1967, Power Piping with Addenda issued before April 28, 1971.

9.7 Board Drop hammers

1. A suitable enclosure shall be provided to prevent damaged or detached boards from falling. The board enclosure shall be securely fastened to the hammer.
2. All major assemblies and fittings which can loosen, and fall shall be properly secured in place.

9.8 Forging Presses: When dies are being changed or maintenance is being performed on the press, the following shall be accomplished:

1. The power to the press shall be locked out.
2. The flywheel shall be at rest.
3. The ram shall be blocked with a material the strength of which shall meet or exceed the specifications or dimensions shown in Table O-11.

9.9 Hydraulic Forging Presses: When dies are being changed or maintenance is being performed on the press, the following shall be accomplished:

1. The hydraulic pumps and power apparatus shall be locked out.
2. The ram shall be blocked with a material the strength of which shall meet or exceed the specifications or dimensions shown in Table O-11.

9.10 Hot Trimming Presses:

1. The power to the press shall be locked out.
2. The flywheel shall be at rest.
3. The ram shall be blocked with a material the strength of which shall meet or exceed the specifications or dimensions shown in Table O-11.

9.11 Cold Trimming Presses: Cold trimming presses shall be guarded in accordance with:

1. Point-of-operation guarding as outlined in OSHA's 1910.217 (c) or;
2. Calculating a safe distance also found in 1910.217 (c).

9.12 Upsetters General Requirements:

1. All upsetters shall be installed, so they remain on their supporting foundations.
2. Upsetters shall be provided with a means for locking out the power at its entry point to the machine and rendering its cycling controls inoperable.

3. Manually operated controls. All manually operated valves and switches shall be clearly identified and readily accessible.

9.13 Tongs: Tongs shall be of sufficient length to clear the body of the worker in case of kickback and shall not have sharp handle ends.

9.14 Changing Dies: When dies are being changed, maintenance performed, or any work done on the machine, the power to the up setter shall be locked out, and the flywheel shall be at rest.

9.15 Other Forging Equipment

1. Billet shears: A positive-type lockout device for disconnecting the power to the shear shall be provided.
2. Saws: Every saw shall be provided with a guard of not less than one-eighth inch sheet metal positioned to stop flying sparks.
3. Conveyors: Conveyor power transmission equipment shall be guarded in accordance with ANSI B20.1-1957, Safety Code for Conveyors, Cableways, and Related Equipment.
4. Shot Blast: The cleaning chamber shall have doors or guards to protect operators.

9.16 Grinding: Personal protective equipment shall be used in grinding operations, and equipment shall be used and maintained in accordance with ANSI B7.1-1970, Safety Code for the Use, Care, and Protection of Abrasive Wheels.

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PURPOSE

Metropolitan Library System has developed this program to protect employees from the hazards of improper lifting techniques and overexertion during lifting.

This program applies to all employees that may conduct manual material handling tasks as part of their job responsibility. This program is intended to minimize the potential for a musculoskeletal injury caused by lifting and moving heavy objects. Employees should not lift any object that exceeds their personal limits without assistance. All employees whose work requires heavy lifting shall be properly trained, physically qualified, and receive a medical evaluation if required by the job description. Additionally, drug and alcohol screening for pre-employment, post-accident, or random as prescribed by the host facility may be required.

This program has the following objectives:

1. Ensuring employees are not required to manually lift materials or objects greater than their personal limit as part of their job functions;
2. Assist in identifying, assessing, and controlling risks associated with manual material handling tasks;
3. Reducing the incidence of manual material handling injuries; and
4. Establishing an effective system for manual material handling

1.0 AUTHORITY AND RESPONSIBILITY

The Department of Environmental Health and Safety has overall responsibility for the establishment and implementation of this program. Specific responsibility of all departments follows.

Safety Coordinator shall be responsible for:

1. Evaluating material handling tasks as requested;
2. Providing force measurements for material handling tasks as requested;
3. Providing training as requested; and
4. Assisting in the selection of appropriate assist devices as requested.

Each Department shall be responsible for:

1. Identifying operations which involve lifting or material handling tasks that may place individuals at risk for back injuries;
2. Instituting engineering controls to reduce manual lifting injury potential;
3. Ensuring that all affected employees are trained in the appropriate requirements of this program;
4. Providing training in proper material handling as needed; and
5. Providing employees with personnel assistance or lift assisting devices as necessary.
6. Periodic supervision and evaluating employees work station techniques to prevent injuries.

The Supervisors shall be responsible for:

1. Ensuring affected employees are trained;
2. Ensuring that employees use proper lifting techniques;
3. Monitoring employee activities and behaviors to determine if employees should be removed from the work site
4. Making assistance available to employees who manually handle or lift 50 pounds or greater;
5. Contacting the Safety Coordinator for assistance in equipment selection, evaluations, and training; and
6. Insuring all employees who experience work-related injuries follow the appropriate procedures.

The Employee shall be responsible for:

1. Attending the required training;

2. Using proper lifting and material handling techniques and equipment;
3. Informing their supervisor if they are fatigued to the point of not being able to perform their duties safely;
4. Warming up the back muscles before lifting is conducted;
5. Notifying their supervisor when taking prescription or over-the-counter medication that could impair his/her ability to work safely;
6. Limiting manual lifting or handling tasks to objects less than their personal limit;
7. Getting assistance whenever manually handling or lifting materials or objects that are greater than their personal limit; and
8. Reporting injuries within 24 hours of their occurrence

2.0 GENERAL LIFTING TECHNIQUES

Whether it is during leisure activities or as a part of paid work, everyone lifts, holds, carries, pushes and pulls on a daily basis. Manual material handling involves lifting light, heavy and awkward objects. Safe lifting is a critical aspect of daily activities and should be the focus of any manual material handling. Before every lift is performed, a hazard assessment must be done and remember to do the following:

- Wear supportive shoes;
- Use lift assist devices (hand dollies, carts, lift tables, forklifts);
- Carry all movements out horizontally (e.g., push and pull rather than lift and lower);
- Always use your body weight and not your feet when pushing;
- Try to have most workplace deliveries placed at hip height;
- Always keep objects in the comfort zone (between hip and shoulder height);
- Keep all loads close to and in front of the body;
- Keep the back aligned while lifting;
- Maintain the center of balance;
- Let the legs do the actual lifting; and
- Reduce the size of the material to keep it light, compact and safe to grasp

2.1 *Plan the Lift* prior to lifting as follows:

- Size up the load, its weight, shape and position;
- Determine if the load is too large, too heavy or too awkward to move alone;
- Get help from a coworker or use a mechanical aid device to help with the lift when necessary;
- Decide on the route to take;
- Check for any problems or obstacles such as slippery or cluttered floors;
- Investigate the location where the load is going to be placed in order to anticipate any difficulties; and
- Always exercise or warm-up the back prior to lifting.

2.2 *Squat Lifting* should be done for a majority of all lifts. Squat lifting should be performed as follows:

- Stand as close to the load as possible;
- Move your feet shoulder width apart;
- Tighten your stomach muscles so you can tuck your pelvis;
- Bend at the knees, keeping your back straight and stomach tucked;
- Get a good firm grip on the load;
- Hug the load close to the center of your body;
- Lift smoothly with your legs gradually straightening the knees and hips into a standing position; and
- Avoid twisting your body as you lift.

2.3 *Carrying Loads* should be done as follows:

- Keep the load close to the center of your body to take full advantage of the mechanical leverage of your body;
- Do not change your grip on the load unless it is weight supported;
- Avoid twisting your body without pivoting your feet at the same time;
- If you must change direction, move your feet in that direction instead of twisting your trunk in that direction;
- Make sure you can see over the load;
- Move carefully toward your destination; and
- If a heavier load is carried for some distance, consider storing it closer.

2.4 *Unloading Objects* should be done the same way as lifting objects, but in the reverse order as follows:

- Slowly bend your knees to lower the load;
- Keep your back straight and the weight close to the center of your body;
- Allow enough room for fingers and toes when the load is set down;
- Place the load on a bench or table by resting it on the edge and pushing it forward with your arms and body; and
- Secure the load to ensure that it will not fall, tip over, roll or block someone's way.

2.5 *One-Arm Loads* are used when carrying items such as pails or buckets. Lifting and carrying one-arm loads should be performed as follows:

- Bend the knees and at the waist keeping your back straight;
- Reach for the load;
- Grasp the handle of the load firmly;
- Lift with your legs not your shoulders and upper back; and

- Keep your shoulders level while switching hands regularly to reduce overexertion on one side of the body while carrying the load.

2.6 *Team Lifts* are used when objects are too heavy, too large or too awkward for one person to lift. Team lifts should be performed as follows:

- Work with someone of similar build and height, if possible;
- Choose one person to direct the lift (e.g., "lift on the count of three");
- Lift with your legs and raise the load to the desired level at the same time;
- Always keep the load at the same level while carrying;
- Move smoothly and in unison; and
- Set the load down together.

2.7 *Overhead Lifts* should be conducted as follows:

- When lifting or lowering objects from above the shoulders, lighten the load whenever possible;
- Stand on something sturdy such as a step stool or platform to decrease the vertical distance; and
- When you are lowering objects from above the shoulders, slide the load close to your body, grasp the object firmly, slide it down your body and proceed with your move.

3.0 MECHANICAL AIDS AND RESTRICTIONS

3.1 Mechanical Aids: Alternative material-handling techniques for carrying or moving loads are to be used whenever possible to minimize lifting and bending requirements. These alternate techniques include the use of: hand trucks, carts, dollies, forklifts, hoists and wheelbarrows. Although mechanical aids are used, safe lifting procedures should still be followed by maintaining the natural curvature of the back, using the legs for any lifting that is encountered and avoid twisting the back.

3.2 Lifting Restrictions: When employees are not able to conduct their task fully due to an injury, they could be placed on work restrictions that may contain weight or lifting restrictions. If an employee is placed on any weight restrictions, they may not handle or lift any object heavier than what they have been restricted to until they are cleared to return to normal duties. If a re-evaluation has been conducted and the weight restriction has been modified or lifted the employee must follow the new restrictions.

3.3 Work Restrictions - Return to Work: If employees have experienced a work-related injury, they may be given certain restrictions regarding physical activity. Employees are to follow those restrictions. Please note that in most cases, continuing usual activity

with some restrictions leads to a better outcome than severely limiting activity. When conditions have improved enough, the restrictions will be lifted.

If employees have experienced a non-work related injury, they will receive care from their primary care provider, or another health care professional. Employees should follow the treatment regimen of their providers. Supervisors should be promptly notified of any work restrictions given by the primary care physician.

4.0 TRAINING

Employees shall receive back injury prevention training as part of new hire safety orientation, including:

- The dangers of improper manual lifting and body warning signals when manually lifting/carrying a load improperly.
- Avoidance of unnecessary physical stress and strain. Use mechanical moving equipment whenever possible.
- Avoidance of musculoskeletal injures and proper lifting techniques
- Lifting aids available (e.g. stages, platforms, steps, trestles, shoulder pads, handles, wheels, mechanical moving equipment, etc.).
- Awareness of what an employee may comfortably handle without strain—an employee should understand his/her body strengths and weaknesses.
- Demonstrate and practice safe manual lifting techniques due to high incidence of back injuries.
- Consider periodic safety talks at least annually to remind personnel about the importance of safe lifting techniques.
- The PPE required for manual movement of loads includes:

    - Eye protection;
    - Hand and forearm protection for loads with sharp/rough edges; and
    - Steel-toed safety shoes/boots. Metatarsal guards shall be required to protect the instep area from impact if working with heavy loads or moving equipment.

5.0 INJURY INVESTIGATION

Once the accident/injury investigation sequence is set in motion, little can be done to control the degree of severity. The difference between a “near miss” and a major accident is usually a matter of chance. Whether an employee turns an ankle or merely trips, is largely accidental. For this reason, all injuries, accidents and “near misses” will be investigated.

All investigations will be made where the accident occurred, if possible. At the scene of the accident are the conditions, equipment, employees, and circumstances that give direct

evidence of clues to underlying causes. Investigations will not be carried out in the supervisor's office or in any place other than the scene of the accident (when feasible).

Preparing a good report is important, because it provides both the details and recommendations. The report presents an opportunity to relay to management what actions are needed and provides the information necessary to justify the expenses associated with the remedies.

The report must include the “Immediate” and “Basic Causes”. “Immediate Causes” are those unsafe conditions or acts, which are closest to the accident (i.e., the extension cord lying on the floor that tripped an employee, or the poor lighting that caused an employee to fall). "Basic Causes” are those underlying causes that allow the immediate causes to exist. To determine the basic cause, ask the question, "Why did the unsafe condition exist, or why did the unsafe act take place?"

All evidence such as people, positions of equipment, parts, and papers will preserved, secured, and collected through notes, photographs, witness statements, and impoundment of documents and equipment.

Once management has discovered the cause(s) of an accident through investigation, the problem can be analyzed, then a solution can be developed that will help avoid a similar accident in the future.

By grouping accident investigation reports and incident records, common causes or trends can be determined. Once the causes or trends are evident, remedies can be applied to control them. Applying the proper remedies will decrease the possibility of similar accidents occurring in the future. Efficient analysis can be achieved by using the following process.

- ASSEMBLE information taken from accident investigation forms and accident records.
- GROUP similar information, and try to determine if there is a pattern of accident cause/trends.
- IDENTIFY source of loss, areas, etc., on which to concentrate.
- STUDY possible solutions to the problem.
- DETERMINE alternatives (remedies) that can be applied to prevent recurrence of this type of accident.
- SELECT the most appropriate alternative.

ONCE A REMEDY IS SELECTED, IT MUST BE APPLIED! If loss prevention is to be effective, efforts must be directed towards the chief sources of loss (or potential loss). These sources may relate to particular operations or departments, to areas within your shop, and to types of accident or injury.

Musculoskeletal injuries must be recorded and reported as required by 29 CFR Part 1904 on the 300 log.

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PURPOSE

The purpose of this program is to set forth procedures for the safe use of electrical equipment, tools, and to comply with NFPA 70E requirements.

SCOPE

This program applies to all Metropolitan Library System employees, temporary employees, and contractors. When work is performed on a non-owned or operated site, the operator's program shall take precedence, however, this document covers Metropolitan Library System employees and contractors and shall be used on owned premises, or when an operator's program doesn't exist or is less stringent.

Metropolitan Library System will advise the host employer of:

- Any unique hazards presented by the contract employer's work,
- Any unanticipated hazards found during work by Metropolitan Library System that the host employer did not mention, and
- The measures Metropolitan Library System took to correct any hazards reported by the host employer to prevent such hazards from recurring in the future.

1.0 RESPONSIBILITIES

1.1 Safety Committee: The Safety Committee or its designate will develop electrical safety programs and procedures in accordance with OSHA and NFPA requirements and/or as indicated by events and circumstances. The Safety Committee or its designate will be responsible for performing a field audit at least annually to ensure compliance with this program.

1.2 Operations Managers and Supervisors are responsible for ensuring that only qualified employees and/or qualified contractors perform electrical repairs or installations. Unqualified persons shall not be permitted to enter spaces that are required to be accessible to qualified employees only, unless the electric conductors and equipment involved are in an electrically safe work condition.

Operations Managers and Supervisors shall ensure a documented job briefing is held before starting each job and will include all employees involved. The briefing will cover hazards associated with the job, work procedures involved, special precautions, energy source controls and PPE requirements.

Operations Managers are also responsible for ensuring all applicable electrical safety programs are implemented and maintained at their locations.

