SAFETY & HEALTH PROGRAM

GENERAL POLICY STATEMENT

The Safety and Health Program developed and utilized by Mechanical Services & Design Inc. reflects our belief that good safety and health practices are a vital part of our daily operations.

It is the primary goal of this Company to maintain a maximum level of safety for all employees, as well as all other persons working on any jobsite operated by Mechanical Services & Design Inc.

In order for this program to be successful, all employees and subcontractor personnel must work as a team. Each worker is an important member of the Mechanical Services & Design Inc. team, and its effectiveness depends on a cooperative effort. Each person working on any job operated by Mechanical Services & Design Inc. has equal and full responsibility to follow all rules and regulations specified in this manual.

Policies and procedures in this manual do not take the place of good common safety sense. Amendments to the Safety and Health Program will be made as needed due to operational and regulatory changes.

We believe that adherence to these policies and procedures will ensure a safe working environment. The objective is to eliminate or greatly minimize the occurrence of accidents and incidents with or without injury. Therefore, adherence to these policies and procedures by all persons employed by Mechanical Services & Design Inc., as well as all subcontractor personnel, will be both expected and enforced by management and supervisors.

IT IS ABSOLUTELY FORBIDDEN THAT ANY EMPLOYEE WILLFULLY COMMIT AN UNSAFE ACT!!

Signed June 10, 2022

_____

President, Mechanical Services & Design Inc.

_____

Safety & Health Manager, Mechanical Services & Design Inc.

Contents

1. GENERAL SAFETY RULES

1. It is a condition of employment that all Mechanical Services & Design Inc. field team members wear safety side shield safety glasses, safety toed leather boots, and long trousers. Sleeves must extend at least 4" from the shoulder.
2. You **MUST** report any injury to your Manager or the Safety Manager immediately. An accident/injury report must be turned in within 2 hours to the Safety Manager.
3. If you do not have current First Aid Training, do not treat an injured, unless there is immediate peril such as profuse bleeding or stoppage of breathing.
4. Appropriate clothing, that follows our dress code, must be worn on the jobsites.
5. Safe work practices are to be used on all job operations. It is absolutely forbidden that any Mechanical Services & Design Inc. team member willfully commits an unsafe act!
6. Personal protective equipment (PPE) must be used as needed.
7. Horseplay is prohibited at all times.
8. Drinking and/or possession of alcoholic beverages or drugs during work hours are not permitted. Any person under the influence of alcohol or drugs will not be permitted to work.
9. Riding on a crane hook or load is prohibited.
10. No employee shall ride on any hoist, vehicle or equipment that is not designed for carrying passengers.
11. **NEVER** remove or by-pass any safety devices.
12. Do not approach operating machinery from the blind side – let the Operator see you.
13. Learn where fire extinguishers and first aid kits are located.
14. Maintain a general condition of good housekeeping in all work areas, at all times. Don't throw your trash on the ground.
15. Obey all traffic regulations when operating vehicles on a public highway and a valid driver's license is required to operate any vehicle. (Example: Seat belts are to be worn at all times)
16. Take extra safety precautions when working close to power-lines. Remember the 10 ft. rule.
17. Place "DO NOT USE" or "RED TAGS" on all tools, machinery, equipment, and devices that are damaged or under repair before they are returned to the tool room.

18. Compressed gas cylinders shall be secured upright at all times. Store fuel gas and oxygen cylinders at least at 20 feet apart if not in use.

19. Vehicles without back-up alarms and with obscured visibility to the rear shall not back in work areas unless guarded by a signalman.

20. Electrically driven power tools must be checked for proper grounding before each use.

21. No extension cord will be used without a GFCI at power source.

22. Faulty or damaged metal scaffold parts shall not be used. Untrained personnel will erect no scaffolding. No scaffold will be erected without the proper scaffold tag.

23. Be aware of the hazards of any jobsite chemicals or materials. If you don't know the hazards, check the Safety Data Sheets (SDS).

SAFETY GUIDELINES

1. All personnel must conduct their work in a safe manner at all times.

2. All personnel must follow the policies and procedures of the Safety and Health Program of Mechanical Services & Design Inc. as part of the normal daily routine.

3. All personnel are encouraged and expected to provide input and suggestions regarding this program. There are no disciplinary repercussions for any suggestions. Input is strongly encouraged and rewarded.

4. All personnel working on any jobsites must comply with the dress code as follows:

    a. Eye protection shall be worn on all projects.

    b. Shirts with sleeves must be worn at all times. Long pants must be worn at all times.

    c. Safety toed leather boots meeting standard ASTM F2413 must be worn at all times in a work zone.

    d. Gym or tennis shoes are prohibited.

5. Each person is responsible for reporting to work in a functional manner. Anyone who reports to the job unable and/or unfit to work safely, will be taken home, then discharged from the job and receive appropriate disciplinary action from his/her employer. The use of drugs, including alcohol, will not be tolerated under any circumstances.

6. Training regarding Safety and Health issues will be provided to all personnel as specified in the Safety and Health Education section of this program.

7. All personnel must ask for assistance when needed with any task or job, which may result in an injury without help, such as heavy lifting.

8. All personnel must follow the ergonomics rules regarding safe body mechanics.

9. All personnel as specified in the Personal Protective Equipment Policy of this program must use Personal Protective Equipment (PPE).

10. All personnel as specified in the Fall Protection Policy of this program must strictly utilize Fall Protection.

11. All personnel as specified in the Fire Prevention and Evacuation Plan Policy of this program must strictly follow all Fire Prevention and evacuate procedures.

12. All tools and equipment present on the jobsites must be in proper functioning and safe condition. Any tool or piece of equipment, which is defective, must be tagged as such. It must be repaired or removed from the jobsite as soon as possible. At the start of each shift,

or each working day, an inspection will be performed to detect any unsafe tools or equipment.

13. Any unsafe condition or safety hazard must be corrected at the time it is found. Work production must be stopped if necessary to correct the hazard.

14. Management or Safety Manager must be notified of any safety hazard at the time it is found.

15. Any accidents or incidents must be reported to management within one (1) hour as specified in the Accident Emergency Procedure Policy of this program.

16. Visitors on a job must report to the management upon arriving at the job. All safety and health rules and regulations will be applied to all visitors.

17. Misuse or mishandling of any tools or equipment owned by Mechanical Services & Design Inc. will not be tolerated.

18. Stealing will not be tolerated under any circumstances. Anyone caught stealing will be discharged permanently from the jobsite. Disciplinary action will ensue.

19. All jobs will start with a pre-job advisory safety meeting where any anticipated job hazard will be made known to all personnel working that job as specified in the Jobsite Initiation Information section of this program.

20. All personnel shall comply with the Mechanical Services & Design Inc. Respirator Program if respirators are in use.

2. SUBSTANCE ABUSE POLICY

Introduction

Mechanical Services & Design Inc. has committed to a safe, healthy, lawful, and productive workplace and work force. Because alcohol abuse and illegal drug use are inconsistent with that commitment, Mechanical Services & Design Inc. has adopted the following policy. This policy is effective September 1, 2004 and applies to all employees.

Employee Assistance

Employees who voluntarily seek help for drug or alcohol problems, before becoming subject to discipline for violating this policy, will be offered confidential assistance in contacting counseling and treatment programs, and provided information about any available insurance coverage or benefits. Depending on the nature of their problem, their job duties and work history, such employees will be placed on unpaid leaves of absence, transferred to non-safety-sensitive jobs or otherwise accommodated as may be required by law. Such employees may be required to satisfactorily document successful completion of, or participation in, an appropriate treatment program and/or comply with other appropriate conditions of continued employment, including but not limited to, agreeing to take and pass drug and/or alcohol tests at any time requested by Mechanical Services & Design Inc. during the next year.

Prohibitions

At all times they are working, supposed to be working, operating Mechanical Services & Design Inc. vehicles or equipment, or present on Mechanical Services & Design Inc. site, employees are prohibited from:

- **Using, possessing, manufacturing, dispensing, selling or buying illegal drugs;**
- **Having an illegal drug (or its metabolites) in their system;**
- **Being under the influence of alcohol, or otherwise unfit to work or drive safely; or**
- **Consuming alcoholic beverages or possessing (open containers of) alcoholic beverages**

Employee Testing

Employees who are reasonably suspected of using or possessing illegal drugs or alcohol in violation of this or other Mechanical Services & Design Inc. policies, or of being impaired by drugs or alcohol while they are working, supposed to be working, operating vehicles, or equipment, or present on or customer premises are subject to drug and/or alcohol testing.
Employees, who appear to have caused or contributed to on-the-job injuries or on-the-job accidents resulting in excessive property damage, are also subject to such testing. Employees are

also subject to testing when, in the opinion of, the nature of the injury or accident may be reasonably suspected of being cause or contributed to by drug or alcohol use.

Employees who refuse to cooperate in or tamper with at required drug/alcohol test will be terminated. Employees who test positive for illegal drugs or alcohol will be terminated.

Testing Procedures

With respect to all drug testing under this policy:

- Specimens shall be collected at clinics chosen by Mechanical Services & Design Inc. and tested by laboratories chosen by Mechanical Services & Design Inc.
- Urine specimens shall be sealed and labeled in the presence of the urine donor.
- A chain of custody shall be established from the point of collection, through testing, to storage.
- A laboratory certified by the U.S. Department of Health and Human Services to do drug testing shall perform tests and which hold all legally necessary licenses.
- Persons with positive lab results shall have an opportunity to promptly establish to the satisfaction of, Medical Review Officer, that their test results were not caused by illegal drug use.
- Employees with positive results for illegal drugs may arrange to have a portion of their original specimen tested by another DHHS-certified lab at their own expense. (The presence, in any concentration, of illegal drugs or their metabolites, in such re-tested specimens shall constitute a positive re-testing).

With respect to all alcohol tests under this policy:

- Breath specimens shall be tested by trained persons using a device capable of producing printed test results, which conforms to the model specifications of the National Highway Traffic Safety Administration for evidential breath testing.
- If an initial breath test results in an alcohol concentration of .04% or more, a confirmation breath test shall be required approximately 15-20 minutes later.
- The result of the confirmation test shall be the test result for purpose of this policy; and
- Absent the prompt submission of acceptable medical documentation that an employee is unable to provide a sufficient breath specimen due to a medical condition, an employee's failure to provide such a specimen shall constitute a refusal to cooperate.