1.3 Employees are responsible to use electrical equipment, tools, and appliances according to this program, for attending required training sessions when directed to do so and to report unsafe conditions to their supervisor immediately.

Only qualified employees may work on electric circuit parts or equipment that has not been de-energized. Such employees shall be made familiar with the use of special precautionary techniques, PPE, insulating and shielding materials and insulated tools.

Qualified employees permitted to work within Limited Approach Boundary of exposed energized electrical conductors and circuit parts operating at 50 volts or more shall, at a minimum, be additionally trained in all of the following:

- The skills and techniques necessary to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment.
- The skills and techniques necessary to determine the nominal voltage of exposed energized electrical conductors and circuit parts.
- The approach distances and the corresponding voltages to which the qualified person will be exposed.
- The decision-making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely.

2.0 BOUNDARIES

2.1 Limited Approach Boundary: The limited approach boundary is the distance from an exposed live part within which a shock hazard exists.

2.2 Restricted Approach Boundary: The restricted approach boundary is the closest distance to exposed live parts a qualified person can approach with without proper PPE and tools. Inside this boundary, accidental movement can put a part of the body or conductive tools in contact with live parts or inside the prohibited approach boundary. To cross the restricted approach boundary, the qualified person must:

- Have an energized work permit that is approved by the supervisor or manager responsible for the safety plan.
- Use PPE suitable for working near exposed lived parts and rated for the voltage and energy level involved.
- Be certain that no part of the body enters the prohibited space.
- Minimize the risk from unintended movement, by keeping as much of the body as possible out of the restricted space; body parts in the restricted space should be protected.

2.3 Prohibited Approach Boundary: The prohibited approach boundary is the minimum approach distance to exposed live parts to prevent flashover or arcing. Approaching any closer is comparable to making direct contact with a live part. To cross the prohibited approach boundary, the qualified person must:

- Have specified training to work on exposed live parts.
- Have a permit with proper written work procedures and justifying the need to work that close.
- Do a risk analysis.
- Have (2) and (3) approved by the appropriate supervisor.
- Use PPE appropriate for working near exposed live parts and rated for the voltage and energy level involved.

2.4 Flash Protection Boundary: The Flash Protection Boundary is the approach limit at a distance from exposed live parts within which a person could receive a second degree burn if an electrical arc flash were to occur. Requirements are:

- Use of PPE appropriate for working near exposed live parts and rated for the voltage and energy level involved
- For systems of 600 volts and less, the flash protection boundary is 4 feet, based on an available bolted fault current of 50 kA and a clearing time of 6 cycles for the circuit breaker to act, or any combination of fault currents and clearing times not exceeding 300 kA cycles

When working on de-energized the parts, but still inside the flash protection boundary for nearby live exposed parts:

- If the parts cannot be de-energized, barriers such as insulated blankets must be used to protect against accidental contact or PPE must be worn.
- Employees shall not reach blindly into areas that might contain exposed live parts.
- Employees shall not enter spaces containing live parts unless illumination is provided that allows the work to be performed safely.
- Conductive articles of jewelry and clothing (such as watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, metal headgear, or metal frame glasses) shall not be worn where they present an electrical contact hazard with exposed live parts.
- Conductive materials, tools, and equipment that are in contact with any part of an employee's body shall be handled in a manner that prevents accidental contact with live parts. Such materials and equipment include, but are not limited to long conductive objects such as ducts, pipes, tubes, conductive hose and rope, metal-lined rules and scales, steel tapes, pulling lines, metal scaffold parts, structural members, and chains.
- When an employee works in a confined space or enclosed spaces (such as a manhole or vault) that contains exposed live parts, the employee shall use protective shields, barriers or insulating materials as necessary to avoid contact with these parts. Doors, hinged panels, and the like shall be secured to prevent them from swinging into employees. Refer to the confined space entry program.

3.0 HAZARD ANALYSIS

3.1 Job Safety Analysis: A Job Safety Analysis shall be performed before starting any job. The employee in charge shall conduct a JSA briefing with the employees involved. The briefing shall include identification of hazards associated with job, and discussion of the work processes, special precautions, energy source controls, and PPE requirements.

3.2 Hazard Analysis: Prior to any work being done within the Limited Approach Boundary a hazard risk analysis shall be performed. The analysis shall contain event severity, frequency, probability, and avoidance to determine the level of safe practices employed.

3.3 Arc Flash Risk Assessment: An arc flash risk assessment must be performed, documented, and reviewed prior to beginning work. The risk assessment includes:

- Collect data on the facility's power distribution system.
  - Arrangement of components on a one-line drawing with nameplate specifications of every device.
  - Lengths and cross-section area of all cables.

- Contact the electric utility for information including the minimum and maximum fault currents that can be expected at the entrance to the facility.
- Conduct a short circuit analysis followed by a coordination study is performed.
- Feed the resultant data into the NFPA 70E equations.
  - These equations produce the necessary flash protection boundary distances and incident energy to determine the minimum PPE requirements.
  - The flash protection boundary is the distance at which PPE is needed to prevent incurable burns (2nd degree or worse) if an arc flash occurs. (It is still possible to suffer 1st or 2nd degree burns.)
- For systems of 600 volts and less, the flash protection boundary is 4 feet, based on an available bolted fault current of 50 kA (kiloamps) and a clearing time of 6 cycles (0.1 seconds) for the circuit breaker to act, or any combination of fault currents and clearing times not exceeding 300 kA cycles (5000 ampere seconds).
- Once completed, the equipment is to be marked with a label.
- Additional safety signs, tags, barricades, or attendants (which ever is most appropriate for the situation) must be used to inform other workers in the area of the potential hazards.

3.4 Energized Electrical Work Permit: Work on energized electrical conductors or circuit parts that are not placed in an electrically safe work condition shall be considered energized electrical work and shall be performed by written permit only.

4.0 WORK PRACTICES

4.1 De-energization: All energized components shall be de-energized and Lockout/Tagout procedure implemented before work is performed. Only qualified persons shall be permitted to work on electrical conductors or circuit parts that have been put into an electrically safe work condition.

If de-energizing introduces additional or increased hazards or is not feasible, a recommendation to work on or around energized components will be made on a case-by-case basis by the Qualified Person. De-energized work that is not feasible due to equipment design or operational limitations include testing of circuits that can only be performed with the circuit energized and work on circuits that form an integral part of a continuous process that would otherwise need to be completely shut down. Energized work shall only be performed after adequate job safety analysis reviewed, written switching procedure reviewed, Safe Work Permit approval, and Energized Electrical Work Permit.

4.2 Verification of De-energization: A qualified employee shall use test equipment to test the circuit elements and electrical parts of equipment to which employees will be exposed and shall verify that the circuit elements and equipment parts are de-energized as follows:

- All capacitors and stored energy devices (excluding batteries) are discharged. Assume them to be energized until verified with voltage detector of proper range. Capacitance shall be discharged and safety grounds applied for no less than one minute per Kilovolt before work proceeds.
- All voltage sources, including back-feed or secondary sources, are to be identified, isolated, and confirmed by test to be safe.
- The absence of voltage shall be tested with an instrument rated for the operating voltage.
- Test equipment shall be checked for proper operation immediately before and immediately after each test using manufacturer's recommended testing procedures.
- Test instruments, equipment and their accessories shall be rated for circuits and equipment to which they shall be connected.
- Visually inspect test instruments, equipment, and their accessories (test leads, cables, power cords, probes, connectors, etc.) for external defects or damage before every use.
- All test leads shall be terminated with proper probes, plugs, clamps, etc.
- Any test equipment of questionable integrity shall not be used until it has been repaired by a qualified repair facility or replaced.
- If no voltage is indicated, the circuit should be momentarily (one minute) grounded with appropriate ground set for the available fault current, with all phases grounded to the ground conductor and to a physical ground. The circuit must be grounded for duration of work if possibility exists for; being energized from another source, induced voltages, stored capacitance, or contact with energized circuit.
- Operate the controls to verify that the equipment cannot be re-energized or cannot be restarted.

Only after the above has been satisfied should work proceed.

4.3 Required Inspections: Electrical equipment, tools, and appliances must be inspected prior to each use.

4.4 GFCI: The use of a hard fixed GFCI or a portable GFCI adapter shall be used with all portable hand tools, electric extension cords, drop lights and all 110-volt equipment.

4.5 Removal from Service: Faulty equipment, tools, or appliances shall be removed from service immediately and tagged "Out of Service", dated and signed by the employee applying the tag.

4.6 Equipment: Test instruments, equipment, and their accessories shall meet the requirements of ANSI/ISA-61010-1-Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use Part 1 General Requirements, for rating and design requirements for voltage measurement and test instruments intended for use on

electrical systems 1000 Volts and below. When test instruments are used for the testing for the absence of voltage on conductors or circuit parts operating at 50 volts or more, the operation of the test instrument shall be verified before and after an absence of voltage test is performed.

4.7 Personal Protective Equipment: All PPE must meet the requirements of NFPA 70E 130.7(C)(14). It must be inspected before each day's use and immediately following any incident that can reasonably be suspected of having caused damage. Insulating gloves shall be given an air test, along with the inspection. Maximum test intervals for rubber insulating personal protective equipment shall include:

- Blankets - before first issue/every 12 months thereafter
- Gloves - before first issue and every 6 months
- Sleeves - before first issue and every 12 months
- Covers and line hose shall be testing if insulating value is suspect.

4.8 Lighting: Employees shall not enter spaces containing electrical hazards unless illumination is provided that enables the employees to perform the work safely. Where lack of illumination or an obstruction precludes observation of the work to be performed employees shall not perform any task within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists.

4.9 Extension Cords:

- Use only three-wire, grounded, extension cords and cables that conform to a hard service rating of 14 amperes or higher, and grounding of the tools or equipment being supplied.
- Only commercial or industrial rated-grounded extension cords may be used in shops and outdoors.
- Cords for use other than indoor appliances must have a rating of at least 14 amps.
- Cords must have suitable strain relief provisions at both the plug and the receptacle ends.
- Work lamps (drop light) used to power electrical tools must have a 3 wire, grounded outlet, unless powering insulated tools.
- Adapters that allow three wire, grounded prongs, connected to two wire non-grounded outlets are strictly prohibited.
- Cords must have a service rating for hard or extra-hard service and have S, AJ, ST, SO, SJO, SJT, STO, or SJTO printed on the cord.
- Cords may not be run through doorways, under mats or carpets, across walkways or aisles, concealed behind walls, ceilings or floors, or run through holes in walls, or anywhere where they can become a tripping hazard.

- High current equipment or appliances should be plugged directly into a wall outlet whenever possible.
- All extension cords shall be plugged into one of the following:
  - A GFCI outlet
  - A GFCI built into the cord
  - A GFCI adapter used between the wall outlet and cord plug
- All extension cords and or electrical cords shall be inspected daily or before each use, for breaks, plug condition and ground lugs, possible internal breaks, and any other damage. If damage is found, the extension cord or electrical cord shall be remove from service and repaired or replaced.
- Extension cords shall not be used on a compressor skid to operate heat tapes or any other type of equipment on a temporary basis. Heat tapes or other equipment shall be hard wired per applicable electrical codes.

4.10 Outlets: Outlets connected to circuits with different voltages must use a design such that the attachment plugs on the circuits are not interchangeable.

4.11 Multiple Outlet Boxes: Multiple outlet boxes must be plugged into a wall receptacle. Multiple outlet boxes must not be used to provide power to microwave ovens, toasters, space heaters, hot plates, coffeepots, or other high-current loads.

4.12 Double Insulated Tools: Double insulated tools must have the factory label intact indicating the tool has been approved to be used without a three-wire grounded supply cord connection. Double insulated tools must not be altered in any way, which would negate the factory rating.

4.13 Switches, Circuit Breakers, and Disconnects: All electrical equipment and tools must have an on and off switch and may not be turned on or off by plugging or unplugging the supply cord at the power outlet. Circuit breaker panel boxes and disconnects must be labelled with the voltage rating. Each breaker within a breaker panel must be labelled for the service it provides. Disconnect switches providing power for individual equipment must be labelled accordingly.

4.14 Ladders: Only approved, non-conductive ladders, may be used when working near or with electrical equipment, which includes changing light bulbs. Ladders must be either constructed of wood, fibreglass, or have non-conductive side rails. Wood ladders should not be painted, which can hide defects, except with clear lacquer. When using ladders, they shall be free from any moisture, oils, and greases.

4.15 Energized and Overhead High Voltage Power Lines & Equipment: A minimum clearance of 10 feet from high voltage lines must be maintained when operating vehicular and mechanical equipment such as forklifts, cranes, winch trucks, and other similar equipment. When possible, power lines shall be de-energized and grounded or other

protective measures shall be provided before work is started. Minimum approach distance to energized high power voltages lines for unqualified employees is 10 feet. Minimum approach distance for qualified employees shall be followed per 29 CFR 1910.333(c)(3)(i) Qualified – Table S5 Selection and Use of Work Practices - Approach Distances for Qualified Employees – Alternating Current).

4.16 Confined or Enclosed Work Spaces: When an employee works in a confined or enclosed space that contains exposed energized parts, the employee shall isolate the energy source and turn off the source and lock and tag out the energy source (Only qualified electricians can work on an exposed energy source). Protective shields, protective barriers or insulating materials as necessary shall be provided.

4.17 Enclosures, Breaker Panels, and Distribution Rooms: A clear working space must be maintained in the front, back and on each side of all electrical enclosures and around electrical equipment for a safe operation and to permit access for maintenance and alteration. A minimum two-foot working floor space in front of panels and enclosures shall be painted yellow. Employees may not enter spaces containing exposed energized parts unless illumination is provided that enables the employees to work safely. Housekeeping in distribution rooms must receive high priority to provide a safe working and walking area in front of panels and to keep combustible materials to the minimum required to perform maintenance operations. All enclosures and distribution rooms must have "Danger: High Voltage – Authorized Personnel Only" posted on the front panel and on entrance doors. Flammable materials are strictly prohibited inside distribution rooms (Boxes, rags, cleaning fluids, etc.)

4.18 Lockout/Tagout: No work shall be performed on (or near enough to them for employees to be exposed due to the dangers of tools or other equipment coming into contact with the live parts) live parts and the hazards they present. If any employee is exposed to contact with parts of fixed electric equipment or circuits which have been de-energized, the circuits energizing the parts shall be locked out or tagged or both. Conductors and parts of electrical equipment that have been de-energized but not been locked or tagged out shall be treated as live parts. Affected personnel will be notified when lockout/tagout activities are being performed in their work area.

4.19 Contractors: Only approved, certified, electrical contractors may perform construction and service work on Metropolitan Library System or client property. It is the Manager/Supervisors responsibility to verify the contractor's certification.

4.20 Fire Extinguishers: Approved fire extinguishers must be provided near electrical breaker panels and distribution centers. Water type extinguishers shall not be located closer than 50 feet from electrical equipment.

4.21 Electric Shock: If someone is discovered that has received an electric shock and is unconscious:

- Call for help immediately.
- Shut off the electrical circuit at the power source if possible.
- Check to see if their body is in contact with an electrical circuit. Do not touch a person until you are sure there is no contact with an electrical circuit.

4.22 Disconnecting Means for Electric Welders: A disconnecting means shall be provided in the supply circuit for each motor-generator arc welder, and for each AC transformer and DC rectifier arc welder which is not equipped with a disconnect mounted as an integral part of the welder. A switch or circuit breaker shall be provided by which each resistance welder and its control equipment can be isolated from the supply circuit. The ampere rating of this disconnecting means may not be less than the supply conductor amperage.