Confidentiality

To the extent required by law, Mechanical Services & Design Inc. will keep confidential drug and alcohol treatment records, medical records, positive test results and information it provides its Medical Review Officer. Such records and information shall be kept in secure files separate from personnel files. Ordinarily, such information will be disclosed within only on a need-to-know basis and disclosed outside Mechanical Services & Design Inc. only where required by law or where a claim, charge or lawsuit is filed against Mechanical Services & Design Inc. or its agents involving such information.

Non-Discrimination

In administering this policy, Mechanical Services & Design Inc. will not discriminate illegally against qualified persons with disabilities, persons with a record of past chemical dependency, persons who are erroneously perceived to be chemically dependent, or against alcohol dependent persons who adhere to all Mechanical Services & Design Inc. normal standards of performance and conduct and do not constitute a threat to property or safety.

Crimes, Criminal Convictions and Disqualifying Driving Offenses

Any employee who is convicted of violating a criminal drug statute in the workplace must notify Mechanical Services & Design Inc. in writing, within five days of the conviction. Conviction includes a plea of guilty or "nolo contendere" or the imposition of a sentence. Such employees will be discharged within thirty days of such notice. Where such employees are directly engaged in performing work under a government agency within ten days of notice to Mechanical Services & Design Inc. of conviction.

A workplace violation is one in which a criminal act was performed on Mechanical Services & Design Inc. or its customers premises or while an employee was working, supposed to be working, or representing Mechanical Services & Design Inc.

Employees, who are arrested, indicted for, or convicted of disqualifying driving offenses shall not be permitted to operate Mechanical Services & Design Inc. vehicles or drive while working. Any employee whose job duties involve operation or Mechanical Services & Design Inc. vehicles or driving any vehicle while being paid must immediately notify Mechanical Services & Design Inc. in writing, of any arrest, indictment or conviction for disqualifying driving offense. Such employees are also subject to suspension and discharge, depending on the circumstances and applicable law.

Medications

Employees are expected to use all medications in a safe and lawful manner and to be fit for duty. Employees who use prescribed or over-the-counter medications, which are accompanied by warnings that they may cause drowsiness, interfere with the ability to drive, or operate machinery safely, or should not be used with alcoholic beverages, must consult their physician to determine if such medications will interfere with their ability to perform their job duties safely and effectively.

Where the physician imposes any restrictions or advises an employee of any potential safety hazard, the employee will be accommodated as required by law. Employees, however, who are taking such medications but fail to comply with this paragraph or use such medications contrary to their physician's instructions or any warnings which accompany the medication, are subject to appropriate discipline.

Definitions

- **Illegal Drugs:** controlled substances listed in Schedules I-V of 21 C.F.R., which are not being used under the supervision of a licensed health care professional or otherwise in accordance with federal law. The term can include but is not limited to, marijuana, cocaine, heroin, PCP, amphetamines, barbiturates, Demerol, and LSD.

- **Under the Influence of Alcohol:** actions, appearance or conduct which reasonably lead a supervisor, manager, or the Plant physician to conclude that an employee has been consuming alcoholic beverages and is not fit to work or an alcohol concentration of .04% or more, (i.e., .04 grams or more or alcohol per 20 liters of expired deep lung air).

- **Disqualifying Driving Offenses:** driving a motor vehicle under the influence of alcohol or a controlled substance, refusing while driving to take a legally required alcohol or controlled substances test, leaving the scene of the accident, or a felony involving the use of a motor vehicle.

Miscellaneous

1. This policy may be revised by Mechanical Services & Design Inc. in its discretion, is not a contract of employment, and does not alter the 'at-will' relationships that exist between Mechanical Services & Design Inc. and its employees. Additionally, this policy may be modified to comply with the policy of management or the Safety Manager.

2. Employees in, and applicants for, positions involving operation of commercial motor vehicles are also subject to Mechanical Services & Design Inc. DOT Drug Control Program.

DOT DRUG CONTROL PROGRAM

The following is Mechanical Services & Design Inc. Drug Control Program for drivers of commercial motor vehicles. This program applies to all drivers of commercial motor vehicles.

A. Policy Statement

1. No driver who uses, or tests positive for a drug shall be on duty, except provided in **A.3.**

2. Drivers, who test positive for a drug is medically unqualified, will not be allowed to drive, and his/her employment will be terminated.

3. Any driver alleged to be in violation of **A.1** might continue to drive after providing clear and convincing proof, the MRO that the drug (other than methadone) was prescribed by a licensed physician familiar with the driver's medical history and assigned duties who has advised the driver that the drug will not affect the driver's ability to safely drive.

B. Definitions

- **Commercial Motor Vehicle or CMV:** any vehicle used in commerce, which has a gross weight, rating, or gross combination weight rating of 26,001 pounds or more or which is designed to transport more than 15 persons, or which transports hazardous materials in sufficient quantities to require placards.

- **Drug:** any controlled substance, other that alcohol, listed in Scheduled I through V or 21 C.F.R. 1308, as revised from time to time. The term includes, but is not limited to, marijuana, cocaine, amphetamines, opiates, and PCP.

- **Medical Review Officer or MRO:** the physician for Mechanical Services & Design Inc. has retained to evaluate test results in accordance with DOT and PUCO regulations and to help administer this program.

C. Employee Assistance, Drug Education and Training

1. Mechanical Services & Design Inc. has a drug education and training program for all drivers covered by this program and their supervisors. The Coordinator of that program is Safety Manager. The Coordinator has the telephone numbers of community substance abuse assistance programs, as well as copies of this Drug Control Program. The Coordinator provides documented training to all covered drivers, supervisors, and Mechanical Services & Design Inc. on the effects of drug use.

2. Referrals, counseling, and materials on the effects of drugs on health, safety and the workplace and the signs and symptoms of drug use, as well as explanations of insurance coverage for drivers with drug abuse problems are available from the Coordinator. Drivers with such problems should contact the Coordinator immediately. Contacting the Coordinator after the occurrence of policy violations, misconduct, absenteeism, or performance problems will not exclude drivers from appropriate disciplinary actions.

D. Types of Drug Testing

1. **Pre-employment Testing.** No one will be hired or used as a driver who has not passed a drug test.

2. **Reasonable Cause Testing.** Whenever trained supervisors or Mechanical Services & Design Inc. managers witness actions, appearance or conduct indicative of an on-duty driver's use of a controlled substance, shall require a drug test of that driver. Such a driver shall be transported immediately to collection site for collection of a urine sample and/or breath specimen for testing. The driver's actions, appearance, and conduct will be documented within 24 hours or before test results are released, or whichever is earlier.

3. **Post-Accident Testing.** As soon as possible after a Reportable Accident, but in no case more than 32 hours after the accident, the driver involved shall cooperate in a drug test if the driver receives a citation for a moving traffic violation arising from the accident. A driver involved in a fatal accident who tests positive, who refuses to be tested, or if seriously injured, who refuses to authorize a release of medical records, shall have his/her

employment terminated.

4. **Random Testing.** All drivers are subject to random testing; drivers shall be selected using a random selection process and shall have an equal chance of selection. The number of such drug tests per calendar year shall equal or exceed 50% of the average number of driver positions covered by this policy and shall be spread throughout the year. The number of such alcohol tests per calendar year shall equal or exceed 25% of the average number of driver positions covered by this policy and shall be spread throughout the year (as applicable per the federal regulations). No supervisor, official or manager shall have any control over the probability of an individual driver's selection for random testing. Drivers who, for legitimate reasons, are unavailable on the day of their selection shall be returned to the selection pool.

5. **Return to Work Testing.** Any employee away from work for more than 30 days for any reason, must pass a drug screen before returning to work.

E. Collection Procedures

1. Urine specimens shall be collected at designated collection sites in accordance with DOT and PUCO collection site procedures. Drivers shall be allowed privacy when providing specimens, unless there is a reason to believe they may alter, adulterate or substitute their specimen. Where such a reason to believe exists, an observed specimen shall be collected; moreover, employee-drivers shall be subject to discharge and driver-applicants shall be ineligible for hire.

F. Test Procedures

1. A laboratory will perform all drug tests under this program certified to do drug testing under, 49 C.F.R., part 40. The lab shall analyze urine samples in accordance with the provisions of that part. Mechanical Services & Design Inc. reserve the right to change labs.

2. The laboratory shall retain the remainder of confirmed positive urine samples for at least one year in a secure freezer, unless requested to retain them for an additional, reasonable time.

G. Discipline

1. Driver-applicants, who refuse to be tested or have verified positive test results or attempt to alter, adulterate, or substitute a specimen will not be hired or used.

2. Employee-drivers selected for reasonable cause testing will be suspended without pay pending receipt of verified positive test results. Drivers selected for other types or testing will be allowed to continue working pending receipt of verified test results.

3. Employee-drivers, who test positive, refuse to be tested or attempt to alter, adulterate, or substitute a specimen, will have his/her employment terminated.

H. Confidentiality, Record Keeping and Notice of Test Results

1. Except as provided herein or permitted by law, test results and information provided by drivers to the MRO are confidential. The MRO shall notify Mechanical Services & Design Inc. whether a test was positive or negative and if positive, the specific drug found and shall also disclose the information listed in **H.4.** Mechanical Services & Design Inc. where, in the MRO's reasonable medical judgment, a driver's medical condition poses a significant safety risk or could result in a determination that a driver is medically unqualified, the MRO may inform Mechanical Services & Design Inc. Prior to obtaining medical information from a driver, the MRO shall inform the driver what information may be disclosed and to whom.

2. The laboratory will not disclose test results to Mechanical Services & Design Inc. unless the driver tested authorizes such disclosure or a claim; grievance or proceeding is initiated against Mechanical Services & Design Inc. or its agents arising from a positive test.

3. Mechanical Services & Design Inc. shall ensure that all records relating to this program are maintained for at least five years, except that individual negative test results shall be maintained for a minimum or twelve months. MRO shall be the custodian of all individual test results and shall maintain such results for at least five years.

4. Mechanical Services & Design Inc. will maintain in drivers' qualification files the following information:

    a) The types of tests for which the driver submitted specimens, the date and location of collections.

    b) The identity of the persons collecting the specimen, analyzing the specimen, and serving as the MRS.

    c) Whether the test was positive or negative, and if positive, what controlled substance was identified?

5. Mechanical Services & Design Inc. shall notify an applicant of the results of a pre-employment test if the applicant writes to Mechanical Services & Design Inc. within 60 days of notice of its decision whether to hire or use the applicant.

6. Mechanical Services & Design Inc. shall maintain the annual summary required by 49 C.F.R. 391.87(h).

I. Relationship to Law and Other Policies

1. The program does not constitute a guarantee or contract of employment and does not alter the at-will relationships that exist between Mechanical Services & Design Inc. and its drivers.

2. Drivers covered by this program remain subject to Mechanical Services & Design Inc. Substance Abuse Policy and all its other policies and rules, to the extent such policies and rules are not inconsistent with the specific terms of this program.

REASONABLE CAUSE

DRUG TESTING PROCEDURE

As a Manager for Mechanical Services & Design Inc. there may come a time when you have reasonable cause to suspect an employee of being under the influence of a controlled substance on the jobsite.

Reasonable Cause, as defined by our Policy is **"physical evidence that an employee's actions are abnormal from their typical employee behavior"**, such as (but not limited to):

a) Poor motor skills (i.e., staggers when walking, lack of coordination, dropping tools/equipment)

b) Noticeable conditions: (for example: reddened eyes, suspicious odors, slurred speech, dilated pupils)

c) Inattentiveness: Not aware of surroundings/people

If this occurs, these are the procedures you must follow:

1. Whenever possible, find someone to witness your actions. Preferably a supervisor or manager. If no witness is available, go ahead and proceed.

2. Pull the employee to the side and express your concerns about their behavior and ask for an explanation. **DO NOT** accuse them of being on anything. This is for the medical professionals to determine.

3. If no reasonable explanation is offered for their behavior, the employee **must** be tested **within three (3) hours. ****. Inform the employee that a reasonable cause drug test will be administered.

    i. If it is unsafe to have employee at testing center within three (3) hours notify, Department Supervisor and Safety Manager

    ii. Relocate employee to a safe location, pending arrival of designated transport official.

4. Contact management or the Safety Manager by telephone, or in person, explaining the situation so Safety Manager, or designated representative, can arrange a drug test. If Safety Manager is not available, call the office and ask for the highest corporate official available for instructions.

5. When a drug test is scheduled, the employee **must** be driven to place of testing. **Under no circumstances** will they be allowed to drive a company vehicle, or themselves, to the testing facility.

6. If an employee refuses testing and attempts to leave the job, advise them that they should not and offer to call someone to pick them up or offer to have them driven home when possible.

7. If employee insists on leaving in their own car, do not stop them. If you feel they are an imminent threat to the public, immediately contact local police department and provide name of employee, description of car, the roadway, and direction traveled. Following police contact, call corporate headquarters and advise Safety Manager, or designated representative.

8. Anyone tested for reasonable cause will not be allowed to return to work until we receive the test results.

3. RESPONSIBILITIES

Each person, whether employed or contracted by Mechanical Services & Design Inc. to complete projects, has widespread responsibility and accountability in safety and health issues. These responsibilities are outlined, but not limited to; those listed in this section of the Safety and Health Program. All levels of management will be measured on the success of the program.

A. UNIVERSAL RESPONSIBILITY

1. Minimizing accident hazards by following all the procedures of the Safety and Health Program.
2. Performing only those tasks/jobs for which there is sufficient knowledge of the methods used to perform the task and the required safety precautions.
3. Correcting any potential accident hazard as soon as it is discovered.
4. Reporting any incident and/or accident as soon as it occurs, even if there is no injury.
5. Asking for assistance when needed.
6. Choosing the appropriate Personal Protective Equipment (PPE) to protect one from injury.
7. Attending all required training sessions and safety meetings.
8. Providing input and suggestions regarding any changes needed in the Safety and Health Program.

B. MANAGEMENT RESPONSIBILTIES

1. Providing leadership and commitment to establish and adhere to all aspects of the Safety and Health Program.
2. Complying with all Universal Responsibilities.
3. Enforcing all policies and procedures of the Safety and Health Program.
4. Directing/assisting managers, the Safety Department, and supervisors with enforcement of the Safety and Health Program.
5. Initiating and/or enforcing disciplinary action as needed for employee safety violations.
6. Completing performance appraisals for all employees.
7. Monitoring all reports and transmittals from the Bureau of Workers Compensation and Division of Safety and Hygiene, OCA, and OSHA.

8. Monitoring and intervening with all submitted safety reports, as needed.

9. Making safety inspections and initiating any necessary corrective action during periodic jobsite visits.

10. Notifying the Safety Manager of the start date for all projects as soon in advance as possible.

11. Providing all necessary Personal Protective Equipment (PPE) for employees.

12. Providing all required safety equipment for employees.

C. SAFETY MANAGER RESPONSIBILITIES

1. Complying with all Universal Responsibilities.

2. Maintaining current knowledge of all safety and health regulations governing the General Industry and the Construction Standards.

3. Formulating all components of the Safety and Health Program.

4. Making updates and necessary changes to the Safety and Health Program and advising all personnel of changes.

5. Enforcing all policies and procedures of the Safety and Health Program.

6. Providing, arranging, and scheduling all training sessions for employees.

7. The Safety Manager (or designee) will consult with safety authorities and specialists, such as the Bureau of Worker's Compensation, Division of Safety and Hygiene, OCA, OSHA, on an "as needed" basis regarding composition, education, and enforcement of an effective, active Safety and Health Program.

8. Attending any necessary seminars regarding safety and health issues.

9. Coordinating safety and health issues on each jobsite with the manager, supervisors, customer, sub-contractors, and any rental services.

10. Making safety inspections periodically, and as needed, on all jobsites and initiating corrective action for safety-violation issues.

11. Compiling as needed or required inspection reports for weekly jobsite visits and submitting a copy to the on-site field supervisor, the project manager, and any necessary sub-contractors.

12. Providing assistance to the field supervisors regarding employee disciplinary action for safety violation.

13. Reviewing all Accident and Incident Reports.

14. Coordinating inspections with any safety inspectors (i.e., OSHA, etc.)

15. Completing all records, forms, and reports as required for the Safety and Health Program.

16. Provide assistance in pre-construction advisory meetings.

D. MANAGERIAL RESPONSIBILITIES

1. Complying with all Universal Responsibilities.

2. Maintaining current knowledge of all rules and regulations governing the General Industry and the Construction Industry Standards.

3. Making safety inspections weekly and communicating safety issues to the employees including current safety data sheets (SDS) for all material ordered or used on the job.

4. Communicating pertinent safety issues and hazards found of the jobsite to the Safety Manager.

5. Assisting the front-line supervisors with safety issues, as needed.

6. Prior to the start of any job, consult with the Safety Manager on all specific safety requirements as well as provide site-specific information for pre-construction advisory meetings for that project.

7. Ensure that job set-up sheets are completed prior to the commencement of any work.

8. Making safety inspections.

9. Communicating with onsite supervisors.

E. FRONT LINE MANAGER AND SUPERVISOR RESPONSIBILITIES

1. Complying with all Universal Responsibilities.

2. Enforcing all policies and procedures included in the Safety and Health Program.

3. Coordinating and supervising safety practices of all personnel on the jobsite.

4. Directly supervising the workers on the jobsite employed by MSD. Investigating and documenting the scene of any accident with injury and notifying the Safety Manager as soon as possible.

5. Ensuring the completion of all necessary Accident and Incident Reports as stated in the Accident and Incident Protocol Policy of the Safety and Health Program.

6. Making safety inspections on the jobsite prior to commencement of work each shift, and routinely throughout the workday, as well as completing pre-shift safety check lists.

7. Initiating and delegating any changes necessary to correct safety hazards as soon as they are discovered.

8. Initiating and delegating the inspection of extension cords, three-prong plugs, broken insulation, and bare wires – test extension cords and GFCI before each use with GFCI receptacle tester before each shift.

9. Initiating and leading all weekly toolbox sessions, safety contacts and observations.

10. Recording attendance rosters and subject matter of the weekly Safety and Health Meetings.

11. Coordinating and assisting with the treatment of any injuries.

12. Reporting all incidents, accidents, and injuries to the Safety Manager.

13. Assisting, as needed, with any Safety Inspections or inspection officials.

14. Communicating with front line managers/foremen regarding any pertinent safety violations and corrective action necessary.

15. Communicating pertinent safety hazards and trends on the jobsite to the Safety Manager.

16. Obtaining the assistance of the Safety Manager and/or management if needed for the enforcement of Safety and Health policies and procedures.

17. Assisting with training of personnel regarding safety and health issues, as needed.

18. Initiating and documenting any necessary disciplinary action for personnel safety violations.

19. Maintaining all required posting and signs on the jobsite.

20. Obtaining any safety equipment necessary from the Safety Manager (or designee)

21. Correcting safety and health problems noted as needed.

22. Complying with all responsibilities as specified in the Hazard Communication Program.

23. Obtaining proper PPE from Safety Manager (or designee) to be used on job and supervising the proper use of PPE on those tasks/jobs requiring specific equipment.

24. Reporting **all** unsafe work conditions, practices, or near misses to management or Safety Manager as soon as possible.

MANAGEMENT AND SUPERVISOR SAFETY RESPONSIBILITIES

BY ACCEPTING RESONSIBILTY OF THIS PROJECT, YOU HAVE THE RESPONSIBILITY FOR THE SAFETY AND HEALTH OF YOUR CREW MEMBERS.

1. Your responsibilities are spelled out in the Responsibilities Section of our Safety and Health Program – Sections D & E and any local/regional additions thereto.

2. Your responsibilities go beyond the Responsibilities Section of our Safety and Health Program – Sections D & E to include enforcement of safety rules and regulations on this project whenever you become aware of an unsafe act or unsafe condition (regardless of whether these unsafe situations involve your crew or not).

3. It is your responsibility as a manager or supervisor to report these unsafe acts or conditions to your immediate report, the Safety Manager and client (as required) once you become aware of them.

4. The Safety Manager is available to assist you and advise on safety matters. You are assigned to enforce safety rules concerning your crew. That responsibility lies with you, the managers, and supervisors. Failure to maintain your responsibilities may lead to disciplinary action up to and including discharge.

4. SAFETY ENFORCEMENT

I. PURPOSE

Mechanical Services & Design Inc. places the utmost importance on safety and that all employees are provided with a safe and healthy working environment. To succeed in providing such an environment, Mechanical Services & Design Inc. finds it necessary to establish guidelines for enforcing safety and health rules and regulations.