4.23 Equipment Grounding: All gas compressors, air compressors, separators, vessels, etc. shall be grounded by means of using a lug and ground strap, nominal in size to a ½" bolt or larger, attached to a ground rod six feet or longer. Equipment bonding jumpers shall be of copper or other corrosion-resistance material. The transfer of hazardous or flammable material from a metal or plastic container with a flash point of 100 degrees F or less shall have a ground strap from the container and attached to the skid or a ground rod placed in the ground.

5.0 TRAINING

5.1 Requirement for Training: Authorized personnel will be trained in lockout/tagout procedures.

5.2 Training Topics: Employees are trained:

- To understand the specific hazards associated with electrical energy
- In safety-related work practices and procedural requirements as necessary to provide protection from the electrical hazards associated with their respective jobs
- To identify and understand the relationship between electrical hazards and possible injury
- In the skills and techniques to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment
- To determine the nominal voltage of exposed energized electrical conductors and circuit parts
- The approach distances specified in table 5-1
- The decision-making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely

Limited Approach Boundary				
Nominal system voltage range, phase to phase	**Exposed movable conductor**	**Exposed fixed-circuit part**	**Restricted approach boundary (allowing for accidental movement)**	**Prohibited approach boundary**
0 to 50 volts	Not specified	Not specified	Not specified	Not specified
51 to 300 volts	10 ft. 0 in.	3 ft. 6 in.	Avoid contact	Avoid contact
301 to 750 volts	10 ft. 0 in.	3 ft. 6 in.	1 ft. 0 in.	0 ft. 1 in.
751 to 15 KV KV	10 ft. 0 in.	5 ft. 0 in.	2 ft. 2 in.	0 ft. 7 in.
15.1 kV to 36 KV	10 ft. 0 in.	6 ft. 0 in	2 ft. 7 in.	0 ft. 10 in.
36.1 KV to 46 kV	10 ft. 0 in.	8 ft. 0 in	2 ft 9 in.	1 ft. 5 in.
46.1 KV to 72.5 KV	10 ft. 0 in.	8 ft. 0 in.	3 ft 2 in.	2 ft. 1 in.
72.6 KV to 121 KV	10 ft. 8 in.	8 ft. 0 in.	3 ft. 3 in.	2 ft. 8 in.
138 KV to 145 KV	11 ft 0 in	10 ft. 0 in.	3 ft. 7 in	3 ft. 1 in.
161 KV to 169 KV	11 ft 8 in.	11 ft. 8 in.	4 ft. 0 in.	3 ft. 6 in.
230 KV to 242 KV	13 ft. 0 in.	13 ft. 0 in.	5 ft. 3 in.	4 ft. 9 in.
345 KV to 262 KV	15 ft. 4 in	15 ft. 4 in.	8ft. 6 in.	8 ft. 0 in.

Table 5-1

5.3 Documentation: Training shall be documented and maintained for the duration of the employee's employment. Documentation shall be made when the employee demonstrates proficiency, be maintained for the duration of the employee's employment, and contain each employee's name and date of training.

5.4 Re-training: An employee shall receive additional training or retraining under any of the following conditions:

- If the supervision or annual inspections indicate that the employee is not complying with the safety-related work practices.
- If new technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices that are different from those that the employee would normally use.
- If they must employ safety-related work practices that are not normally used during their regular job duties.
- Retraining of "Qualified Personnel" should not exceed 3 years.
- When required, OSHA 1910.269 refresher training. The employer shall determine, through regular supervision and through inspections conducted on at least an annual basis that each employee is complying with the safety-related work practices required by this section.

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PURPOSE

When engineering, work practice, and administrative controls are not feasible or do not provide sufficient protection, employers must provide personal protective equipment (PPE) to their employees and ensure its use. Personal protective equipment, commonly referred to as "PPE", is equipment worn to minimize exposure to a variety of hazards. Examples of PPE include such items as gloves, foot and eye protection, protective hearing devices (earplugs, muffs) hard hats, respirators and full body suits.

This guide will help Metropolitan Library System employees do the following:

- Understand the types of PPE
- Know the basics of conducting a "hazard assessment" of the workplace
- Select appropriate PPE for a variety of circumstances
- Understand what kind of training is needed in the proper use and care of PPE

1.0 REQUIREMENTS FOR PPE

To ensure the greatest possible protection for employees in the workplace, the cooperative efforts of both Metropolitan Library System and its employees will help in establishing and maintaining a safe and healthful work environment.

1.1 Company responsibilities: Metropolitan Library System is responsible for:

- Performing a "hazard assessment" of the workplace to identify and control physical and health hazards.
- Identifying and providing appropriate PPE for employees.
- Providing required PPE.
- Maintaining PPE, including replacing worn or damaged PPE.
- Periodically reviewing, updating and evaluating the effectiveness of the PPE program.

1.2 Employee responsibilities: employees are responsible to:

- Properly wear PPE
- Attend training sessions on PPE
- Care for, clean and maintain PPE
- Inform a supervisor of the need to repair or replace PPE
- Defective or damage PPE shall NOT be used

1.3 Training: employees will be trained in the following areas:

- When and what PPE is necessary
- How to properly don, doff, adjust, and wear PPE
- The limitations of the PPE
- The proper care, maintenance, useful life and disposal of the PPE

1.4 Testing: each affected employee will demonstrate an understanding and the ability to use PPE properly before being allowed to perform work requiring the use of PPE.

1.5 Retraining: when Metropolitan Library System has reason to believe that any affected employee who has already been trained does not have the understanding and skill, the employee will be retrained. Circumstances where retraining is required include, but are not limited to, situations where:

- Changes in the workplace render previous training obsolete
- Changes in the types of PPE to be used render previous training obsolete
- Inadequacies in an affected employee's knowledge or use of assigned PPE indicate that the employee has not retained the requisite understanding or skill

1.6 Documentation: Metropolitan Library System will verify that each affected employee has received and understood the required training through a written certification that

contains the name of each employee trained, the date(s) of training, and that identifies the subject of the certification.

1.7 Purchase of PPE: some standards require that employers provide PPE at no cost to the employee while others simply state that the employer must provide PPE. Metropolitan Library System will comply with those standards. Employees may purchase their own PPE, however, employee-owned PPE must meet the applicable standards.

2.0 HAZARD ASSESSMENT

2.1 Description: a first critical step in developing a comprehensive safety and health program is to identify physical and health hazards in the workplace. This process is known as a "hazard assessment." This has typically already been done by most Metropolitan Library System clients for their sites. In such case, Metropolitan Library System employees will need to receive site specific training by the client. Potential hazards may be physical or health-related and a comprehensive hazard assessment should identify hazards in both categories. If an assessment has not been done, the following procedures should be followed.

2.2 Walk-through: the hazard assessment should begin with a walk-through survey of the job site to develop a list of potential hazards in the following basic hazard categories:

- Impact
- Penetration
- Compression (roll-over)
- Chemical
- Heat/cold
- Harmful dust
- Light (optical) radiation
- Biological

2.3 Sources of hazards: in addition to noting the basic layout of the job site, things to look for during the walk-through survey include:

- Sources of electricity
- Sources of motion such as machines or processes where movement may exist that could result in an impact between personnel and equipment
- Sources of high temperatures and pressures that could result in burns, eye injuries or fire
- Types of chemicals used in the workplace
- Sources of harmful dusts
- Sources of light radiation, such as welding, brazing, cutting, furnaces, heat treating, high intensity lights, etc
- The potential for falling or dropping objects
- Sharp objects that could poke, cut, stab or puncture
- Biologic hazards such as blood or other potentially infected material

2.4 PPE selection: when the walk-through is complete, Metropolitan Library System organizes and analyzes the information so that it may be efficiently used in determining the proper types of PPE required at the worksite. It is desired to select PPE that will provide a level of protection greater than the minimum required to protect employees from hazards.

2.5 Reassessment: the job site should be periodically reassessed for any changes in conditions, equipment, or operating procedures that could affect occupational hazards. This periodic reassessment should also include a review of injury and illness records to spot any trends or areas of concern and taking appropriate corrective action. The suitability of existing PPE, including an evaluation of its condition and age, should be included in the reassessment.

2.6 Documentation: documentation of the hazard assessment is required through a written certification that includes the following information:

- Identification of the workplace evaluation
- Name of the person conducting the assessment
- Date of the assessment
- Identification of the document certifying completion of the hazard assessment

3.0 SELECTION OF PPE

3.1 Fitment: Metropolitan Library System takes the fit and comfort of PPE into consideration when selecting appropriate items for their workplace. PPE that fits well and is comfortable to wear will encourage employee use of PPE. Most protective devices are available in multiple sizes and care should be taken to select the proper size for each employee. If several different types of PPE are worn together, make sure they are compatible. If PPE does not fit properly, it can make the difference between being safely covered or dangerously exposed. It may not provide the level of protection desired and may discourage employee use.

3.2 Standard requirements: OSHA requires that many categories of PPE meet or exceed the standards developed by the American National Standards Institute (ANSI). PPE in the categories listed below must meet the cited ANSI standard. Existing PPE stocks must meet the ANSI standard in effect at the time of its manufacture or provide protection equivalent to PPE manufactured to the ANSI criteria. Employees may provide their own PPE, but that PPE is subject to the approval of Metropolitan Library System to ensure that it conforms to the employer's criteria, based on the hazard assessment, OSHA requirements, and ANSI standards. OSHA requires PPE to meet the following ANSI standards:

- Eye and Face Protection: ANSI Z87.1-1989 (USA Standard for Occupational and Educational Eye and Face Protection)

- Head Protection: ANSI Z89.1-1986
  Foot Protection: ANSI Z41.1-1991

3.3 Hand protection: for hand protection, there is no ANSI standard for gloves but OSHA recommends that selection be based upon the tasks to be performed and the performance and construction characteristics of the glove material. For protection against chemicals, glove selection must be based on the chemicals encountered, the chemical resistance, and the physical properties of the glove material.

3.4 Care: all PPE, clothing and equipment, should be of safe design and construction, and should be maintained in a clean and reliable fashion.

4.0 EYE AND FACE PROTECTION

4.1 Duty to have protection: employees can be exposed to a large number of hazards that pose danger to their eyes and face. OSHA requires that employees have appropriate eye or face protection if they are exposed to eye or face hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, potentially infected material or potentially harmful light radiation.

4.2 Selection and use: many occupational eye injuries occur because workers are not wearing any eye protection while others result from wearing improper or poorly fitting eye protection. Metropolitan Library System requires that their employees wear appropriate eye and face protection and that the selected form of protection is appropriate to the work being performed and properly fits each worker exposed to the hazard.

4.3 Prescription lenses: everyday use of prescription corrective lenses will not provide adequate protection against most occupational eye and face hazards, so Metropolitan Library System makes sure that employees with corrective lenses either wear eye protection that incorporates the prescription into the design or wear additional eye protection over their prescription lenses. It is important to ensure that the protective eyewear does not disturb the proper positioning of the prescription lenses so that the employee's vision will not be inhibited or limited. Also, employees who wear contact lenses must wear eye or face PPE when working in hazardous conditions.

4.4 Hazard assessment: OSHA suggests that eye protection be routinely considered for use by carpenters, electricians, machinists, mechanics, millwrights, plumbers and pipefitters, sheet metal workers and tinsmiths, assemblers, sanders, grinding machine operators, sawyers, welders, laborers, chemical process operators and handlers, and timber cutting and logging workers. Metropolitan Library System will decide whether there is a need for eye and face PPE through a hazard assessment. Often the client’s requirement will determine the PPE required in their site. If the client and Metropolitan Library System requirements ever conflict, the most stringent requirement will apply.

4.5 Potential injuries: examples of potential eye or face injuries include:

- Dust, dirt, metal or wood chips entering the eye from activities such as chipping, grinding, sawing, hammering, the use of power tools or even strong wind forces
- Chemical splashes from corrosive substances, hot liquids, solvents or other hazardous solutions
- Objects swinging into the eye or face, such as tree limbs, chains, tools or ropes
- Radiant energy from welding, harmful rays from the use of lasers or other radiant light (as well as heat, glare, sparks, splash and flying particles)

4.6 Type selection: selecting the most suitable eye and face protection for employees should take into consideration the following elements:

- Ability to protect against specific workplace hazards
- Should fit properly and be reasonably comfortable to wear
- Should provide unrestricted vision and movement
- Should be durable and cleanable
- Should allow unrestricted functioning of any other required PPE

The eye and face protection selected for employee use must clearly identify the manufacturer. Any new eye and face protective devices must comply with ANSI Z87.1-1989 or be at least as effective as this standard. Any equipment purchased before this requirement took effect on July 5, 1994, must comply with the earlier ANSI Standard (ANSI Z87.1-1968) or be shown to be equally effective.

Each type of protective eyewear is designed to protect against specific hazards. Metropolitan Library System will identify the specific workplace hazards that threaten employees' eyes and faces by completing a hazard assessment as outlined in the earlier section.

4.7 Procurement: Metropolitan Library System may choose to provide one pair of protective eyewear for each position rather than individual eyewear for each employee. If this is done, Metropolitan Library System will make sure that employees disinfect shared protective eyewear after each use. Protective eyewear with corrective lenses may only be used by the employee for whom the corrective prescription was issued and may not be shared among employees.

4.8 Types of protection: some of the most common types of eye and face protection include the following:

- **Safety spectacles:** These protective eyeglasses have safety frames constructed of metal or plastic and impact-resistant lenses. Side shields are available on some models. Many clients require side shields.

- **Goggles:** These are tight-fitting eye protection that completely cover the eyes, eye sockets, and the facial area immediately surrounding the eyes and provide protection from impact, dust, and splashes. Some goggles will fit over corrective lenses.
- **Welding shields:** Constructed of vulcanized fiber or fiberglass and fitted with a filtered lens, welding shields protect eyes from burns caused by infrared or intense radiant light; they also protect both the eyes and face from flying sparks, metal spatter, and slag chips produced during welding, brazing, soldering, and cutting operations. OSHA requires filter lenses to have a shade number appropriate to protect against the specific hazards of the work being performed in order to protect against harmful light radiation.
- **Laser safety goggles:** These specialty goggles protect against intense concentrations of light produced by lasers. The type of laser safety goggles chosen will depend upon the equipment and operating conditions in the workplace.
- **Face shields:** These transparent sheets of plastic extend from the eyebrows to below the chin and across the entire width of the employee's head. Some are polarized for glare protection. Face shields protect against nuisance dusts and potential splashes or sprays of hazardous liquids but will not provide adequate protection against impact hazards. Face shields used in combination with goggles or safety spectacles will provide additional protection against impact hazards.

4.9 Welding operations: the intense light associated with welding operations can cause serious and sometimes permanent eye damage if operators do not wear proper eye protection. The intensity of light or radiant energy produced by welding, cutting, or brazing operations varies according to a number of factors including the task producing the light, the electrode size, and the arc current. The following table shows the minimum protective shades for a variety of welding, cutting and brazing operations in general industry and in the shipbuilding industry.