II. APPLICABILITY

The provisions contained herein shall be applicable to all employees working under the jurisdiction of Mechanical Services & Design Inc.

III. ACTION

Failure to comply with established safety and health rules and regulations shall result in disciplinary actions contained in these guidelines.

IV. DISCIPLINARY ACTION

A. Unsafe acts and/or practices not considered to be immediately dangerous to life and health, such as failure to wear appropriate safety eye wear, and required work shoes, violations of Job Safety & Health Analysis (JSHA), etc., will result in the following disciplinary actions.

- First occurrence - Verbal warning and notations made in writing to the Company Safety Department
- Second occurrence -Written warning and a copy forwarded to the Company and Safety Department.
- Third occurrence -Progressive Discipline- 1-day, 3-day, 5-day, Termination

B. Unsafe acts and/or practices considered to be immediately dangerous to life and health shall be grounds for immediate progressive discipline and or termination of employment. Acts consisting of, but not limited to the following:

1. Failure to use appropriate fall protection issued by Mechanical Services & Design Inc. while working from an unguarded elevation six (6) or more feet above the ground or floor surface. (Safety harnesses, lanyards and safety lifelines are required as fall protection).
2. Failure to wear required and issued respirator equipment.
3. Employees who are determined to be under the influence of drugs and alcohol.

4. Fighting

5. Entering confined space without first testing the atmosphere and/or failing to fully obey entry permit.

6. Failure to comply fully with hot work permits.

7. Smoking in prohibited areas.

8. Riding equipment not designed for transporting employees. (Cranes, loads, forklifts, bulldozers, etc.)

9. Unsafe and/or reckless operation of motorized equipment. (Cranes, trucks, forklifts, bulldozers, etc.)

10. Any unsafe act and/or practice are considered to be immediately dangerous to life and health (IDLH) shall be grounds for termination of employment without prior warning or reprimand.

11. Insubordination – refusal to perform a safe work assignment given by a Manager or the Safety Manager.

12. Horseplay – scuffling, pranks, wrestling or throwing material at others

13. Failure to follow established lock out / try out (verification) procedures.

Disciplinary Form

Mechanical Systems of Dayton
4401 Springfield St
Dayton. OH 45431

EMPLOYEE
WARNING REPORT

Employees receiving this warning report are hereby put on notice of a violation of our organization's rules and/or standards of employee conduct. Further violation(s) of such conduct may result in further discipline including the possible termination of employment.

Employee's Name _____ Date _____

Employee # _____ Department _____ Shift _____

Copy Forwarded to: ❑ Employee Representative ❑ Employee ❑ Other

TYPE OF VIOLATION

❑ Attendance	❑ Carelessness	❑ Insubordination
❑ Lateness/Early Quit	❑ Violation of Company Policies or Procedures	❑ Violation of Safety Rules
❑ Unauthorized Absence From Work Area	❑ Willful Damage to Material/Equipment	❑ Working on Personal Matters/ Conflict of Interest
❑ Substandard Work Quality	❑ Threatening or Engaging in Violence	❑ Unsatisfactory Behavior Towards Employees or Customers
❑ Drinking/Drugs While at Work	❑ Unfit for Duty	❑ Other

SUPERVISOR'S/EMPLOYER'S STATEMENT

Date of Violation ____/____/____ Time: ____:____ AM PM

EMPLOYEE'S STATEMENT

❑ I agree with Supervisor's/Employer's Statement
❑ I disagree with Supervisor's/Employer's description of violation for these reasons:

Employee Signature _____ Date _____

PREVIOUS WARNINGS

DATE	ORAL	WRITTEN	OTHER	SUPERVISOR/MANAGER

ACTION TO BE TAKEN

❑ Warning ❑ Suspension ❑ Dismissal ❑ Other

TIMETABLE FOR IMPROVEMENT

❑ Immediate ❑ 30 days ❑ 60 days
❑ Other _____

CONSEQUENCES

Failure to improve will result in: ❑ Warning ❑ Suspension ❑ Dismissal ❑ Other _____

❑ I have read this Employee Warning Notice and understand it. ❑ Employee declined to sign this form.

Date _____ Employee Acknowledgement of Receipt _____ Date _____ Supervisor/Manager Signature _____

5. REPORTS & INVESTIGATIONS

V. ACCIDENT & INCIDENT REPORTS

A. Accidents and incidents as specified shall be reported on an Accident/ Incident report form and sent to management and the Safety Manager within 8 hours of occurrence. Note: some clients required reports to be filled out on their specific report form and submitted to them by 6am of the day following the accident/incident. Some customers also require a phone call immediately. Check local requirements.

1. Occupational injuries and illnesses

2. Accidents involving significant damage to property, or material loss.

3. Incidents or "near misses" considered by the employee or management to be potentially serious.

4. Spills and releases

VI. FORMAL INVESTIGATIONS

A. Formal investigation for potentially serious accidents and recordable injuries/illnesses shall be conducted.

1. The first concern at an accident is care of the injured. Nothing should interfere with this except the safety of the rescuers themselves.

2. After the accident site is safe to approach, the investigation shall begin.

3. Preserve the scene as it was after the accident. Restrict or barricade the area to prevent curious bystanders from destroying evidence.

4. Make a walk-through of the accident site. Take notice of and record the location of all items of evidence. Mark the location of items likely to be moved.

5. Obtain the identity of all people who might have information about the accident. Record their names.

6. Examine the evidence. Items that will provide information about what happened, how it happened and why it happened must be identified and examined. Photographs (with permission of the customer) of the accident site and the items of evidence should be taken as soon as possible after the accident.

7. Make a diagram of the accident site. A sketch shall be made showing the location of all evidence essential to understanding the accident situation. Distances will be measured and recorded on the sketch.

8. Interview all witnesses and obtain statements from them. Persons who may be able to contribute information about the accident shall be interviewed as soon as possible after the accident and recorded statements should be obtained from them.

9. A written report shall be prepared for all serious accidents. The report shall include:

    a. Accident/incident description. What happened, when did it happen, and who was involved

    b. The underlying causes

    c. Management, employee, or program deficiencies

    d. Identification and implementation of corrective action to prevent a recurrence

    e. Definition of accountabilities and timetables for corrective action

    f. A designee to follow-up the corrective actions

B. Accident and incident and job-related injury data are maintained, and periodically reviewed, to determine the most serious and frequent causes of accidents and incidents. Appropriate actions to address the causes are implemented.

C. Immediately upon completion of a formal investigation report, copies shall be issued to the Corporate Department of Safety and Health.

D. Copies of all accident and incident reports and all formal investigation reports shall be maintained on file.

E. A formal interview shall take place within 3 working days after the accident.

F. Customer requirements may be greater than the above listed. Check and follow local requirements.

6. ASBESTOS CONTROL STANDARD OPERATING PROCEDURE

Table of Contents

1. BASIS: The purpose of this program is to establish guidelines and procedures in the operations and maintenance of asbestos containing materials at Mechanical Services & Design Inc. to protect all employees, contractors, visitors, and vendors from potential health hazards of asbestos related diseases. This Program applies to all buildings and structures owned by Mechanical Services & Design Inc., to all employees and sub-contractors of Mechanical Services & Design Inc., to occupants of Mechanical Services & Design Inc. buildings and to external organizations who may come into contact with or disturb asbestos- containing material on Mechanical Services & Design Inc. projects. The Program applies to routine work during which an employee may encounter asbestos as well as work undertaken to repair or remove asbestos-containing material.

2. RESPONSIBILITY: The Director of Environmental Health and Safety is responsible for all facets of this program and has full authority to make necessary decisions to ensure success of the program. The Director of EHS is authorized to amend this program and is authorized to halt any operation where there is danger of serious personal injury.

3. WRITTEN PROGRAM: Mechanical Services & Design Inc. will review and evaluate this program in accordance with the following:

a. On an annual basis.

b. When changes occur to governing regulatory sources that require revision.

c. When changes occur to related campus procedures that require a revision.

d. When facility operational changes occur that requires a revision.

e. When there is an accident or close call that relates to this area of safety.

f. Anytime the procedures fail.

g. If the TWA and/or excursion limit is exceeded this written program to reduce employee exposure shall be instituted as well as air monitoring and proper respiratory protection.

Effective implementation of this program requires support from all levels of management. This written program will be communicated to all personnel that are affected by it. It encompasses the total workplace, regardless of the number of workers employed or the number of work shifts. It is designed to establish clear goals and objectives.

4. GENERAL: Mechanical Services & Design Inc. will ensure that all potential sources of asbestos within our facilities are evaluated. This program is intended to address comprehensively the issues of, evaluating and identifying potential sources of asbestos, evaluating the associated potential hazards, communicating information concerning these hazards, and establishing appropriate procedures and protective measures for employees. It is the policy of Mechanical Services & Design Inc. that employees are not involved in any asbestos repairs, maintenance, or removal operations.

Prior to the commencement of construction activities, the project manager or designee shall assure that all potential asbestos containing material is sampled. If during construction activity a suspect material is discovered the area will be cordoned off until sampling has been

completed. If the material is determined to be asbestos, then the Director of EHS will coordinate its removal with an outside contractor.

All employees shall be protected from exposure to asbestos fibers by isolating and controlling access to all affected areas during asbestos work. All tasks involving the disturbance of asbestos containing material will be conducted by an outside contractor only after appropriate work controls have been identified and implemented. A qualified supervisor shall be available at asbestos-controlled work sites during all activities. Proper personal protective equipment (PPE), vacuums and HEPA filters shall be used and properly maintained. All outside contractors must provide the appropriate certifications and documentation prior to conducting the work.

Mechanical Services & Design Inc. employees are prohibited from intentionally disturbing asbestos containing materials. Any removal or disturbance of asbestos must be performed by outside certified asbestos abatement contractors. Never do the following to any asbestos- containing materials or suspected materials:

- Drill
- Saw
- Move
- Hammer
- Break
- Disturb
- Cut
- Damage

Floor Tiles

Many buildings have floors tiles that contain asbestos. Regular washing, waxing, stripping, and buffing of these tiles will not release dangerous levels of asbestos. In order to prevent release of asbestos from these tiles, the following rules apply:

- Never sand floor tiles.
- When stripping floors, use low abrasion pads at speed lower than 300 rpm and use wet methods.
- Burnishing or dry buffing may be done only when the flooring has enough of a finish so that the pad cannot contact the asbestos-containing material.
- Broken and damaged asbestos floor tiles must be removed by asbestos abatement workers.