Table 1
Filter Lenses for Protection against Radiant Energy

Operations	Electrode size in 1/32" (0.8mm)	Arc current	Minimum* protective shade
Shielded metal arc welding	< 3 3 - 5 5 - 8 > 8	< 60 60 - 160 160 - 250 250 - 550	7 8 10 11
Gas metal arc welding and flux cored arc welding		< 60 60 - 160 160 - 250 250 - 500	7 10 10 10
Gas tungsten arc welding		< 50 50 - 150 150 - 500	8 8 10
Air carbon	(light)	< 500	10
Arc cutting	(heavy)	500 - 1,000	11
Plasma arc welding		< 20 20 - 100 100 - 400 400 - 800	6 8 10 11
Plasma arc cutting	(light)** (medium)** (heavy)**	< 300 300 - 400 400 - 800	8 9 10
Torch brazing			3
Torch soldering			2
Carbon arc welding			14

Table 2
Filter Lenses for Protection against Radiant Energy

Operations	Plate thickness inches	Plate thickness mm	Minimum* protective shade
Gas welding: Light	< 1/8	< 3.2	4
Gas welding: Medium	1/8 - 1/2	3.2 - 12.7	5
Gas welding: Heavy	> 1/2	> 12.7	6
Oxygen cutting: Light	< 1	< 25	3
Oxygen cutting: Medium	1 - 6	25 - 150	4
Oxygen cutting: Heavy	> 6	> 150	5

* As a rule of thumb, start with a shade that is too dark to see the weld zone. Then go to a lighter shade which gives sufficient view of the weld zone without going below the minimum. In oxyfuel gas welding or cutting where the torch produces a high yellow light, it is desirable to use a filter lens that absorbs the yellow or sodium line in the visible light of the (spectrum) operation.

** These values apply where the actual arc is clearly seen. Experience has shown that lighter filters may be used when the arc is hidden by the work piece.

4.10 Construction requirements: the construction industry has separate requirements for filter lens protective levels for specific types of welding operations, as indicated in the table below:

Table 3
Construction Industry Requirements for Filter Lens Shade Numbers for Protection against Radiant Energy

Welding Operation	Shade Number
Shielded metal-arc welding 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes	10
Gas-shielded arc welding (nonferrous) 1/16-, 3/32-, 1/8-, 5/32-inch diameter electrodes	11
Gas-shielded arc welding (ferrous) 1/16-, 3/32-, 1/8-, 5/32-inch diameter 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
Soldering	2
Torch brazing	3 or 4
Light cutting, up to 1 inch	3 or 4
Medium cutting, 1 to 6 inches	4 or 5
Heavy cutting, more than 6 inches	5 or 6
Gas welding (light), up to 1/8-inch	4 or 5
Gas welding (medium), 1/8- to 1/2-inch	5 or 6
Gas welding (heavy), more than 1/2-inch	6 or 8

4.11 Laser operations: laser light radiation can be extremely dangerous to the unprotected eye and direct or reflected beams can cause permanent eye damage. Laser retinal burns can be painful, so it is essential that all personnel in or around laser operations wear appropriate eye protection. Laser safety goggles should protect for the specific wavelength of the laser and must be of sufficient optical density for the energy involved. Safety goggles intended for use with laser beams must be labeled with the laser wavelengths for which they are intended to be used, the optical density of those wavelengths and the visible light transmission.

The table below lists maximum power or energy densities and appropriate protection levels for optical densities 5 through 8.

Table 4
Selecting Laser Safety Glass

Intensity, CW maximum power density (watts/cm^2)	Attenuation	
	Optical density (O.D.)	Attenuation factor
10-2	5	10^5
10-1	6	10^6
1.0	7	10^7
10.0	8	10^8

5.0 HEAD PROTECTION

5.1 Duty to have protection: Metropolitan Library System requires that their employees wear head protection if any of the following apply:

- Objects might fall from above and strike them on the head
- They might bump their heads against fixed objects, such as exposed pipes or beam
- There is a possibility of accidental head contact with electrical hazards
- The client requires head protection

5.2 General features: in general, protective helmets or hard hats should do the following:

- Resist penetration by objects
- Absorb the shock of a blow
- Be water-resistant and slow burning
- Have clear instructions explaining proper adjustment and replacement of the suspension and headband

5.3 Standard requirements: protective headgear must meet ANSI Standard Z89.1-1986 (Protective Headgear for Industrial Workers) or provide an equivalent level of protection. Helmets purchased before July 5, 1994 must comply with the earlier ANSI Standard (Z89.1-1969) or provide equivalent protection.

5.4 Types of hard hats: there are two types of hard hats based on the impact protection they provide:

- Type I: conventional hard hats that are designed to reduce the force of impact to the top of the head, neck, and spine.
- Type II: designs that offer additional impact protection to the front, sides, and back, as well as the top of the head.

5.5 Classes: hard hats are divided into three classes based on their electrical insulation properties:

- Class C (Conductive): provides no electrical protection. They are designed for work in explosive environments.
- Class E (Electrical): provide the highest level of protection against electrical hazards, with high-voltage shock and burn protection (up to 20,000 volts).
- Class G (General): provide minimal protection from electrical hazards (up to 2200 volts).

Each hat should bear a label inside the shell that lists the manufacturer, the ANSI designation and the class of the hat.

5.6 Bump caps: another class of protective headgear on the market is called a “bump cap." They are recommended for areas where protection is needed from head bumps and lacerations. These are not designed to protect against falling or flying objects and are not ANSI approved. It is essential to check the type of hard hat employees are using to ensure that the equipment provides appropriate protection.

5.7 Sizing: head protection that is either too large or too small is inappropriate for use, even if it meets all other requirements. Protective headgear must fit appropriately on the body and for the head size of each individual. Most protective headgear comes in a variety of sizes with adjustable headbands to ensure a proper fit (many adjust in 1/8-inch increments). A proper fit should allow sufficient clearance between the shell and the suspension system for ventilation and distribution of an impact. The hat should not bind, slip, fall off, or irritate the skin. Hard hats must be worn with the bill forward to protect employees properly.

5.8 Accessories: some protective headgear allows for the use of various accessories to help employees deal with changing environmental conditions, such as slots for earmuffs, safety glasses, face shields, and mounted lights. Optional brims may provide additional protection from the sun and some hats have channels that guide rainwater away from the face. Protective headgear accessories must not compromise the safety elements of the equipment.

5.9 Cleaning and inspection: periodic cleaning and inspection will extend the useful life of protective headgear. A daily inspection of the hard hat shell, suspension system and other accessories for holes, cracks, tears, or other damage that might compromise the protective value of the hat is essential. Paints, paint thinners, and some cleaning agents can weaken the shells of hard hats and may eliminate electrical resistance. Consult the helmet manufacturer for information on the effects of paint and cleaning materials on their hard hats. Never drill holes, paint, or apply labels to protective headgear as this may reduce the integrity of the protection. Do not store protective headgear in direct sunlight, such as on the rear window shelf of a car, since sunlight and extreme heat can damage them.

5.10 Removal from services: hard hats with any of the following defects should be removed from service and replaced:

- Perforation, cracking, or deformity of the brim or shell
- Indication of exposure of the brim or shell to heat, chemicals, or ultraviolet light and other radiation (in addition to a loss of surface gloss, such signs include chalking or flaking)

5.11 Impacts: always replace a hard hat if it sustains an impact, even if damage is not noticeable. Suspension systems are offered as replacement parts and should be replaced when damaged or when excessive wear is noticed. It is not necessary to replace the entire hard hat when deterioration or tears of the suspension systems are noticed.

6.0 FOOT AND LEG PROTECTION

6.1 Duty to have protection: employees who could possibly get foot or leg injuries from falling or rolling objects or from crushing or penetrating materials should wear protective footwear. Also, employees whose work involves exposure to hot substances or corrosive or poisonous materials must have protective gear to cover exposed body parts, including legs and feet. If an employee's feet may be exposed to electrical hazards, non-conductive footwear should be worn. On the other hand, workplace exposure to static electricity may necessitate the use of conductive footwear.

6.2 Examples: examples of situations in which an employee should wear foot and/or leg protection include:

- When heavy objects such as barrels or tools might roll onto or fall on the employee's feet
- Working with sharp objects such as nails or spikes that could pierce the soles or uppers of ordinary shoes; Exposure to molten metal that might splash on feet or legs
- Working on or around hot, wet or slippery surfaces
- Working when electrical hazards are present.

6.3 Standard requirement: safety footwear must meet ANSI minimum compression and impact performance standards in ANSI Z41-1991 (American National Standard for Personal Protection-Protective Footwear) or provide equivalent protection. Footwear purchased before July 5, 1994, must meet or provide equivalent protection to the earlier ANSI Standard (ANSI Z41.1-1967). All ANSI approved footwear has a protective toe and offers impact and compression protection.

6.4 Types of protection: foot and leg protection choices include the following:

- Leggings: protect the lower legs and feet from heat hazards such as molten metal or welding sparks. Safety snaps allow leggings to be removed quickly.
- Metatarsal guards: protect the instep area from impact and compression. Made of aluminum, steel, fiber, or plastic, these guards may be strapped to the outside of shoes.

- Toe guards: fit over the toes of regular shoes to protect the toes from impact and compression hazards. They may be made of steel, aluminum, or plastic.
- Combination foot and shin guards: protect the lower legs and feet, and may be used in combination with toe guards when greater protection is needed.
- Safety shoes: have impact-resistant toes and heat-resistant soles that protect the feet against hot work surfaces common in roofing, paving, and hot metal industries. The metal insoles of some safety shoes protect against puncture wounds. Safety shoes may also be designed to be electrically conductive to prevent the buildup of static electricity in areas with the potential for explosive atmospheres or nonconductive to protect workers from workplace electrical hazards.

6.5 Special purpose shoes: electrically conductive shoes provide protection against the buildup of static electricity. Employees working in explosive and hazardous locations such as explosives manufacturing facilities or grain elevators must wear conductive shoes to reduce the risk of static electricity buildup on the body that could produce a spark and cause an explosion or fire. Foot powder should not be used in conjunction with protective conductive footwear because it provides insulation, reducing the conductive ability of the shoes. Silk, wool, and nylon socks can produce static electricity and should not be worn with conductive footwear. Conductive shoes must be removed when the task requiring their use is completed. Employees exposed to electrical hazards must never wear conductive shoes.

6.6 Nonconductive shoes: electrical hazard, safety-toe shoes are nonconductive and will prevent the wearers' feet from completing an electrical circuit to the ground. These shoes can protect against open circuits of up to 600 volts in dry conditions and should be used in conjunction with other insulating equipment and additional precautions to reduce the risk of a worker becoming a path for hazardous electrical energy. The insulating protection of electrical hazard, safety-toe shoes may be compromised if the shoes become wet, the soles are worn through, metal particles become embedded in the sole or heel, or workers touch conductive, grounded items. Nonconductive footwear must not be used in explosive or hazardous locations.

6.7 Foundry shoes: in addition to insulating the feet from the extreme heat of molten metal, foundry shoes keep hot metal from lodging in shoe eyelets, tongues or other shoe parts. These snug-fitting leather or leather-substitute shoes have leather or rubber soles and rubber heels. All foundry shoes must have built-in safety toes.

6.8 Care: as with all protective equipment, safety footwear should be inspected prior to each use. Shoes and leggings should be checked for wear and tear at reasonable intervals. This includes looking for cracks or holes, separation of materials, and broken buckles or laces. The soles of shoes should be checked for pieces of metal or other embedded items that could present electrical or tripping hazards. Employees should follow the manufacturers' recommendations for cleaning and maintenance of protective footwear.

7.0 HAND AND ARM PROTECTION

7.1 Duty to have protection: if a workplace hazard assessment reveals that employees face potential injury to hands and arms that cannot be eliminated through engineering and work practice controls, Metropolitan Library System requires that employees wear appropriate protection. Potential hazards include skin absorption of harmful substances, chemical or thermal burns, electrical dangers, bruises, abrasions, cuts, punctures, fractures, and amputations. Protective equipment includes gloves, finger guards, and arm coverings or elbow-length gloves. In some cases, clients require fire retardant clothing, such as Nomex. Such garments typically must have long sleeves.

7.2 Engineering and work practice controls: Metropolitan Library System explores possible engineering and work practice controls to eliminate hazards and use PPE to provide additional protection against hazards that cannot be completely eliminated through other means. For example, machine guards may eliminate a hazard. Installing a barrier to prevent workers from placing their hands at the point of contact between a table-saw blade and an item being cut is another method.

7.3 Selection of gloves: there are many types of gloves available today to protect against a wide variety of hazards. The nature of the hazard and the operation involved will affect the selection of gloves. The variety of potential occupational hand injuries makes selecting the right pair of gloves challenging. It is essential that employees use gloves specifically designed for the hazards and tasks found in their workplace because gloves designed for one function may not protect against a different function even though they may appear to be an appropriate protective device. The following are examples of some factors that may influence the selection of protective gloves for a workplace.

- Type of chemicals handled
- Nature of contact (total immersion, splash, etc.)
- Duration of contact
- Area requiring protection (hand only, forearm, arm)
- Grip requirements (dry, wet, oily)
- Thermal protection
- Size and comfort
- Abrasion/resistance requirements

7.4 Categories of gloves: gloves are made from a wide variety of materials and are designed for many types of workplace hazards. In general, gloves fall into four groups:

- Gloves made of leather, canvas, or metal mesh
- Fabric and coated fabric gloves
- Chemical and liquid resistant gloves
- Insulating rubber gloves

7.5 Leather, canvas, and metal mesh gloves: sturdy gloves made from metal mesh, leather, or canvas provide protection against cuts and burns. Leather or canvas gloves also protect against sustained heat. Leather gloves protect against sparks, moderate heat, blows, chips, and rough objects.

7.6 Aluminized gloves: provide reflective and insulating protection against heat and require an insert made of synthetic materials to protect against heat and cold.

7.7 Aramid fiber gloves: protect against heat and cold, are cut and abrasive resistant and wear well.

7.8 Synthetic gloves of various materials: offer protection against heat and cold are cut and abrasive resistant and may withstand some diluted acids. These materials do not stand up against alkalis and solvents.

7.9 Fabric and coated fabric gloves: are made of cotton or other fabric to provide varying degrees of protection. Fabric gloves protect against dirt, slivers, chafing, and abrasions. They do not provide sufficient protection for use with rough, sharp, or heavy materials. Adding a plastic coating will strengthen some fabric gloves. Coated fabric gloves are normally made from cotton flannel with napping on one side. By coating the unnapped side with plastic, fabric gloves are transformed into general-purpose hand protection offering slip-resistant qualities. These gloves are used for tasks ranging from handling bricks and wire to chemical laboratory containers. When selecting gloves to protect against chemical exposure hazards, always check with the manufacturer or review the manufacturer's product literature to determine the gloves' effectiveness against specific workplace chemicals and conditions.

7.10 Chemical and liquid resistant gloves: chemical resistant gloves are made with different kinds of rubber: natural, butyl, neoprene, nitrile, and fluorocarbon (viton); or various kinds of plastic: polyvinyl chloride (PVC), polyvinyl alcohol, and polyethylene. These materials can be blended or laminated for better performance. As a general rule, the thicker the glove material, the greater the chemical resistance but thick gloves may impair grip and dexterity, having a negative impact on safety. Some examples of chemical-resistant gloves include:

- Butyl gloves are made of a synthetic rubber and protect against a wide variety of chemicals, such as peroxide, rocket fuels, highly corrosive acids (nitric acid, sulfuric acid, hydrofluoric acid and red-fuming nitric acid), strong bases, alcohols, aldehydes, ketones, esters, and nitrocompounds. Butyl gloves also resist oxidation, ozone corrosion, and abrasion, and remain flexible at low temperatures. Butyl rubber does not perform well with aliphatic and aromatic hydrocarbons and halogenated solvents.
- Natural (latex) rubber gloves are comfortable to wear, which makes them a popular general-purpose glove. They feature outstanding tensile strength, elasticity, and

temperature resistance. In addition to resisting abrasions caused by grinding and polishing, these gloves protect workers' hands from most water solutions of acids, alkalis, salts, and ketones. Latex gloves have caused allergic reactions in some individuals and may not be appropriate for all employees. Hypoallergenic gloves, glove liners, and powderless gloves are possible alternatives for workers who are allergic to latex gloves.

- Neoprene gloves are made of synthetic rubber and offer good pliability, finger dexterity, high density, and tear resistance. They protect against hydraulic fluids, gasoline, alcohols, organic acids, and alkalis. They generally have chemical and wear resistance properties superior to those made of natural rubber.
- Nitrile gloves are made of a copolymer and provide protection from chlorinated solvents such as trichloroethylene and perchloroethylene. Although intended for jobs requiring dexterity and sensitivity, nitrile gloves stand up to heavy use even after prolonged exposure to substances that cause other gloves to deteriorate. They offer protection when working with oils, greases, acids, caustics, and alcohols but are generally not recommended for use with strong oxidizing agents, aromatic solvents, ketones, and acetates.

7.11 Table 1: the following table from the U.S. Department of Energy (Occupational Safety and Health Technical Reference Manual) rates various gloves as being protective against specific chemicals and will help you select the most appropriate gloves to protect your employees. The ratings are abbreviated as follows: VG: Very Good; G: Good; F: Fair; P: Poor (not recommended). Chemicals marked with an asterisk (*) are for limited service.

Table 1
Chemical Resistance Selection Chart for Protective Gloves

Chemical	Neoprene	Latex/Rubber	Butyl	Nitrite
Acetaldehyde*	VG	G	VG	G
Acetic acid	VG	VG	VG	VG
Acetone*	G	VG	VG	P
Ammonium hydroxide	VG	VG	VG	VG
Amy acetate*	F	P	F	P
Aniline	G	F	F	P
Benzaldehyde*	F	F	G	G
Benzene*	P	P	P	F
Butyl acetate	G	F	F	P
Butyl alcohol	VG	VG	VG	VG
Carbon disulfide	F	F	F	F
Carbon tetrachloride*	F	P	P	G
Castor oil	F	P	F	VG
Chlorobenzene*	F	P	F	P
Chloroform*	G	P	P	F
Chloronaphthalene	F	P	F	F
Chromic acid (50%)	F	P	F	F
Citric acid (10%)	VG	VG	VG	VG
Cyclohexanol	G	F	G	VG
Dibutyl phthalate*	G	P	G	G
Diesel fuel	G	P	P	VG
Diisobutyl ketone	P	F	G	P
Dimethylformamide	F	F	G	G
Dioctyl phthalate	G	P	F	VG
Dioxane	VG	G	G	G
Epoxy resins, dry	VG	VG	VG	VG
Ethyl acetate*	G	F	G	F
Ethyl alcohol	VG	VG	VG	VG
Ethyl ether*	VG	G	VG	G
Ethylene dichloride*	F	P	F	P
Ethylene glycol	VG	VG	VG	VG
Formaldehyde	VG	VG	VG	VG
Formic acid	VG	VG	VG	VG
Freon 11	G	P	F	G

Chemical	Neoprene	Latex/Rubber	Butyl	Nitrite
Freon 12	G	P	F	G
Freon 21	G	P	F	G
Freon 22	G	P	F	G
Furfural*	G	G	G	G
Gasoline, leaded	G	P	F	VG
Gasoline, unleaded	G	P	F	VG
Glycerin	VG	VG	VG	VG
Hexane	F	P	P	G
Hydrazine (65%)	F	G	G	G
Hydrochloric acid	VG	G	G	G
Hydrofluoric acid (48%)	VG	G	G	G
Hydrogen peroxide (30%)	G	G	G	G
Hydroquinone	G	G	G	F
Isooctane	F	P	P	VG
Kerosene	VG	F	F	VG
Ketones	G	VG	VG	P
Lacquer thinners	G	F	F	P
Lactic acid (85%)	VG	VG	VG	VG
Lauric acid (36%)	VG	F	VG	VG
Lineolic acid	VG	P	F	G
Linseed oil	VG	P	F	VG
Maleic acid	VG	VG	VG	VG
Methyl alcohol	VG	VG	VG	VG
Methylamine	F	F	G	G
Methyl bromide	G	F	G	F
Methyl chloride*	P	P	P	P
Methyl ethyl ketone*	G	G	VG	P
Methyl isobutyl ketone*	F	F	VG	P
Methyl metharcrylate	G	G	VG	F
Monoethanolamine	VG	G	VG	VG
Morpholine	VG	VG	VG	G
Naphthalene	G	F	F	G
Napthas, aliphatic	VG	F	F	VG
Napthas, aromatic	G	P	P	G
Nitric acid*	G	F	F	F
Nitric acid, red and white fuming	P	P	P	P

Chemical	Neoprene	Latex/Rubber	Butyl	Nitrite
Nitromethane (95.5%)*	F	P	F	F
Nitropropane (95.5%)	F	P	F	F
Octyl alcohol	VG	VG	VG	VG
Oleic acid	VG	F	G	VG
Oxalic acid	VG	VG	VG	VG
Palmitic acid	VG	VG	VG	VG
Perchloric acid (60%)	VG	F	G	G
Perchloroethylene	F	P	P	G
Petroleum distillates (naphtha)	G	P	P	VG
Phenol	VG	F	G	F
Phosphoric acid	VG	G	VG	VG
Potassium hydroxide	VG	VG	VG	VG
Propyl acetate	G	F	G	F
Propyl alcohol	VG	VG	VG	VG
Propyl alcohol (iso)	VG	VG	VG	VG
Sodium hydroxide	VG	VG	VG	VG
Styrene	P	P	P	F
Styrene (100%)	P	P	P	F
Sulfuric acid	G	G	G	G
Tannic acid (65)	VG	VG	VG	VG
Tetrahydrofuran	P	F	F	F
Toluene*	F	P	P	F
Toluene diisocyanate (TDI)	F	G	G	F
Trichloroethylene*	F	F	P	G
Triethanolamine (85%)	VG	G	G	VG
Tung oil	VG	P	F	VG
Turpentine	G	F	F	VG
Xylene*	P	P	P	F

7.12 Care: protective gloves should be inspected before each use to ensure that they are not torn, punctured, or made ineffective in any way. A visual inspection will help detect cuts or tears but a more thorough inspection by filling the gloves with water and tightly rolling the cuff towards the fingers will help reveal any pinhole leaks. Gloves that are discolored or stiff may also indicate deficiencies caused by excessive use or degradation from chemical exposure.

7.13 Removal from service: any gloves with impaired protective ability should be discarded and replaced. Reuse of chemical-resistant gloves should be evaluated carefully, taking

into consideration the absorptive qualities of the gloves. A decision to reuse chemically-exposed gloves should take into consideration the toxicity of the chemicals involved and factors such as duration of exposure, storage and temperature.

8.0 BODY PROTECTION

8.1 Duty to have protection: employees who face possible bodily injury of any kind that cannot be eliminated through engineering, work practice or administrative controls, must wear appropriate body protection while performing their jobs. In addition to cuts and radiation, the following are examples of workplace hazards that could cause bodily injury:

- Fires/flames in refineries and chemical plants
- Temperature extremes
- Hot splashes from molten metals and other hot liquids
- Potential impacts from tools, machinery and materials
- Hazardous chemicals

8.2 Requirements: there are many varieties of protective clothing available for specific hazards. Metropolitan Library System requires that their employees wear personal protective equipment only for the parts of the body exposed to possible injury. Examples of body protection include laboratory coats, coveralls, vests, jackets, aprons, surgical gowns and full body suits.

8.3 Full body protection: if a hazard assessment indicates a need for full body protection against toxic substances or harmful physical agents, the clothing should be carefully inspected before each use, it must fit each worker properly, and it must function properly and for the purpose for which it is intended. Refineries and chemical plants typically require Nomex fire retardant clothing.

8.4 Materials: protective clothing comes in a variety of materials, each effective against particular hazards, such as:

- Nomex fire retardant clothing to protect against accidental fires and flames
- Paper-like fiber used for disposable suits provide protection against dust and splashes
- Treated wool and cotton adapts well to changing temperatures, is comfortable and fire-resistant and protects against dust, abrasions and rough and irritating surfaces
- Duck is a closely woven cotton fabric that protects against cuts and bruises when handling heavy, sharp or rough materials
- Leather is often used to protect against dry heat and flames
- Rubber, rubberized fabrics, neoprene and plastics protect against certain chemicals and physical hazards. When chemical or physical hazards are present, check with the clothing manufacturer to ensure that the material selected will provide protection against the specific hazard.

APPENDIX A: HAZARD ANALYSIS WORKSHEET

Department _____ Job Title _____ Location of job duties _____ _____ Analysis done by _____ Date ____/____/____	**Hazard Key** 1. Cut 2. Abrasion 3. Burn 4. Fall 5. Falling objects 6. Noise 7. Flying particles 8. Inhalation 9. Bump 10. Slip 11. Splash 12. Other	**Body Part Key** a. Head b. Face c. Eye(s) d. Ear(s) e. Respiratory system f. Trunk g. Arm(s) h. Hand(s) i. Fingers j. Leg(s) k. Feet/foot l. Toe(s) m. Other	**PPE Required Key** A. Hard hat B. Chemical goggles C. Safety glasses D. Ear plugs E. Ear muffs F. Body harness G. Gloves (list type) _____ H. Shoes/boots (list type) _____ I. Respirator J. 1st Other _____ K. 2nd Other_____
Activities/Tasks	**Potential Hazards**	**Body Part(s)**	**PPE Required**

_____

Signature of Certification Date

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PURPOSE

Metropolitan Library System recognizes that employees in certain operations can be exposed to respiratory hazards during routine operations. The purpose of this program is to ensure that all employees are protected from exposure to these hazards.

This program describes the procedures for identification of airborne hazards, selection and usage of proper respirators, medical evaluations of employees, fit testing of respirators, and the training and record keeping requirements. The program outlines the policy and procedures necessary to implement a Respiratory Protection program.

SCOPE

This program applies to all employees who are required to wear respirators to prevent exposure to airborne contaminants.

1.0 RESPONSIBILITIES

1.1 Safety Committee: will retain responsibility for proper attention and use of these regulations and forms. The Safety Committee will ensure the following are properly maintained:

- Maintaining a written Respiratory Protection Program with instructions for areas requiring respiratory protection
- Contacting appropriate provider to coordinate hazard assessments, respirator selection, training, medical evaluations and fit tests at no cost to employees
- Maintaining records and a current list of approved respirator wearers, including training, medical evaluations, fit tests, and the types of approved respirators
- Purchasing and providing approved respirators and replacement cartridges
- Funding medical evaluations and fit tests for employees who wear respirators
- Auditing the program for continued effectiveness
- At the Metropolitan Library System, the Safety Committee will also act as the Respiratory Supervisor.

1.2 Company Respiratory Supervisor: the company respiratory supervisor is responsible for:

- Knowing the hazards in their areas that require respiratory protection
- Knowing the types of respirators that need to be used
- Ensuring the respirator program is followed
- Enforcing the wearing of respirators where it is required
- Ensuring that employees receive training and medical evaluations when necessary
- Coordinating annual re-training
- Notifying Safety Committee of any problems with respirator use, or any changes in work processes that would impact airborne contaminant levels

1.3 Employee: the employee is responsible for:

- Participating in all training
- Wearing the respirator in accordance with the program policies
- Properly maintaining their respiratory protection equipment
- Reporting any malfunctions or concerns to their supervisor

2.0 IDENTIFICATION OF AIRBORNE CONTAMINENTS

2.1 Types of contaminants: there are two main types of respiratory hazards: oxygen deficiency and airborne contaminants. This program covers only airborne contaminants. The main types of airborne contaminants are:

- Dusts: particles, released during work operations such as grinding and sawing
- Mists: particles of liquid, released during operations such as spray painting

- Vapors: gaseous forms of a liquid, such as benzene paint solvents
- Fumes: vaporized condensed metals, as present in welding operations
- Gases: such as nitrogen, methane, carbon monoxide

2.2 Worksite evaluations / hazard assessments: once a respiratory hazard has been identified, the work area must be monitored for any changes in concentration level or for new hazards. Changes in work processes, substitution of materials, or changes in the ventilation of an area may necessitate re-testing. Supervisors are responsible for monitoring day-to-day operations and reporting changes to the Safety Committee.

3.0 SELECTING PROPER RESPIRATORY EQUIPMENT

3.1 Controlling airborne hazards: when controlling airborne hazards, engineering and administrative controls will first be considered as a means to reduce the hazards. Engineering controls can include enclosure, substitution, process modification, and ventilation. Administrative controls include schedule changes to reduce time spent in contaminated areas.

3.2 Required use of respirators: in situations where engineering and administrative controls do not sufficiently reduce exposure to levels below Permissible Exposure Levels (PELs), respirators are required.

3.3 Selection of Respirators: only NIOSH approved respirators will be used. Single strap disposable comfort masks are not approved respirators. Respirators will be selected based on the respiratory hazards to which the employee is exposed, and the workplace and user factors that affect performance. An employee shall wear only a respirator that has been fit tested and approved for the employee and the hazards of the exposure. Respirator types, models, sizes, and cartridges are not interchangeable. The following evaluation will be utilized in selection of respirators and use:

- Identification and development of a list of hazardous substances used in the workplace, by department, or work processes
- Review of work processes to determine where potential exposure to hazardous substances may occur
- Exposure monitoring to quantify potential hazardous exposures

If the employee exposure cannot be identified or estimated, then the atmosphere must be considered an imminent danger to life or health.

3.4 Particulates: for protection against particulates, one of the following respirators will be provided:

- An atmosphere supplying respirator

- An air purifying respirator equipped with a filter certified by NIOSH as a HEPA (High Efficiency Particulate Air) filter
- An air purifying respirator equipped with a filter certified for particulates by NIOSH

3.5 Other particulates: for contaminants consisting primarily of particulates with a mass median aerodynamic diameter (MMAD) of at least 2 micrometers, an air-purifying respirator with any filter certified for particulates by NIOSH

3.6 Gases and vapors: for protection against gases and vapors, one of the following respirators shall be provided:

- An atmosphere supplying respirator
- An air purifying respirator that is either equipped with a chemical cartridge that has an end of service life indicator (ESLI) certified by NIOSH for the contaminant, OR if there is no appropriate ESLI, then a replacement schedule must be in place for cartridges and filters based on information that will assure the cartridges are changed before their end of service life. The replacement schedule must be included in the worksite specific instructions.