5. ASBESTOS INVENTORY: Mechanical Services & Design Inc. will hire a consultant to conduct surveys and prepare a written inventory of the type and locations of asbestos-containing material to:

a. Allow for periodic condition inspections.

b. Allow for maintenance and repair of damaged asbestos.

c. For each building the inventory contains the following information:

- Type of asbestos-containing material i.e., sprayed fireproofing, texture coating, or thermal insulation.
- The location of the material.

Presumed to be Asbestos Containing Building Material (ACBM):

Certain building materials installed prior to 1981 must be presumed to contain asbestos unless proven to be asbestos-free. This is to prevent over sampling, and to prevent sampling that would trigger unnecessary remedial response such as fire doors or vibration dampers. Sampling these items would damage them and trigger their replacement. Normally sampling is only performed on these items when they will be disturbed or are already damaged. When there is reasonable belief that assigned work has potential hazards or suspected hazards, the employee shall stop work activities and immediately contact their supervisor. The supervisor will contact the Director of EHS to determine the potential of asbestos present. Should asbestos be determined to be present then the Director of EHS will take the proper procedures to either abate or render safe the area of concern. The employee will be informed when the work is determined to be safe. The employee will then proceed with completion of the assignment.

The following are presumed to be ACBM:

- Transite/Cement Board
- Vibration Dampers on all HVAC components

6. REPAIR AND MAINTENANCE OF ACM:

a. **Reporting suspect ACM**: Should an employee or a contractor encounter material which is not identified and is not listed in the Asbestos Inventory, and which might reasonably be expected to be asbestos, the person will stop any work which could create airborne asbestos and report the discovery to a supervisor. Where it is determined that friable asbestos- containing material is in a condition that could likely lead to inhalation exposure, the supervisor will immediately limit access to the location and contact the Director of EHS. Where there is reasonable doubt about the composition of a friable material, it will be treated as asbestos until testing demonstrates that asbestos is present at levels below 1%.

b. **Authorized personnel:** Cleanup and repair of asbestos-containing material will only be carried out by the appropriate clean up procedure by outside contractors who have been properly trained.

c. **Hazard notification:** All employees, visitors, vendors, and contractors will be notified in advance when work involving asbestos is to be carried out in any area of Mechanical Services & Design Inc. buildings which they occupy.

7. TRAINING: All Mechanical Services & Design Inc. and sub-contractors that have a responsibility for operations will be trained to carry out their work without endangering themselves, their coworkers or other building occupants. The training should be provided prior to or at the time of initial assignment and at least annually thereafter and at no cost to the employee. The training should be done in a manner that the employee is able to understand, and the employee must past a written test with a score of no less than 80%. The training must include:

a. Health effects associated with exposure to asbestos;

b. Locations, signs of damage and deterioration of asbestos-containing materials and presumed asbestos-containing materials;

c. The proper response to fiber release episodes;

d. The types, properties, and uses of asbestos.

e. The hazards of asbestos fiber inhalation and ingestion.

f. Types of activities which could release asbestos fibers.

g. Information on the synergistic relationship between smoking and exposure to asbestos producing lung cancer.

h. A certificate of training should be provided and maintained.

8. SPILL AND LEAK PROCEDURES: Spills and leaks will be under the supervision of EHS. The following apply:

a. Notify co-workers and evacuate the area.

b. Immediately report incident to your Supervisor who will notify the Director of EHS

c. The Director of EHS will commence clean up procedures with an outside contractor.

9. EMERGENCY FIRST AID PROCEDURES: In the event of an emergency call 911. For emergency medical assistance dial 9-911. Report all work related incidents to the Safety Department.

a. **Eye Exposure:** Wash immediately with large amounts of water for at least 15 minutes. Lifting the lower and upper lids occasionally, get medical attention as soon as possible.

b. **Skin Exposure:** Immediately flush with copious amounts of water. Remove any clothing contaminated, and flush exposed skin areas, get medical attention as soon as possible.

c. **Swallowing Exposure:** If Asbestos has been swallowed and the victim is conscious, call for medical assistance or a doctor immediately.

d. **Respiratory Exposure**: Get the victim to open, fresh air immediately. Keep the victim warm and at rest. Get medical attention as soon as possible.

General Asbestos Standard 29 CFR 1910.1001

The federal OSHA general industry Asbestos Standard (29 CFR 1910.1001) and construction industry Asbestos Standard (29 CFR 1926.1101) have been adopted under the New Jersey Public Employees Occupational Safety and Health (PEOSH) Act. These new asbestos standards replace the PEOSH Asbestos Standard (N.J.A.C 12:100-12).

A: BACKGROUND

Asbestos fibers enter the body by being breathed in or by being swallowed and can become lodged in the respiratory or digestive systems. Exposure to asbestos can cause many disabling or fatal diseases; these diseases take years to develop. Among these diseases is asbestosis, a chronic lung disease characterized by lung scarring which stiffens the lung. This interferes with normal lung function, resulting in shortness of breath, increased vulnerability to lung infections, and sometimes death. Occupational exposure to asbestos increases the risk of lung and gastrointestinal cancer and mesothelioma. Mesothelioma is a cancerous tumor that spreads rapidly in the membranes covering the lungs and body organs.

B: WHAT ACTIVITIES ARE COVERED?

This information bulletin provides an overview of the general industry Asbestos Standard. The standard applies to all occupational exposures to asbestos in general industry. The largest group of public employees potentially affected by this standard are brake and clutch mechanics, but this standard also covers custodial activities such as housekeeping and maintenance work.

For more information on the PEOSH construction industry Asbestos Standard, obtain the PEOSH information bulletin on "Asbestos Standard for Construction."

C: WHAT ARE THE KEY PROVISIONS OF THE STANDARD

- Permissible Exposure Limits
- Guidelines for Exposure Monitoring
- Regulated Areas
- Control Methods
- Respiratory Protection
- Personal Protective Clothing
- Hygiene Facilities
- Communication of Hazards - Information and Training
- Housekeeping
- Medical Surveillance
- Recordkeeping

D: WHAT ARE THE REQUIREMENTS FOR EXPOSURE MONITORING?

The employer must assess all asbestos operations for potential generation of airborne asbestos fibers. Where an exposure may exceed the excursion limit of 1.0 fiber per cubic centimeter of air as averaged over a sampling period of 30 minutes, employee exposure measurements must be made from breathing zone air samples representing the 8-hour TWA and 30-minute EL for each employee.

Initial monitoring also must be performed for all employees who are, or may reasonably be expected to be, exposed to airborne concentrations of asbestos at or above the PEL and/or EL unless: (1) the employer can supply historic monitoring results; and (2) the collected data demonstrates that asbestos is not being released at or above the PEL and/or EL when materials are being processed, used, or handled.

If initial air monitoring indicates that exposures are above the PEL and/or EL, periodic monitoring must be conducted at intervals of at least every six months. Results must be documented.

Affected employees and their representatives must be allowed to observe monitoring and must be notified in writing within 15 working days after the receipt of the monitoring results.

E: WHAT DO I NEED TO KNOW ABOUT REGULATED AREAS?

The employer must establish and set apart a regulated area wherever airborne concentrations of asbestos and/or presumed asbestos-containing material exceed the PEL and/or EL.

- No smoking, eating, drinking, chewing tobacco or gum, or applying cosmetics is permitted in regulated areas.
- Only authorized personnel may enter regulated areas. This includes all construction related housekeeping.
- Warning signs must be provided and posted at all approaches to regulated areas.
- Warning labels must be affixed to all asbestos products (raw materials, mixtures, scrap) and to all containers of asbestos products, including waste containers.

F: WHAT CONTROL METHODS ARE IN THE STANDARD?

Where feasible, engineering and work practice controls must be used to reduce and maintain employee exposure at or below the PEL and or EL. The standard requires the employer to institute the following methods and work practices:

Methods

- Design, construct, install, and maintain local exhaust ventilation and dust collection systems according to the *American National Standard Institute.* This should also include exhaust systems for hand tools.
- Provide a local exhaust ventilation system with HEPA (high-efficiency particulate air filter) filters for all hand-operated and power-operated tools such as saws, scorers, abrasive wheels, and drills that produce or release asbestos fibers.
- Use a negative-pressure enclosure/HEPA vacuum system or a low-pressure/wet cleaning method during automotive brake and clutch inspection, disassembly, repair, and assembly operations. An

equivalent method also can be used if the employer demonstrates that the method being used achieves the required exposure reductions. (See 29 CFR Part 1910.1001 Appendix F to the standard.)

- Where no more than five pairs of brakes or five clutches are inspected, disassembled, repaired, or assembled weekly, the control methods or work practices in 29 CFR Part1910.1001 Appendix F to the standard may be used

- Where engineering and work practice controls have been implemented, but do not sufficiently reduce exposures to the required levels, then the employees must be provided with proper respiratory protection

- Establish and implement a written program to reduce employee exposures by using engineering and work practice controls and by using proper respirators where the PEL and or/EL is exceeded.

- Employee rotation cannot be used as a means of compliance with the PEL and/or the AL G:

WHAT ARE THE RESPIRATORY PROTECTION REQUIREMENTS?

Respirators must be selected, provided, and used while feasible engineering and work practice controls are being installed; work operations to reduce exposure or other activities where engineering and work practice controls are not feasible; in work situations where feasible engineering and work practice controls are not yet sufficient to reduce exposure to or below the PEL and/or EL; and in emergencies. When respirators are used, the employer must:

- Select respirators that are approved by NIOSH. These shall be provided at no cost to the employee

- Provide a powered, air-purifying respirator in lieu of any negative-pressure respirator when the employee chooses it and when the respirator provides adequate protection.

Work Practices

The employer must assure that employees:

- Handle, mix, apply, remove, cut, score, or work with asbestos using wet methods to prevent employee exposure.

- Do not remove cement, mortar, coating, grout, plaster, or similar material containing asbestos from bags, cartons, or other containers that are being shipped without wetting, enclosing, or ventilating them.

- Clean up as you go and wear proper PPE.

- Do not use compressed air to remove asbestos or materials containing asbestos unless the compressed air is used in conjunction with a ventilation system designed to capture the dust cloud created by the compressed air.

- Develop a written respiratory program in accordance with 29 CFR 1910.134 (b), (d), (e), and (f).

- Provide employees with high-efficiency particulate air filters (99.97% effective to 0.3 microns) for appropriate respirators and assure that the filters are changed whenever an increase in breathing resistance is detected. Employees who wear respirators must be allowed to wash their faces and respirator facepieces whenever necessary to prevent skin irritation associated with respirator use.

- Assign the employee to another job or give the employee the opportunity to transfer to a different job that does not require the use of a respirator when a physician determines the employee is unable to wear a respirator. The job must be with the same seniority, status, and rate of pay, if such a position is available.

- Ensure that a respirator issued to an employee fits properly and exhibits minimum facepiece leakage. Employers must perform quantitative or qualitative fit tests at the time of initial fitting and at least every 6 months for each employee wearing negative-pressure respirators. Protocols for fit tests are found in 29 CFR 1910.1001 Appendix C of the standard.

H: WHAT PROTECTIVE CLOTHING IS NEEDED?

- For any employee exposed to airborne concentrations of asbestos that exceed the PEL and/or EL, the employer must provide at no cost to the employee protective clothing such as coveralls or similar full- body clothing, head coverings, gloves, and foot coverings. If the possibility of eye irritation exists, face shields, vented goggles, or other appropriate protective equipment must be provided and worn.

- Asbestos-contaminated work clothing must be removed in change rooms and placed and stored in closed, labeled containers.

- The employer must provide clean protective clothing and equipment at least weekly to each affected employee and inform the person who launders the asbestos-contaminated clothing of the potentially harmful effects of exposure to asbestos.

- Contaminated clothing and equipment must be transported in sealed impermeable bags, or other closed containers, and must be labeled.

I: WHAT HYGIENE FACILITIES AND PRACTICES ARE REQUIRED?

- Employees who are exposed above the PEL/EL must be provided with clean change rooms, shower facilities, and lunchrooms. Change rooms must have two separate lockers – one for work clothing, the other for street clothing.

- Employees must shower at the end of the shift.

- Lunchroom facilities must have a positive-pressure filtered air supply and be accessible.

- The employer must ensure that employees wash their hands prior to eating, drinking, or smoking. Smoking is prohibited in regulated areas.

J: WHAT COMMUNICATION RESPONSIBILITIES DO BUILDING/FACILITY OWNERS AND EMPLOYERS HAVE?

The standard requires building/facility owners and employers of potentially exposed employees to institute the following practices:

- Treat thermal system insulation and sprayed-on and troweled-on surfacing materials as asbestos- containing materials, unless analyzed and found to contain no more than 1 percent asbestos (in buildings built before 1980).
- Treat asphalt and vinyl flooring materials installed up to 1980 as asbestos-containing, unless properly analyzed and found to contain no more than 1 percent asbestos.
- Train employees who may come in contact with asbestos to handle it safely.
- Inform employers of employees performing custodial/housekeeping activities of the presence and location of asbestos-containing materials and presumed asbestos-containing materials that may have contaminated the area.
- Keep records of the presence, location, and quantity of asbestos-containing materials and presumed asbestos-containing materials present in the building for the duration of ownership and transfer these records to a successive owner.

K: WHAT INFORMATION AND TRAINING IS REQUIRED?

- Employers must develop a training program for all employees who are exposed to airborne concentrations of asbestos at or above the PEL and/or EL. This training must be provided prior to or at the time of initial assignment and then yearly and include information on how employees can safeguard their health.
- Employers must provide an annual awareness training course for employees who do custodial/housekeeping operations in facilities where asbestos-containing materials or presumed asbestos-containing materials are present.
- The training must include the health effects of asbestos; locations, signs of damage and deterioration of asbestos-containing materials and presumed asbestos-containing materials; the proper response to fiber release episodes; and housekeeping requirements found in the standard.
- Training must be made available to employees on work time without cost and in a clearly understandable manner.

L: HOW CAN TRAINING BE ARRANGED?

- Required training can be obtained through a number of sources. Consultants or other means of obtaining required training may be used, provided that the training content meets the minimum requirements and trainers meet the criteria outlined in the standard. The PEOSH Program

recommends using consultants and training courses that are certified by the NJDHSS Environmental and Consumer Health Service.

- The PEOSH Program provides an overview of the Asbestos Standard. This educational document assists employers and employees in understanding the requirements of the standard.

M: WHAT ARE THE HOUSEKEEPING REQUIREMENTS?

- All surfaces must be kept as free as possible of accumulations of waste containing asbestos and/or asbestos dust.
- The preferred methods of cleanup are wet cleaning and/or vacuuming with HEPA filtered vacuuming equipment. Compressed air and dry sweeping must not be used.
- All spills and sudden releases of asbestos-containing materials must be immediately cleaned up.
- Sanding asbestos-containing floors is prohibited.
- Stripping of floor finishes must be conducted using wet methods and low abrasion pads at speeds lower than 300 rpm.

N: WHO NEEDS MEDICAL SURVEILLANCE?

- The employer must institute a medical surveillance program for all employees who are or will be exposed to airborne concentrations of asbestos at or above the PEL and/or EL.

O: WHAT MEDICAL SURVEILLANCE NEEDS TO BE DONE?

- All medical examinations and procedures must be performed by or under the supervision of a licensed physician.
- All medical examinations must occur at a reasonable time and place and be provided at no cost to the employee.
- Annual examinations must include a medical and work history; a complete physical examination with emphasis on the respiratory system, the cardiovascular system, and the digestive tract; a chest X-ray; pulmonary function tests; an Initial Medical Questionnaire (see 29 CFR Part 1910.1001 Appendix D, Part 1 of the standard); and any additional appropriate tests ordered by the examining physician.
- An abbreviated Periodic Medical Questionnaire (see CFR part 1910.1001 Appendix D, Part 2 of the standard) must be administered to employees who are provided periodic medical examinations.
- The employer must provide the examining physician with a copy of the standard and Appendices D and E; a description of the affected employee's duties relating to asbestos exposure; the employee's actual or anticipated exposure level; a description of personal protective and respiratory equipment used; and results of previous medical examinations.

- When the physician has completed the exam, he must supply the employer a written signed opinion that includes the medical examination results, whether the employee has any medical conditions that would place the employee at an increased risk from exposure to asbestos; any recommended limitations on employee use of personal protective equipment, a statement that the employee has been informed of their examination results, and a statement that the employee has been informed of the increased risk of lung cancer due to the combined effect of smoking and asbestos exposure.

- The physician is not to reveal to the employer specific findings or diagnoses unrelated to occupational asbestos exposure.

- The employer must provide a copy of the physician's written opinion to the affected employee within 30 days of its receipt.

P: WHAT RECORDS NEED TO BE KEPT?

- The employer must keep employee asbestos exposure records for 30 years.

- Medical surveillance records must be kept for the duration of employment plus 30 years.

- Employee training records must be kept for one year beyond the last date of employment.

- Building and facility owners are required to keep records about the presence, location, and quantity of asbestos containing material and presumed asbestos-containing material in the building and/or facility. These records must be kept for the duration of ownership and must be transferred to the subsequent owners.

7. HEAD PROTECTION

I. PRIMARY HEAD PROTECTION

A. All Mechanical Services & Design Inc. employees are required to wear hard hats meeting the ANSI Z89.1 standard, when on a construction site or exposed to hazards that would make one required. The hard hats shall have the company's name on the front of the hat. The hats shall be worn bill forward.

8. FALL PROTECTION

I. PRIMARY FALL PROTECTION SYSTEMS

A. Primary fall protection systems are preferred methods of fall protection and exhaustive efforts shall be taken to use them before restoring to secondary fall protection systems.

B. Primary fall protection systems provide working and walking surfaces in elevated areas which are free from floor openings, are equipped with standard guardrail system on all open sides and with closure apparatus for ladder openings, or other points of access, when required. These systems include but are not limited to scaffolds, aerial lifts, and other approved personnel lifting devices.

1. Standard guardrail system consists of a top rail approximately 42 inches above the working/walking surface, a mid rail approximately 21 inches above that surface and a 4-inch-tall toe-board mounted at the working surface. Upright support post spacing shall not exceed 8 feet, and the entire system must be capable of supporting 200 pounds force in any direction with minimum deflection. If chain, synthetic, fiber or wire rope is used as guard-railing, the maximum deflection when a load of 200 pounds is applied shall not exceed 3 inches in any direction including free hanging sag.

2. Floor openings/hole covers are used to close openings and holes in floors, platforms, and walkways. These covers shall be capable of supporting the maximum potential load they may be subjected to, shall completely cover the opening/hole, and be secured against accidental displacement.

3. Aerial lifts (boom, scissor, and snorkel types) and other vehicle mounted elevated work platforms shall be used in accordance with 296 CFR 1926.556, "Aerial Lifts", and ANSI A92.2. Employees riding in or working from these lifts shall secure their safety lanyards to the lift basket.

4. Systems must be capable of supporting at least 5,000 lbs.

5. Retractable lifelines shall be attached to supports capable of withstanding 5,000 of impact.

6. All equipment used in elevated work, shall be inspected by the user prior to each use. Defective equipment shall be immediately removed from service.

II. SECONDARY FALL PROTECTION SYSTEMS

A. Secondary fall protection systems are required when primary protection cannot be installed. Full body harnesses, anchorage points, shock absorbing lanyards or safety nets shall be utilized to provide 100% fall protection.

B. A secondary fall protection system consists of an approved full body harness, anchorage point and shock absorbing lanyards. This system shall be used in absence of primary systems when employees are working six (6) feet or more above the work surface. "Worn and used" means that the body harness shall have lanyards properly tied off to point or lifeline system with positive attachment 100% of the time.

a. Only full body safety harnesses and shock absorbing lanyards capable of supporting 5,000 pounds shall be used.

b. The tie off point must be at least shoulder level or higher and capable of supporting at least 5,000 pounds.

c. Lifeline systems are points of attachment for fall protection lanyards.

d. System must be capable of supporting at least 5,000 pounds.

e. Lifeline may be mounted either vertically or horizontally and is generally intended to provide mobility to personnel working in elevated areas.

1. Horizontal lifelines must be made of at least 5/8-inch wire rope properly supported to withstand at least 5,400 pounds impact and pulled tight enough to prevent deflection.

2. Horizontal lifelines shall be positioned so as to provide points of attachment at waist level or higher.

3. Vertical lifelines are used for fall protection when vertical mobility is required and may be comprised of static lifelines made of at least 5/8-inch nylon rope which is equipped with approved sliding rope grabs, or they may consist of self-retracting reel type lanyard/lifeline which are attached directly to a safety harness.