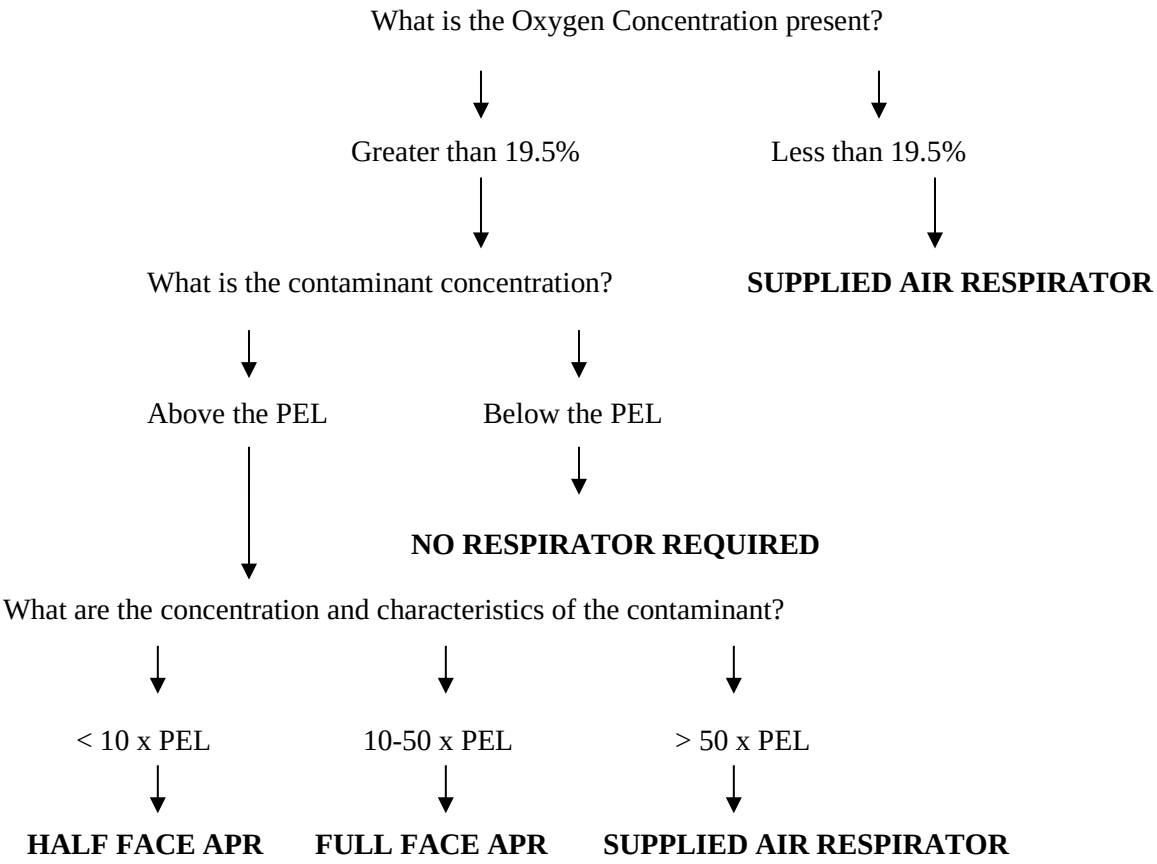
Respirator Types

Type	Capabilities	Fit Test	Limitations
Air Purifying, Chemical Cartridge, Half-face	Chemical Specific Cartridge APF = 10	qualitative	Not for use in atmospheres with concentrations above 10 times the PEL. Not for use for any chemical not listed on the cartridge, IDLH or unknown atmospheres.
Air Purifying, Chemical Cartridge, Full-face	Chemical Specific Cartridge APF = 50	qualitative or quantitative	Qualitative fit testing is not approved for respirator use in atmospheres above 10 times the PEL. Not for use for any chemical not listed on the cartridge, IDLH or unknown atmospheres.
Powered Air Purifying, Chemical Cartridge, Full-face	Chemical Specific Cartridge APF = 50	qualitative or quantitative	Not for use for any chemical not listed on the cartridge, IDLH or unknown atmospheres.

APF = assigned protection factor

Reference: NIOSH Respirator Decision Logic

Respirator Selection Guide



4.0 VOLUNTARY USE OF RESPIRATORS

4.1 Allowance: employees will be allowed to use respirators voluntarily if the respirator itself will not create a hazard.

4.2 Requirements: employees voluntarily wearing respirators other than dust masks are subject to the requirements of this program, including medical evaluations, training, and maintenance procedures.

4.3 Fit tests: are not required for voluntary users, but are encouraged.

4.4 Form B: all employees voluntarily wearing respirators will be provided a copy of the information contained in Form B, “Information for Employees Using Respirators When Not Required under the Standard.”

4.5 Dust masks: employees whose only use of a respirator is the voluntary use of a dust mask (filtering face piece) will not be subject to the written program; however must comply with 29 CFR 1910.134(k) and Appendix D.

5.0 CARE AND USE OF RESPIRATORS

5.1 Cleaning and Disinfecting: each applicable employee will be provided with a respirator that is clean, sanitary, and in good working order.

5.2 Cleaning procedures: respirators are to be cleaned and disinfected using procedures recommended by the manufacturer; otherwise the procedures below may be used if the manufacturer's procedures prove ineffective.

(1) Remove filters, cartridges, or canisters. Disassemble face pieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
(2) Wash components in warm (43 deg. C [110 deg. F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
(3) Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain.
(4) Disinfect components. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:

- Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43 deg. C (110 deg. F)
- Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 43 deg. C (110 deg. F)
- Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

(5) Rinse components thoroughly in clean, warm (43 deg. C [110 deg. F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on face pieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
(6) Dry components. Components should be hand-dried with a clean lint-free cloth or air-dried.
(7) Reassemble face piece, replacing filters, cartridges, and canisters where necessary.
(8) Test the respirator to ensure that all components work properly.

5.3 Frequency: the frequency for cleaning and disinfecting is as follows:

- Respirators used by only one employee shall be cleaned and disinfected as often as necessary to be maintained in a sanitary condition.
- Shared respirators must be cleaned and disinfected prior to use.
- Emergency use respirators must be cleaned and disinfected after each use.
- Respirators used in fit tests and training exercises must be cleaned and disinfected after use.

5.4 Storage: respirators are to be stored so as to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals. Respirators are to be stored in such a manner as to prevent deformation of the face piece and valves.

5.5 Emergency use respirators: are to be kept accessible to the work area or in compartments or covers that are clearly marked as containing emergency respirators, and stored in accordance with the manufacturer's instructions.

5.6 Inspection: respirators used in routine situations are to be inspected before each use and during cleaning. Emergency use respirators are to be inspected at least monthly, and in accordance with the manufacturer's instructions. Emergency use respirators are also to be checked for proper function before and after each use. Escape-only respirators are to be inspected before being brought into the work area. A respirator inspection includes the following:

- A check of respirator function, tightness of connections, and the condition of the various parts, including the face piece, head straps, valves, connecting tubes, cartridges, canisters and filters
- A check of the elastic parts for pliability or deterioration.

5.7 Repairs: respirators that fail inspections or are otherwise found to be defective are to be removed from service and discarded, repaired, or adjusted by appropriately trained persons, with NIOSH approved parts, according to manufacturer's specifications. Valves, regulators, and alarms are to be adjusted or repaired only by the manufacturer or manufacturer's technicians.

5.8 Identification of filters, cartridges, and canisters: filters, cartridges, and canisters must be labeled and color-coded with the NIOSH approval label. The label is not to be removed and must remain legible.

5.9 Leaving the respirator work area: employees must be allowed to leave the respirator use area:

- To wash their faces and respirators as necessary to prevent eye or skin irritation

- If they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the face piece
- To replace the respirator or the filter cartridges or canisters
- A defective respirator must be replaced or repaired before returning to the work area

6.0 LIMITATIONS OF AIR PURIFYING RESPIRATORS

6.1 Immediate Danger to Life or Health (IDLH) atmospheres: air purifying respirators are not to be used in oxygen deficient atmospheres, immediate danger to life or health atmospheres, or unknown atmospheres. All confined spaces shall be considered immediate danger to life or health unless proven otherwise. If assistance is required to determine an unknown atmosphere, contact the appropriate professional.

6.2 Cartridges and filters: cartridges and filters are specific to certain hazards. Use the cartridge approved for the task. Do not interchange manufacturer's cartridges or filters.

6.3 Concentration: there are limits to the concentration levels that can be used with half mask and full-face respirators. Consult the cartridge's Maximum Upper Limit to determine if you have the proper level of protection.

6.4 Face seal protection: anything that breaks the seal of a respirator will reduce its effectiveness. Facial hair, temple bars of glasses, and head coverings are not to be worn. Corrective lenses can be fitted inside a full-face respirator with a special insert kit.

7.0 MEDICAL EVALUATIONS

7.1 Initial evaluations: every applicable employee must be medically evaluated prior to fit testing and initial use of a respirator at no cost to employee. Medical evaluations will be conducted by a physician or other licensed health care professional. Medical evaluations will consist of either a medical questionnaire or an initial medical examination that obtains the same information as the questionnaire. The requirements of the questionnaire are mandatory. Medical questionnaires and examinations will be administered confidentially and during normal working hours.

7.2 Follow-up medical examinations: follow-up medical examinations are necessary if an employee gives a positive response to any of the questions numbered 1 through 8 in section 2 of the questionnaire. The follow-up medical examination will include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination.

7.3 Supplemental information: the following information must be supplied to the physician or other licensed health care professional before a recommendation is made:

- Type and weight of the respirator to be used

- Duration and frequency of use
- Expected physical effort
- Additional protective clothing and equipment to be worn
- Temperature and humidity that may be encountered
- A copy of the written program and the regulation

7.4 Medical determination: the Program Administrator must obtain a written recommendation from the physician or other licensed health care professional on whether or not the employee is medically able to use the respirator. The recommendation will include only the following information:

- Any limitations on respirator use related to the medical condition of the employee or workplace conditions including whether the employee is medically able to wear the respirator
- The need, if any, for a follow-up medical examination
- A statement that the physician or other health care professional has provided the employee with a copy of the recommendation

If the physician or other licensed health care professional finds an employee cannot use a negative pressure respirator, a powered air-purifying respirator (PAPR) will be provided, if suitable.

7.5 Additional medical evaluations: additional medical evaluations will be provided if:

- An employee reports medical signs or symptoms related to the ability to use a respirator
- A physician or other licensed health care professional, supervisor, or the program administrator deems an employee needs re-evaluation
- Information from the program, observations during fit tests, or evaluations indicate the need for re-evaluation
- Changes in the workplace conditions result in increased physiological burden on the employee

7.6 Employee access: the employee will receive a copy of the physician or other licensed health care professional's recommendation. The employee will have an opportunity to discuss the questionnaire and examination with the physician or other licensed health care professional.

8.0 FIT TESTING

8.1 Initial fit tests: before wearing a respirator, employees are required to be fit tested with the same make, model, style, and size of respirator that will be used. A sufficient number of respirator models and sizes will be available so that the respirator is acceptable to and

correctly fits the user. Employees will wear only respirators that have been fit tested and approved for use.

8.2 Fit test procedures: fit tests are either qualitative or quantitative, depending on the respirator type and use, and must follow the procedures outlined in the OSHA Standard 1910.134. Qualified fit test technicians will perform the fit test. To be qualified, a fit test technician must have been trained in both qualitative and quantitative fit test procedures in a 16-hour training course.

8.3 Frequency: fit testing will be conducted initially, annually, and whenever changes in an employee's physical condition could affect respirator fit, and whenever requested by the employee because the fit is unacceptable.

8.4 Records: records of fit tests must be maintained by the Program Administrator and should include names, dates, types of tests, results, and make, model, style, and size of the respirator fitted.

9.0 FACE SEAL PROTECTION

9.1 Prohibitions: tight fitting face pieces are not to be worn by employees:

- Who have facial hair that comes between the sealing surface and the face, or that interferes with valve function
- Who have any condition that interferes with the seal, such as missing dentures, jewelry, or head gear
- If corrective glasses, goggles, or other PPE interfere with the seal

9.2 User seal checks: employees must perform a user seal check each time they put on the respirator.

9.3 Procedures: the individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed below or the respirator manufacturers recommended user seal check method is to be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

9.4 Positive pressure check:

- Close off the exhalation valve and exhale gently into the face piece
- The face fit is considered satisfactory if a slight positive pressure can be built up inside the face piece without any evidence of outward leakage of air at the seal
- For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test

9.5 Negative pressure check:

- Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s)
- Inhale gently so that the face piece collapses slightly, and hold the breath for ten seconds
- The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove.
- If the face piece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory

9.6 Manufacturer's recommended user seal check procedures: the respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.

9.7 Continued respirator effectiveness: the respiratory supervisor and Safety Committee or Program Administrator will maintain appropriate surveillance of the work area and employee exposure. Respirator effectiveness must be re-evaluated when there is a change in work area conditions or degree of employee exposure or stress.

10. ATMOSPHERE-SUPPLYING RESPIRATORS (SUPPLIED-AIR AND SCBA)

10.1 The employer shall ensure that compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration accords with the following specifications for IDLH procedures:

- Compressed and liquid oxygen shall meet the United States Pharmacopoeia requirements for medical or breathing oxygen;
- Outside standby persons, maintaining communication, proper training and equipment, notification procedures, and necessary action. Mandatory equipment must include SCBA or SAR with auxiliary air supply & appropriate retrieval equipment or equivalent rescue means.
- Compressed breathing air shall meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:
  - Oxygen content (v/v) of 19.5-23.5%;
  - Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;
  - Carbon monoxide (CO) content of 10 ppm or less;
  - Carbon dioxide content of 1,000 ppm or less; and
  - Lack of noticeable odor.

10.2 The employer shall ensure that compressed oxygen is not used in atmosphere-supplying respirators that have previously used compressed air.

10.3 The employer shall ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.

10.4 The employer shall ensure that cylinders used to supply breathing air to respirators meet the following requirements:

- Cylinders are tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR part 173 and part 178);
- Cylinders of purchased breathing air have a certificate of analysis from the supplier that the breathing air meets the requirements for Grade D breathing air; and
- The moisture content in the cylinder does not exceed a dew point of -50 deg.F (-45.6 deg.C) at 1 atmosphere pressure.

10.5 The employer shall ensure that compressors used to supply breathing air to respirators are constructed and situated so as to:

- Prevent entry of contaminated air into the air-supply system;
- Minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (5.56 deg.C) below the ambient temperature;
- Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters shall be maintained and replaced or refurbished periodically following the manufacturer's instructions.
- Have a tag containing the most recent change date and the signature of the person authorized by the employer to perform the change. The tag shall be maintained at the compressor.

10.6 For compressors that are not oil-lubricated, the employer shall ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm.

10.7 For oil-lubricated compressors, the employer shall use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.

10.8 The employer shall ensure that breathing air couplings are incompatible with outlets for nonrespirable worksite air or other gas systems. No asphyxiating substance shall be introduced into breathing air lines.

10.9 The employer shall use breathing gas containers marked in accordance with the NIOSH respirator certification standard, 42 CFR part 84.

11.0 RECORDKEEPING AND PROGRAM EVALUATION

11.1 Recordkeeping: the Program Administrator will keep records of training and fit testing for the duration of the wearer's employment. Records of medical evaluations will be kept for the duration of the wearer's employment and 30 years following.

11.2 Program Evaluation: the Program Administrator will conduct evaluations of the workplace as necessary to ensure the provisions of this written program are being effectively implemented. The program evaluation will include consulting with employees required to wear respirators to assess the employee's views on program effectiveness and to identify any problems. Any problems identified will be corrected. Factors to be assessed include respirator fit, appropriate respirator selection, proper use, and maintenance.

12.0 TRAINING AND INFORMATION

12.1 Training: all employees who are required to wear respirators will receive initial training in their use and maintenance. Employees will be sufficiently trained to demonstrate:

- Knowledge of why the respirator is required
- How improper fit, usage, or maintenance can compromise the protectiveness of the respirator
- The limitations and capabilities of the respirator
- How to deal with emergencies or malfunctions
- How to inspect, don and remove, and check the seal of the respirator
- Maintenance and storage procedures
- Medical symptoms and signs that may limit or prevent the effective use of respirators from medical evaluation
- General requirements of the OSHA standard

12.2 Trainers: qualified persons who are familiar with the regulatory requirements of the Respiratory Protection Standard and trained in respirator use and fit test procedures will provide training.