4. Retractable lifeline devices shall be attached to supports capable of withstanding 5,400-pound impact loading and shall be secured by means of shackles and wire rope chokers or synthetic.

5. Sliding rope grabs approved for the size rope used are the only method for securing a safety lanyard to a vertical lifeline.

6. Safety nets shall be used only when approved by the Safety Manager.

7. All equipment, used in elevated work, shall be inspected by the user, prior to each use. Defective equipment shall be tagged "DO NOT USE" and immediately removed from service.

9. RESPIRATORY PROTECTION

I. GENERAL

A. Purpose

1. To insure the protection of all employees from respiratory hazards through the use of engineering controls, administrative controls, and the use of respirators. When respirators are provided, they must be NIOSH Certified applicable and suitable for the purpose and exposure intended. Respirators, medical screening, fit testing, and training are required to be furnished to employees at no cost.

2. This program is required to be reviewed quarterly and updated as needed. Updates shall not exceed one year. Updates are based on medical evaluations and other historical data, including information from NIOSH and shall be site specific.

3. To ensure compliance with 29 CFR 1926.55 and 1926.103, incorporating 29 CFR 1910.94 and 1910.134.

II. Responsibility

A. The Safety Manager (or designee) is responsible for all facets of this program.

B. Only the Safety Manager (or designee) may change these procedures.

C. The Safety Manager, supervisor or management is authorized to halt any operation where a respiratory hazard presents a danger of serious personal injury.

D. The Safety Manager will be qualified as far as knowledge of the complexity of this program and be current in his/her training,

III. Procedure Elements

A. Hazard determination

B. Engineering controls

C. Administrative controls

D. Respirator selection

E. Physical fitness determination

F. Instruction

G. Fit testing

H. Respirator use, including limitations

I. Respirator Cleaning and Storage

J. Monitoring

K. Recommendations

L. Restrictions

a) Employees will not use respirators furnished by another employer. The company will not furnish respiratory protection to the employees of another company.

b) No employee may issue any respirator protection to anyone other than company employees.

c) No employee may fit-test or instruct employees of other companies.

M. These procedures are intended for the exclusive use of Mechanical Services & Design Inc. and make no recommendation of these procedures to any other employer. Subcontractors are required to have their own written program.

IV. HAZARD DETERMINATION

A. Unidentified hazards

1. Contaminants/hazards must be identified. Mechanical Services & Design Inc. Employees and any subcontractors are required to identify hazards, select and provide respirators based on those hazards and factors affecting performance. The brand of any respirator and models must be listed. By using historical data, estimates shall be used when real time detection is not available. Until this is accomplished then exposures shall be addressed as Immediately Dangerous to Life and Health (IDLH). IDLH conditions require SCBA/SAR. All respirators shall be NIOSH approved.

B. Known hazards

1. Level of contamination must be established.

2. Permissible exposure limit must be determined.

3. Oxygen level in work area must be determined.

a) Employer can require Respirators be worn at any time.

V. ENGINEERING CONTROLS

A. Removing or containing the hazard must be attempted before respirator use is Considered.

B. Respirator use is permitted only when engineering controls are not feasible, during engineering controls installation, or in emergency situations.

C. Engineering controls examples: exhaust hoods, forced air ventilation, piping, blinds, vessel or tank purging or containment structures.

VI. ADMINISTRATIVE CONTROLS

A. Evaluate the chemical products that workers must use.

1. Ensure that workers use only that product which presents the least respiratory hazard and still does the job.

2. Ensure that the Time Weighted Average (TWA) for worker exposure does not exceed the Permissible Exposure Limit (PEL).

a) Examples: Substitute a non-asbestos gasket for gasket containing asbestos; if permitted, set amount of time a worker might spend in a problem area during the workday.

VII. RESPIRATOR SELECTION- 1. Respirators shall be used only after engineering and administrative controls cannot control the hazard below action levels, permissible exposure limits and IDLH environments, including oxygen deficiency. Emergency situations can occur where respirators may be applicable. Only trained workers with proper respiratory protection shall be involved in these situations. All respirators shall be NIOSH approved.

A. Selection Table

HAZARD	RESPIRATOR
Oxygen Deficiency (<19.5%)	Self-contained breathing apparatus (SCBA). Hose masks with blower. Combination airline respirator (ALR) with auxiliary self-contained air supply or air-storage receiver with alarm.
Gas and vapor contaminants immediately dangerous to life and health (IDLH).	SCBA. Hose mask with blower. Air-purifying piece respirator with chemical canister (gas mask). Self-rescue mouthpiece respirator (for escape only). Combination ALR with Auxiliary self-contained air supply or air-storage receiver with alarm.

Gas and vapor not IDLH.	ALR. Hose mask with blower. Air purifying, half-mask or mouthpiece respirator with chemical cartridge.
Particular contaminants IDLH Particulars not IDLH	SCBA. Hose mask with blower. Combination ALR with auxiliary self-contained air supply or air-storage receiver with alarm. Air-purifying full-face piece with appropriate filter. Self- rescue mouthpiece respirator (for escape only). Air purifying half-mask or mouthpiece respirator with filter pad or cartridge. ALR. Airline abrasive blasting respirator. Hose mask without blower.
Combination gas, vapor, and particulate contaminants IDLH Combination gas, vapor and particulate not IDLH	SCBA. Hose mask with blower. Air-purifying full-face piece respirator with chemical canister and appropriate filter. Self-rescue mouthpiece respirator (for escape only). Combination ALR with auxiliary self-contained air supply or air- storage receiver with alarm. ALR. Hose mask with blower. Air purifying half-mask or mouthpiece respirator with chemical cartridge and appropriate filter.

VIII. For respirator selection, IDLH (immediately dangerous to life and health) is defined as a condition that either posed an immediate threat to life and health or an immediate threat of severe exposure to contaminates, such as benzene, which are likely to have adverse delayed effects on health.

A. Selection must be specific to the hazard.

1. Canisters, cartridges, or single use respirators must state that they are designed for use against either the identified contaminant or the group to which it belongs.

2. The limitations of the respirator and the effective life of any filter medium must be considered.

3. Characteristics of the hazardous operation must be considered.

4. The location of the hazardous area must be considered.

5. The period of time that workers must spend in the hazardous area must be considered.

B. Only NIOSH approved respirators may be used.

1. Employee acceptance of a particular respirator model will be considered:

a) Discomfort

b) Breathing resistance

c) Respirator weight

d) Interference with vision or work

IX. PHYSICAL FITNESS DETERMINATION

A. The worker must be physically and psychologically capable or performing the assigned work and of wearing the selected respirator.

B. Mechanical Services & Design Inc. shall provide a medical evaluation to determine the employee's ability to use a respirator before the employee is fit tested or required to wear a respirator.

1. A PLHCP must evaluate each employee who is required to wear a respirator. The PLHCP will rate the employee's ability to wear a respirator. These evaluations shall be confidential, understandable and the employee shall be given a chance to discuss the results the PLHCP.

2. Unless PLHCP grants approval, no employee will wear a respirator except for emergency escape.

3. If an employee refuses to complete the questionnaire, the Safety Manager will be contacted.

X. TRAINING

A. Each employee required to wear a respirator will be trained in the use and limitations of that respirator. Training will be made available before use. Retraining shall occur when a new or different respirator or type of respirator is used. Annual retraining for Respiratory Protection is required.

B. Instruction will be given for every respirator that an employee will be required to wear prior to use.

C. Instruction will include:

1. The nature, extent, and effects of respiratory hazards
2. Respirator capabilities, limitations
3. Donning and doffing
4. Proper respirator selection, use, maintenance, and storage
5. Fitting instructions
6. Fitting demonstrations
7. Practice wearing the respirator
8. Field fit check procedures
9. Conditions which prohibit respirator use
10. Medical signs and symptoms of respirator leakage
11. Emergency procedures

D. The instruction session will provide the employee with the opportunity.

1. To handle the respirator
2. To have it fitted properly
3. To test its face-to-mask seal
4. To wear it in normal air for a sufficient time to become familiar with it
5. To wear it in a test atmosphere

E. Management training will additionally include

1. Hazard determination
2. Basic respiratory protection practices
3. Issuance of respirators
4. Regulations concerning respirator use
5. Instruction will be repeated at least annually

XI. FIT TESTING

A. A qualitative or quantitative respirator-fitting test will be used to determine the ability of each individual to obtain a satisfactory fit with a negative-pressure respirator.

B. All employees required to wear a negative-pressure respirator will have each respirator they will use fit tested by one of the approved protocols.

1. Qualitative Negative-pressure Respirator Protocols

PROTOCOL	RESPIRATOR
1. SACCHARIN	Any respirator equipped with a particular filter
ISOAMYL ACETATE (Banana Oil)	Respirator with organic vapor cartridges or face piece which protects against organic vapors
3. IRRITANT SMOKE	Respirator with acid gas/high efficiency cartridges or face piece, which offers the same protection. NOTE: Irritant smoke may cause eye irritation. Care should be taken to keep the smoke from the employee's eyes.

For details of these protocols see Appendix B

C. Under no circumstances will any employee be allowed to use any respirator if the results of the fit test indicate that the employee is unable to obtain a satisfactory fit with that respirator.

D. The Safety Manager will be contacted if none of the available respirators will properly fit an employee who is required to wear a respirator.

E. No employee will be fit tested if beard stubble, sideburns, mustache or other facial hair interferes with the face piece seal or valves.

F. No employee will be fit tested for a full-face piece respirator if prescription eyeglasses are required for that person to safely perform the work or to see visual warnings given by a signalman.

G. The fit test portion of the Medical Questionnaire/Fit Test Form will be completed. The following must be recorded:

1. The respirator models and sizes tested

2. Both successful and unsuccessful tests

3. The protocols used

4. Date

5. Tester's signature

6. Employee's signature

H. Fit tests will be repeated at least annually

1. More frequently if there is a change in facial configuration.

2. Things that can affect the seal must be prohibited. This shall include facial hair, glasses, certain skin features, etc.

XII. RESPIRATOR USE

A. Manufacturer's recommendations for the proper use of respirator's will be followed.

1. The wearer will inspect the respirator immediately before donning.

2. Defective respirators will be returned

3. Field fit checking will be performed each time a respirator is donned.

4. Negative-pressure respirators will be fit checked by negative pressure or positive pressure seal checks as recommended by the manufacturer.