12.3 For voluntary users of respirators: employees voluntarily wearing a respirator will be provided the information in Form B.

12.4 Frequency of re-training: re-training will be provided annually and whenever the following occur:

- Changes in the workplace or type of respirator used
- Inadequacies in the employee's knowledge or use of the respirator are apparent
- Any other situation in which re-training is necessary to ensure safe respirator use

APPENDIX A: RESPIRATORY HAZARD ASSESSMENT

Contaminant	Concentration	Job Activity	Exposure Time	Recommended Respirator

RESPIRATOR SELECTION AND APPROVED WEARERS

Employee	Job Tasks	Medical Eval.	Fit Test	Approved Respirator(s)	Training

APPENDIX B: §1910.134 APPENDIX D

Form B. Information for Employees Using Respirators When Not Required Under the Standard

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers.

However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards.

If your employer provides respirators for your voluntary use, of if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

- Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning, and care, and warnings regarding the respirator's limitations.
- Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human SERVICE, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
- Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
- Keep track of your respirator so that you do not mistakenly use someone else's respirator.

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PURPOSE

Walking and Working Surfaces Program is designed to reduce the number of injuries and accidents due to slips, trips, and falls to employees and to the public. Injury reduction can be accomplished with engineering controls, training, operational procedures, and hazard awareness methods.

1.0 GENERAL REQUIREMENTS

Regular maintenance and inspection of walking and working surfaces is vital to reducing slip and trip incidents. Fatalities occur annually from "same-level falls." These same-level falls are the result of conditions that interfere with a person's balance. Slipping on spills or tripping on cords and hoses are just a couple of examples. In general the following apply to all walking and working surfaces:

1.1 Maintenance: All places of employment, passageways, storerooms, service rooms, and walking-working surface must be kept in a clean, orderly, and sanitary condition. All walking and working surfaces must be maintained free of hazards such as sharp or protruding objects, loose boards and tiles, corrosion, leaks, spills, snow, and ice.

1.2 Slip hazards: The floor of each workroom must be maintained in a clean and, to the extent feasible, in a dry condition. Spills must be cleaned immediately or the area secured to prevent other employees from being exposed to the slip hazard.

1.3 Floor loading: Each walking and working surface must be capable of supporting the maximum intended load for the surface.

1.4 Access/egress: A safe means of access and egress must be available to and from all walking and working surfaces. Employees are required to use the safe means provided at all times.

1.5 Inspection: All walking and working surfaces are to be inspected regularly. Walking and working surfaces found to be substandard must be repaired before employees access the surfaces.

2.0 FLOORS, AISLES, AND PASSAGEWAYS

Floor, aisles, and passageways are a special concern because of the large amount of traffic they typically have. Substandard floors only multiply the risk of incidents occurring. Floors, aisles and passageways that are in top condition and well illuminated are very important in avoiding incidents. The following requirements will help to ensure that these areas are up to standard.

2.1 Construction: All floors should be built with or dressed with adequately slip-resistant material. The co-efficient of friction of the floor should not be less than 0.60. The material should be suited to the uses and processes of a particular area.

2.2 Maintenance: Floors should not be waxed, polished or treated in any way that compromises their slip resistance by causing their coefficient of friction to become lower than .60. Floors should be kept clear and clean. Every floor, working place, and passageway should be kept free from splinters, holes, loose boards, and protruding nails.

2.3 Marking: Permanent aisles and passageways should be appropriately marked to prevent them from being used as storage areas and thereby creating trip hazards. Such marking also aids inspections.

2.4 Lighting: Aisles and passageways should be provided with good lighting whenever they are in use.

2.5 Carpet: Any carpet or carpet tile used on a ground or floor surface should be securely attached. It should have a firm cushion, pad, or backing, or no cushion or pad. It should have a leveled loop, textured loop, level cut pile, or level cut/uncut pile texture. Exposed edges of carpet should be fastened to floor surfaces and have trim along the entire length of the exposed edge. The maximum pile thickness of the carpeting should be one-half inch. Carpeting should be kept in good repair. Loose, worn, or torn carpeting which presents a hazard should be immediately repaired or replaced.

2.6 Access: Where mechanical handling equipment is used, sufficient safe clearances should be allowed for aisles, at loading docks, through doorways, and wherever turns or passage must be made.

2.7 Spills: If any non-hazardous material is spilled, the spill should be cleaned up immediately. If a hazardous material is spilled, regulations governing clean-up of the material must be followed. Until a spilled material can be cleaned up, the section of the floor covered by the spill should be blocked off and warning signs should be used to convey the spill hazard.

2.8 Inspection: The floors, aisles, and passageways should be inspected every month to ensure compliance with the rules listed above. A Floor, Aisle, and Passageway Safety Checklist is in Appendix A. Any deficiencies should be corrected immediately. The inspection sheet should be filed upon completion of inspection.

3.0 SIDEWALKS AND PARKING LOTS

Sidewalks and parking lots are vulnerable to change in weather conditions. The following requirements are to ensure all sidewalks and parking lots are in top condition.

3.1 Construction: Sidewalk and parking lot surfaces should have a friction coefficient of at least 0.60. Sidewalk and parking lot surfaces will not be painted or treated in any other way if such treatment will bring the friction coefficient to below 0.60. Sidewalks and parking lots should be designed so their coefficient of friction will not greatly decrease, even when wet.

3.2 Drainage: Sidewalks and parking lots should be designed so that adequate drainage prevents accumulation of rainwater and other liquids. Such drainage should not obstruct the sidewalks or parking lots.

3.3 Maintenance: Sidewalks should remain clear and unobstructed at all times. Sidewalks and parking lots should remain free of holes, drop-offs, cracks and all other depressions and openings. If any of these conditions occur, repairs will be made immediately.

3.4 Lighting: Sidewalks and parking lots should be provided with good lighting at all times that they will be in use.

3.5 Ramps: When sidewalks and parking lots change levels, such as with the use of a ramp, lighting and high contrast signage and coloring should be used to denote the change in level. The ramp can be painted or outlined with safety yellow to bring attention to the level change. However, the paint cannot decrease the slip resistance of the sidewalk or parking lot ramp

3.6 Snow and Ice: Snow removal from sidewalks and parking lots should be performed once every 4 hours for as long as snow falls, and once after snowing stops. This frequency should be changed, depending on the amount of snow fall. Sidewalks and parking lots should be de-iced when necessary to control ice buildup.

3.7 Wheel Stops: Wheel stops should only be placed where necessary. Wheel stops should be six feet long or shorter. Adjacent wheel stops should be at least three feet apart. Wheel stops should be painted traffic yellow or some other high contrast color.

3.8 Speed Control: Speed bumps will be traffic yellow or some other high contrast color. However, the paint used on them will not bring their coefficient of friction to 0.60 or below.

3.9 Inspections: All sidewalks and parking lots should be inspected at least monthly. Any deficiencies found during inspection will be corrected as soon as possible. A copy of the Sidewalk Safety Checklist can be found in Appendix B.

4.0 STAIRWAYS

Falls on stairways present a special hazard because of the higher severity injuries involved with a fall associated with a change in level. These falls sometimes occur because people are in hurry or because they are not being careful. However, many occur because stairs, handrails, or guardrails are in substandard condition. Not only will substandard stairs, guardrails, and handrails cause a fall to occur, but substandard handrails and guardrails will prevent a person from being able to stop the fall, and could even make the fall worse by providing a false sense of security. It is important to keep stairs, handrails, and guardrails in superior condition. The following requirements will help to ensure this.

4.1 Risers: All stairways must have uniform riser heights and uniform riser tread depths. Stair treads should not be less than 9-1/2” in depth, measured from riser to riser. Riser height must not exceed 9-1/2”.

4.2 Lighting: Stairways and ramps must be provided with good lighting whenever they can be expected to be in use.

4.3 Railings: Stairways are required to have at least one (1) handrail. Additionally, a stair rail system must be installed on each unprotected side. The top of the handrail gripping surface should be mounted 30-38" above the stair tread nosing when by itself and 36-38" when combined with a stair rail. Handrails for stairways and ramps should be securely and firmly connected. Gripping surfaces on handrails should be uninterrupted by newel posts, other construction elements, or any obstructions. The clear space between handrails and walls must be at least 2-1/4".

4.4 Guardrailing: Guardrails will be placed at any exposed (open) sides of stair landings, balconies, and any platforms that are four (4) feet or more above the floor. These guardrails will be securely and firmly connected at the correct height.

4.5 Carpeting: When carpeting is present on stairs or ramps, the carpeting should be securely attached. Carpeting should have a firm cushion, pad or backing, or no cushion or pad. It should have a leveled loop, textured loop, level cut pile, or level cut/uncut pile texture. Exposed edges of carpet should be fastened to floor surfaces and have trim along the entire length of the exposed edge. The maximum pile thickness of the carpeting should be one-half inch.

4.6 Carpet condition: Carpeting should be kept in good condition. Loose, worn, or torn carpeting should be immediately repaired or replaced.

4.7 Stairway maintenance: Stairs should always be kept dry. Spills on stairs should be cleaned immediately. Until the spill is cleaned warning signs should be placed to warn of the spill hazard. Stairways should always remain unobstructed. Outdoor stairs should be designed so liquid cannot significantly accumulate on them. Proper accommodations should be made for snow removal.

4.8 Inspection: A safety survey of all stairways and ramps should be performed on monthly basis. Any deficiencies found should be corrected immediately. A copy of a Stairway Safety Checklist is in Appendix C.

5.0 DOCKBOARDS

5.1 Types: Only dockboards designed, constructed, and maintained to prevent vehicles from running off the dockboard edge may be used unless there is no actual hazard of a vehicle running off the dockboard. All dockboards must have handholds or some other means of permitting safe handling.

5.2 Portable dockboards: All portable dockboards must be secured to prevent them from moving out of a safe position. If this is not feasible, there must be sufficient contact between the dockboard and the working surface to prevent it from moving out of position.

5.3 Transport vehicle: Wheel chocks must be used during loading operations to prevent the transport vehicle from moving while a dockboard is in position and be used.

6.0 GUARDRAIL SYSTEMS

Guardrail systems are very important for fall prevention. Not only are they a barrier against open sides and other fall hazards, they also provide a way for people to regain their balance and stop a fall before an injury occurs. The following guidelines apply to all guardrail systems.

6.1 Top rails: The top rails of guardrail systems are to be 42 inches high plus or minus 3 inches. Top rails must be so designed as to withstand 200 pounds of force in downward or outward directions.

6.2 Intermediate members: Midrails, screens, mesh, vertical members, solid panels, or other intermediate members are to be used between the top rail and the platform, floor, or walking surface. Midrails must be placed midway between the top rail and the walking / working surface. Screens and/or mesh must extend from the walking / working surface to the top rail. Intermediate vertical members can have a maximum opening of 19". All intermediate members must be able to support 150 pounds in downward and outward directions.

6.3 Toe boards: Anytime there is a hazard of objects falling from elevated surfaces onto employees below, toe boards will be installed to a minimum height of 3.5". Toe boards must be able to withstand 50 pounds of force in downward and outward directions.

6.4 Injury prevention: All parts of the guardrail system must be surfaced to prevent injury. Wood should be sanded to remove potential splintering and steel should have all burs ground off. Any material used must be a minimum of ¼" in diameter or thickness. Steel and/or plastic banding is NOT allowed to be used for guardrail components. The ends of the railing are not to overhang such that they become a projection hazard.

6.5 Inspection: Guardrail systems should be inspected once a month. Any deficiency with guardrails or any lack of use of guardrails where needed will be corrected immediately. A Guardrail Safety Checklist is in Appendix D.

APPENDIX A: FLOOR, ISLE, AND PASSAGEWAY CHECKLIST

Location: _____

Street Address/Block: _____

Surveyed by: _____

Date _____ Time _____AM/PM

Hazards to Check	Yes	NO
Are permanent aisles and passageways appropriately marked?		
Are aisles and passageways clear and unobstructed?		
Are all floors/aisles/passageways/ clean, dry and free of debris and trash?		
Are floors free of protruding nails, splinters, and other projections that can cause injuries?		
Are floors free of depressions, holes, grates and drop offs?		
Are standard warning signs used where needed (floor openings, etc.)?		
Do signs not block walks, or vision?		
Is good drainage provided for wet processes to prevent liquid buildup on floors?		
Is drainage away from entrances, aisles and passageways?		
Do all aisles and passageways have good lighting?		
Do lighting and coloring highlight changes in level?		
Are hand and guard rails at level changes?		
Are all carpets attached securely to floor with no loose edges or tiles?		
Is carpeting in good condition with no severe wears, tears, or loose areas?		
Is pile thickness of carpeting one-half inch or less?		
Corrective Action Needed	**Referred To:**	**Date completed:**

APPENDIX B: STAIRWAY AND RAMP CHECKLIST

Location: _____

Surveyed by: _____

Date _____ Time _____AM/PM

Hazards to Check	Yes	NO
STAIRWAYS		
Are handrails and guardrails in place and at correct height?		
Are handrails connected securely (not loose)?		
Are treads and risers in good condition?		
Are risers of uniform height and treads of uniform width?		
Is the stairway clear and unobstructed (nothing blocking stairway entrance or exit and nothing on the stairway)?		
Are stairway treads adequately slip-resistant?		
Is the stairway free of water, oil, or other liquid which can cause slippage?		
Is all carpeting on stairway securely fastened with no loose edges?		
Is carpeting on the stairway free of wears/tears/loose areas?		
RAMPS		
Are handrails in place (if ramps run is more than six feet) and at correct height?		
Are handrails securely connected?		
Is the ramp surface adequately slip-resistant?		
Is the ramp clean and unobstructed?		
Is the ramp free of water, oil, or other liquid which can cause slippage.		
Is the ramp designed so that liquid cannot accumulate on surface?		
Is all carpeting on ramps securely fastened with no loose edges?		
Is carpeting on ramps free of wears/tears/loose areas?		
Corrective Action Needed	**Referred To:**	**Date completed:**

APPENDIX C: SIDEWALK / PARKING LOT CHECKLIST

Location: _____

Street Address/Block: _____

Surveyed by: _____

Date _____ Time _____AM/PM

Hazards to Check	Yes	NO
Are sidewalk and parking lot surfaces slip resistant?		
Is drainage adequate, and away from entrances and walkways?		
Is sidewalk free of doorstops or projections?		
Are walking surface free of depressions, holes, grates and drop offs?		
Is the walking area free of manhole covers, drain clean outs raised edges, cracks?		
Is the surface finish rough, not painted or polished?		
Are standard warning signs used where needed?		
Are signs positioned to not block walks or vision?		
Are curb and sidewalk joints even?		
Are hand and guardrails at level changes?		
Is there good visual contrast at sidewalk ends, curbs and level changes?		
Are wheel stops used only where necessary, with high visual contrast?		
Are wheel stops six feet long or shorter?		
Are speed bumps traffic yellow or some other highly visible color?		
Are speed bumps slip resistant?		
Does lighting and coloring highlight changes in level?		
Are down spouts and rain gutters positioned to not cause wet or icy walks?		
Corrective Action Needed	**Referred To:**	**Date completed:**

APPENDIX D: GUARDRAIL CHECKLIST

Location: _____

Street Address/Block: _____

Surveyed by: _____

Date _____ Time _____AM/PM

Hazards to Check	Yes	NO
Are guardrails in place at balconies and landings?		
If the landings and balconies have open sides, do the open sides have midrails and toe boards in addition to the guardrails?		
Are there guardrails with midrails and toe boards at open pits, tanks, vats, ditches, and other such locations?		
Do all work levels three feet or more above the ground have guardrails, midrails, and toe boards?		
Do all means of access to or egress from work levels three feet or more above the ground have railing system?		
Are guardrails at the correct height (42 inches high) and of the correct size (2 x 4 inches)?		
Are midrails at the correct height (half the distance between the guardrail and the walking-working surface) and of the correct size (1 x 4 inches)?		
Are toe boards at least 4 inches in height?		
Corrective Action Needed	**Referred To:**	**Date completed:**

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PURPOSE

The objective of this program is to supplement our safety policy by providing specific standards regarding Hot Work and to ensure that each employee is adequately trained and fully aware of safety procedures associated with Hot Work.

Welding and Hot Work, such as brazing or grinding presents a significant opportunity for fire and injury. Company employees or contractors must apply all precautions of this program prior to commencing any welding or hot work. Reference: OSHA 29 CFR 1910.252

Elimination of injuries and illnesses improves employee morale, improves customer service, improves product quality, and reduces Workers' Compensation costs. This policy serves as a tool to increase employee protection, and to reduce jobsite hazards.

SCOPE

Employees are required to comply with the guidelines set forth. In the event an unsafe condition arises employees should alert the lead person on the jobsite immediately. Employees should also alert co-workers of any unsafe conditions that arise.

Any Metropolitan Library System employee who disobeys and/or disregards the guidelines set forth in this program or the company's safety program will be subject to disciplinary action, up to and including termination of employment.

1.0 HOT WORK PROCEDURES

1.1 Location: Where practicable all combustibles will be relocated at least 35 feet from the work site. Where relocation is impractical, combustibles must be protected with flameproof covers, shielded with metal, guards, curtains, or wet down to help prevent ignition of material. Where combustibles cannot be relocated on the opposite side of the work, a fire watch person will be provided on the opposite side of the work. Ducts, conveyor systems, and augers that might carry sparks to distant combustibles must be protected or shut down.

1.2 Walls, Partitions, Ceilings, and Roofs: Where cutting or welding is done near walls, partitions, ceilings, or a roof of combustible construction, fire-resistant shields or guards will be provided to prevent ignition. If welding is to be done on a metal wall, partition, ceiling, or roof, precautions must be taken to prevent ignition of combustibles on the other side, due to conduction or radiation of heat. Welding will not be attempted on a metal partition, wall, ceiling, or roof having a covering or on walls having combustible sandwich panel construction. Cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings, or roofs will not be undertaken if the work is close enough to cause ignition by combustion.

1.3 Dust: In areas where there is dust accumulation of greater than 1/16 inch within 35 feet of the area where welding/hot works will be conducted, all dust accumulation will be cleaned up following the housekeeping program of the facility before welding/hot works are permitted.

1.4 Fire Protection: Suitable fire extinguishers must be provided and maintained ready for instant use. A fire watch will be provided during and for 30 minutes past the completion of the welding project.

1.5 Permits: A cutting/welding permit will be issued on all welding or cutting outside of designated welding areas.

1.6 Situations Not Permitted: Cutting or welding will not be permitted in the following situations:

- In areas not authorized by management
- In buildings with sprinkler systems while such protection is impaired
- In the presence of potentially explosive atmospheres
- In areas near the storage of large quantities of exposed, readily ignitable materials
- When welding cannot be done safely

2.0 FIRE PREVENTION MEASURES

2.1 Designated Area: A designated welding area should be established to meet the following requirements:

- Floors swept and clean of combustibles within 35 feet of work area
- Flammable and combustible liquids and material will be kept 35 feet from work area
- Adequate ventilation providing 20 air changes per hour, such as a suction hood system should be provided to the work area.
- At least one 10-lb. dry chemical fire extinguisher should be within access of the 35 feet of work area

2.2 Dividers: Protective dividers such as welding curtains or non-combustible walls will be provided to contain sparks and slag to the combustible free area.

2.3 Welding Outside Designated Areas: Portable welding curtains or shields must be used to protect other workers in the welding area.

- A hot work permit must be completed and complied with prior to welding operation.
- Respiratory protection is mandatory unless an adequate monitored airflow away from the welder and others present can be established and maintained
- Plastic materials must be covered with welding tarps during welding procedures
- Fire Watch must be provided for all hot work operations

3.0 STANDARD OPERATING PROCEDURES (SOP)

The following lists Welding Standard Operating Procedures (SOP) and are applicable for all electric and gas welding.

3.1 Electric Welding

- Perform safety check on all equipment
- Ensure fire extinguisher is charged and available
- Ensure electrical cord, electrode holder and cables are free from defects (no cable splices are allowed within 10 feet of the electrode holder)
- Ensure PPE (welding hood, gloves, rubber boots/soled shoes, and aprons) are available and have no defects
- Ensure the welding unit is properly grounded
- All defective equipment must be repaired by qualified personnel or replaced before use
- Remove flammables and combustibles
- No welding is permitted on or near containers of flammable material, combustible material or unprotected flammable structures

- Place welding screen or suitable barricade around work area to provide a fire safety zone and prevent injuries to passersby (do not block emergency exits or restrict ventilation)
- Ensure adequate ventilation and lighting
- Execute Hot Work Permit procedures
- Set Voltage Regulator no higher than the following for:
  - Manual Alternating Current Welders - 80 volts
  - Automatic Alternating Current Welders - 100 volts
  - Manual or automatic Direct Current Welders -100 volts
- Uncoil and spread out welding cable
- To avoid overheating, ensure proper contact of work leads and connections, remove any metal fragments from magnetic work clamps (to avoid electric shock do not wrap welding cables around a body part and avoid welding in wet conditions)
- Fire watch will be 30 minutes after welding & until all welds have cooled
- Perform final fire watch and terminate permit

3.2 Gas Welding

- Perform Safety Check on all equipment
- Ensure tanks have gas and fittings are tight
- Ensure fire extinguisher is charged and available
- Inspect hoses for defects
- Ensure PPE (welding hood, gloves, rubber boots/soled shoes, and aprons) are available and have no defects
- All defective equipment must be repaired by qualified personnel or replaced before use
- Remove flammables and combustibles
- No welding is permitted on or near containers of flammable material, combustible material or unprotected flammable structures
- Place welding screen or suitable barricade around work area to provide a fire safety zone and prevent injuries to passersby (do not block emergency exits or restrict ventilation)
- Use an authorized Air Filtering Respirator, if required
- Ensure adequate ventilation and lighting
- Execute Hot Work Permit procedures
- Open valves on oxygen and gas tanks to desired flow
- Shut tank valves & relieve hose pressure. Store hoses
- Fire watch will be 30 minutes after welding and until all welds have cooled
- Perform final fire watch and terminate permit

4.0 COMPRESSED GAS

4.1 Valve Caps: Valve caps on cylinders must be in place and secured. Valve caps must not be used for lifting. Do not pry cylinder caps while frozen. Loosen caps with warm water.

4.2 Transporting: Cylinders must be transported on a secured cradle only, and by tilting or rolling them. Cylinders must be moved by tilting and rolling them on their bottom edges. Avoid dropping cylinders or striking other cylinders. Cylinders transported by powered vehicles must be secured in a vertical position. Regulators must be removed and caps put in place prior to moving cylinders, unless cylinders are secured on a special carrier. Cylinder valves must be closed when cylinders are empty or when cylinders are moved.

4.3 Steadying Devices: Proper steadying devices must be used to keep cylinders from falling over while in use.

4.4 Storage: Oxygen cylinders must be stored separated from fuel gas cylinders or combustible materials a minimum distance of 20 feet or by a five foot high non-combustible barrier with a fire-resistance rating of one-half hour.

4.5 Inside Storage: Cylinders stored inside buildings must be stored 20 feet from combustible materials where they are well protected, well ventilated, and dry. Cylinders must not be stored near elevators, stairs or gangways. Assigned storage locations must prevent cylinders from being knocked over or damaged.

4.6 Location: Cylinders must be kept away from welding or cutting operations to prevent sparks, hot slag, or flame from reaching them. Fire resistant shields must be used when this is impractical. Cylinders must be placed away from electrical circuits. Do not strike electrodes against a cylinder to strike an arc.

4.7 Confined Spaces: Cylinders containing oxygen, acetylene, or other fuel gases must not be used in confined spaces.

4.8 Mixing: Only the gas supplier is authorized to mix gases in a cylinder.

4.9 Damaged Cylinders: No damaged or defective cylinder may be used. If cylinders, valves, regulators, plugs, or other safety devices are damaged, they must be tagged out of service and removed from the work area.

4.10 Use of Fuel Gas: Employees will be instructed in the safe use of fuel gas. Workmen in charge of the oxygen or fuel-gas supply equipment, including generators, and oxygen or fuel-gas distribution piping systems shall be instructed and judged competent by their employers for this important work before being left in charge. Rules and instructions covering the operation and maintenance of oxygen or fuel-gas supply equipment

including generators, and oxygen or fuel-gas distribution piping systems shall be readily available.

4.11 Cracking: Valves must be opened slightly and closed immediately before a regulator is connected to the cylinder. This is called "cracking" which clears the valve of dust and dirt. The employee must stand to the side of the outlet, not in front. Valves must be cracked away from welding work, sparks, flames or other sources of ignition.

4.12 Valve Care: Valves must be opened slowly to prevent damage to the regulator. Valves must not be opened more than 1½ turns. If a wrench is required it must stay in position in case of emergency for a quick shut off. Manifold or coupled cylinders must have a wrench available for immediate use. Do not place objects on top of cylinders, or damage may occur to the safety device or interfere with the quick closing of the valve.

4.13 Regulator Removal: Cylinders must be closed and the gas released from the regulator before removing the regulator.

4.14 Manifolds: Fuel gas and oxygen manifolds must bear the name of the substance they contain. Fuel gas and oxygen manifolds must not be placed in confined spaces, but will be placed in safe, well ventilated, and accessible locations. Nothing may be placed on manifolds that will damage the manifold or interfere with the quick closing of the valves.

4.15 Hoses Connections: Hose connections must be made so that they cannot be interchanged between fuel gas and oxygen manifolds and supply header connections. Keep hose connections free of grease and oil, and do not use adapters to interchange hoses. Manifold and header hose connections must be capped when not in use.

4.16 Hoses: Fuel gas hose and oxygen hose must be distinguishable from each other, and not be interchangeable. Contrast may be made by different colors or by surface characteristics distinguishable by the sense of touch. Employees will inspect all hoses in use at the beginning of each work shift. Defective hoses will be tagged and removed from service. Hoses subjected to flashback or which show severe wear or damage must be tested at twice the normal pressure for the hose, but not less than 300 psi. If defective, the hose must not be used. Hose couplings must be disconnected by rotary motion only. Hoses stored in boxes must be well ventilated. Hoses, cables, and other equipment must be kept clear of passageways, ladders and stairs.

4.17 Torches: Torches must be inspected at the beginning of each working shift for leaking shutoff valves, hose couplings, and tip connections. Defective torches may not be used. Clogged torch tip openings must be cleaned. Torches may be lit by friction lighters or other approved devices only.

4.18 Regulators and Gauges: Pressure regulators and related gauges, must work properly while in use.

4.19 Oil and Grease Hazards: Oxygen cylinders and fittings must be kept away from oil or grease. Cylinders and fittings must be kept free from oil or greasy substances and may not be handled with oily hands or gloves. Oxygen must not be directed at oily surfaces, greasy clothes, or within a fuel oil or other storage tank or vessel.

5.0 TRAINING

5.1 Training Requirement: Employees are required to become familiar with and understand the guidelines regarding all Welding and Cutting operations. Designated welders and cutters and anyone assigned to fire watch duties must receive annual training, skills evaluation, and must demonstrate their understanding of these guidelines.

5.2 Training Topics: Training will include:

- OSHA 1910.252; 1910.253; and 1910.254
- Use of Hot Works Permit System
- Supervisor responsibilities
- Fire Watch responsibilities
- Operator responsibilities
- Contractors responsibilities
- Documentation requirements
- Respirator usage requirements
- Fire Extinguisher training

5.3 Certification: Upon completion of Welding and Cutting training, Metropolitan Library System will certify in writing that each designated welder has received and understands training requirements. Certification must include the employee's name, name of the trainer, date of training, and subject of certification.

6.0 SPECIAL HAZARDS

6.1 Maximum Allowable Concentration: Local exhaust or general ventilating systems shall be provided and arranged to keep the amount of toxic fumes, gases, or dusts below the maximum allowable concentration as specified in 1910.1000. Any welding, cutting, or burning of lead base metals, zinc, cadmium, mercury, beryllium, or exotic metals or paints not listed here shall have proper ventilation and/or respiratory protection.

6.2 Electrode Removal: When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine disconnected from the power source.

6.3 Gas Cylinder Shutoff: In order to eliminate the possibility of gas escaping through leaks of improperly closed valves, when gas welding or cutting, the torch valves shall be closed and the fuel-gas and oxygen supply to the torch positively shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. Where practicable the torch and hose shall also be removed from the confined space.

6.4 Warning Signs: After welding operations are completed, the welder shall mark the hot metal or provide some other means of warning other workers.

APPENDIX A: HOT-WORK PERMIT

Applies Only to Area Specified Below

Date: _____/_____/_____ Building: _____

Floor: _____

Nature of Job: _____

The above location has been examined; the precautions checked below have been taken to prevent fire. All ignition sources will be addressed or moved within the 35 feet of work such as vehicles, cell phones, cameras, and etc.

Precautions

The supervisor must inspect the proposed work area and check precautions to prevent fire.

General Precautions

- ☐ Sprinklers and/or fire host in service
- ☐ Cutting and welding equipment in good repair
- ☐ Area supervisor notified

Precautions within 35 Feet of Work

- ☐ Floors swept clean of combustibles
- ☐ Combustible floors wet down, covered with damp sand, metal, or fireproof sheets
- ☐ No combustible materials or flammable liquids
- ☐ Combustibles and flammable liquids protected with fire-proof tarpaulins or metal shields
- ☐ All wall and floor openings covered
- ☐ Fireproof tarpaulins suspended beneath work to collect sparks and protect pedestrians

Work on Walls or Ceilings

- ☐ Construction noncombustible and without combustible covering or insulation
- ☐ Combustibles moved away from opposite side

Work on Enclosed Equipment

- ☐ Equipment cleaned of all combustibles
- ☐ Containers purged of flammable vapors

☐ Adequate air flow through enclosed equipment to be provided while cutting and welding is done

Firewatch

☐ To be provided during and for 30 minutes after operation

☐ Supplied with extinguishers or small hose

☐ Trained in use of equipment and in sounding alarms

I have personally examined the above and certify that the checked precautions have been taken.

Signed: _____ (Supervisor Performing Work)

Permission is granted for this Work

Permit Expires on _____/_____/_____ at _____ : _____ AM/PM

Signed: _____ (Area Supervisor)

Time Started: ____ : _____ AM/PM _____ : _____ AM/PM

Final Check-Up

Work area and all adjacent areas to which sparks and heat might have spread (such as floors above and below and on opposite sides of walls were inspected for at least 30 minutes after the work was completed and were found fire safe.

Signed: _____ (Supervisor Performing Work)

After signing, return permit to person who issued it.