5. Pressure demand respirators will be fit checked by checking for air leaking around the face piece.

6. No employee will enter the hazardous area until the respirator is properly fitted.

B. All SAR's and SCBA's shall use Grade D breathing air or better. Compressor shall be located in a clean atmosphere, with in-line purification and tagged to indicate date or change out. A carbon monoxide monitor shall be in place and set to alarm at 10PPM or monitored frequently. Fittings shall be incompatible for non-respirable gasses and containers.

C. If an employee experiences any difficulty with a respirator, that person will leave the hazardous area immediately. Examples of difficulties:

1. Smell or taste a substance through the respirator

2. Experience increased difficulty breathing

3. Dizziness

4. Increase heart rate

5. Claustrophobia

6. Other distress

D. Any difficulty fitting or using the respirator will be immediately reported to supervision.

E. No employee will remove the respirator in the hazardous area until that area has been certified to be free of dangerous levels of contaminants.

F. IDHL atmospheres

1. At least one standby person shall be present in the safe area.

2. The standby will have the proper equipment available to assist the respirator wearers in case of emergency.

3. Adequate and clear communication will be maintained between the standby and the respirator wearers.

4. Employees wearing respirators in IDLH atmospheres will have a safety harness and lifeline or equivalent provision for removing them to the safe area in case of an emergency.

G. Confined Space

1. No employee will enter a confined space without an entry permit.

2. All the personal protective equipment, including respirators, specified on the permit will be worn.

3. At least on standby person shall be present outside the confined space.

4. The standby will have the proper equipment available to assist the workers inside in case of emergency.

5. Communication will be maintained between the standby and the workers inside the confined space.

6. When an employee is wearing an air-line-type or hose-type respirator in a confined space, the level of respiratory hazards in the atmosphere or the confined space will be monitored.

H. IDLH atmospheres in confined spaces

1. Only a positive-pressure self-contained breathing apparatus or combination position-pressure airline respirator with auxiliary self-contained air-supply will be used.

2. An oxygen-type SCBA will not be worn in a confined space where the possibility of fire or explosion hazard is increased.

3. The standby will be equipped with an SCBA or equivalent.

I. RESPIRATOR CLEANING, STORAGE AND REPAIR

1. Respirators will be cleaned and sanitized after each use. Follow Appendix B or Manufacturer's procedures.

   a) Strong cleaning and sanitizing agents and many solvents can damage respirator parts. These agents must be used with caution.

   b) High temperatures (>120F) may damage respirator parts.

   c) Respirators may be washed in a detergent solution and sanitized with the following in a 2-minute immersion:

      (1) A hypochlorite (bleach) solution of 50 PPM

      (2) An aqueous iodine solution of 50 PPM

      (3) A quaternary ammonia solution 200 PPM (adjusted to the hardness of the water).

   d) Sanitizing solutions will be completely rinsed from the respirator.

2. Each respirator will be inspected to determine if it is in good working order.

3. Respirators will be stored in a manner that will protect them from dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals.

   a) Respirators will be stored in a manner that does not distort the face piece.

4. Only qualified personnel will make repairs to respirators.

5. Respirators shall be made available for Emergency use. Then shall be kept in clean, sanitary containers where they cannot be damaged. For Escape only respirators-checked daily and carried in for use.

XIII. RESPIRATOR PROGRAM MONITORING

A. Frequent random inspections will be made by the Safety Manager to insure that:

1. Proper respirators are selected
2. Respirator wearers are properly trained
3. Correct respirators are issued and used
4. Respirators are worn properly
5. Respirators are in good working condition
6. Respirators are inspected and maintained properly
7. Storage is satisfactory
8. Medical surveillance is carried out
9. Respiratory hazards are monitored

XIV. RECOMMENDATIONS

A. Anticipate respiratory protection needs so that the proper protection is on the job before the need arises.

B. Plan the work so that a minimum amount of time is spent in the hazardous area.

C. Make sure that all the tools required to do the task are on hand before workers enter the hazardous area.

D. Make sure that only previously qualified workers are assigned to the task in the hazardous area.

E. Schedule the hazardous area work so that nearby working areas will not be disturbed.

F. Before work begins, establish who will do the hazard determination.

G. Make sure that competent and qualified people are assigned to issuing, inspecting, cleaning and storage respirators.

H. To verify written program effectiveness, employees must be asked about fit, selection, use, maintenance, etc.

I. Consider single use respirators to avoid the cleaning, storage, and maintenance procedures.

J. Make sure that manager's supervising respirator wearers are qualified for respirator use even if the manager is not required to wear use a respirator for the task.

K. Recordkeeping shall be maintained for all medical records, fit testing records, exposure records, incidents, and types and models of respirators used. These records shall be kept in the Safety Managers office.

10. HEARING PROTECTION

- **Required for all employees exposed to an 8-hour time-weighted average (TWA) of 90 dBA or greater.**
- **The Hearing Conservation Program (HCP) must include the following:**

A. NOISE MONITORING

- A complete and up-to-date noise survey must be on record.
- Monitoring must be repeated whenever a change in production process, equipment or controls increases noise exposures enough to affect the HCP or hearing protection policies.
- Employees in the HCP must be informed of the results of monitoring.

    a. If the employee is currently wearing hearing protection that does not offer adequate protection, then different protective devices with greater noise reduction must be provided.

    b. Hearing protection fit will be checked, the employee refit if necessary and retrained in the proper use and care of hearing protection.

B. HEARING PROTECTION DEVICES

1. Hearing protectors must be made available to all employees exposed to 90 dBA TWA or greater.
2. Use of hearing protectors is mandatory for employees in the hearing conservation program who:

    (1) Are exposed too greater than 90 dBA TWA.

    (2) Have demonstrated a Standard Threshold Shift.

    (a) Employees have the opportunity to select their hearing protectors from a variety of suitable types provided by the company. The minimum variety is usually considered to be one earplug or one earmuff.

    (b) Hearing protectors must adequately reduce the workplace noise exposure of each employee.

    (c) Hearing protection shall be worn when cutting/welding.

OSHA PERMISSIBLE NOISE EXPOSURES DURATIONS PER DAY HOURS	SECOND LEVEL dBA SLOW RESPONSE
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
½	110
¼ or less	110
NOTE: Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.	

11. SCAFFOLDS / AERIAL LIFTS

1. General Requirements

*NOTE: See Instruction #8 Fall Protection for additional requirements concerning fall protection.

A. The footing or anchorage for scaffolds shall be sound, rigid and capable of carrying the maximum intended load without settling or displacement
B. Guardrails and toe boards shall be installed on all open sides and ends of scaffold platform more than four feet above the ground or floor.

    a. Top rails shall be installed approximately 42 inches above the working or walking surface, a mid rail approximately 21 inches and toe board mounted at the working surface four inches tall.

C. Scaffolds shall be provided with an access ladder of equivalent safe access. Employees shall not climb or work from scaffold handrails, mid rails or brace members.
D. When freestanding manually propelled mobile scaffolds are used, the height shall not exceed four times the minimum base dimension.
E. To prevent movement, the scaffold shall be secured to a structure at intervals not to exceed 30 feet horizontally and 26 feet vertically.
F. Cross bracing shall not be used in place of standard guard railing.
G. Competent person prior to use shall inspect all scaffolds.
H. Employee working from suspended scaffolds shall be equipped and use full body harnesses with lanyard attached to a vertical lifeline by a rope grab of same size.
I. Employees shall be trained on scaffold safety prior to use.
J. The scaffold inspection form must be completed before climbing scaffolding. See attached.
    a. Scaffolding shall be erected and dismantled under the direct supervision of a Competent Person.
    b. All scaffolding used must be intact, in good condition, and be free of damage.
    c. All planking used must be scaffold grade and free of splits greater than 12 inches long and 1/8 of an inch wide.
    d. Unless planking is secured, it must extend a minimum of six inches over bearers, but not to exceed twelve inches.
    e. All erected scaffolds must have safe access.
    f. All scaffolds must be kept free of excess debris and slippery substances
    g. Scaffolds must be erected plumb and level. All X-Braces must be in place at all times.
    h. All scaffolding platforms must have an 18-inch minimum width.
    i. All scaffolds must be kept away from energized or unguarded power lines.
    j. If a scaffold is erected over walkways or traffic areas, 18-gauge (or equivalent) screen must be in place to prevent items from falling off the scaffold.
    k. Mudsills shall be used for scaffold footing. Block, brick, and similar items must not be used.
    l. If the width of a scaffolding platform is less that 45-inches, a guardrail must be used at 4 feet.

m. Lock-pins shall be used.
n. If a scaffold exceeds 26 feet in height or 30 feet in horizontal length, it must be secured to the building or structure.
o. Scaffold components must be capable of supporting 4 times the intended workload without failure.
p. Lean-to or shore scaffolds are prohibited.
q. Fall protection must be used with scaffolding according to current fall protection regulations. (See Policy: FALL PROTECTION)
r. MANUALLY PROPELLED MOBILE SCAFFOLDS must be used with the following guidelines:
    i. Manually propelled mobile scaffolds shall not be built higher than 3 times their minimum base dimension.
    ii. Horizontal bracing must be in place to prevent "racking" even if manufactured platforms are used.
    iii. The supporting casters must have operating locks. These locks must be engaged when the scaffold is occupied.
    iv. Mobile scaffolds must be fully planked.
    v. When moving the scaffold, special care must be used to avoid striking piping, electric lines, or other obstructions.
    vi. Prior to moving a scaffold, tools, materials, and equipment should be secured or removed from the platform.
    vii. All personnel are prohibited from riding a moving scaffold.

K. SELF-PROPELLED MOBILE SCAFFOLDS (articulating boom, vertical tower, etc.) must be used with the following guidelines:
    a. Operation of a self-propelled mobile scaffold must be performed by an authorized or trained person.
    b. The upper and lower controls must be legibly marked as to their function and must be inspected before use.
    c. All personnel using the scaffold must wear a harness (when required) with the lanyard attached to the boom or basket, not to adjacent structures or equipment.
    d. Pinch points must be guarded or barricaded to prevent entanglement.
    e. A safety device must be in place to prevent movement unless the platform is lowered to a height less than twice the width of the wheelbase.
    f. Guardrails must be in place with the gate(s) closed during operation.

L. SUSPENDED SCAFFOLDS must be used with the following guidelines:
    a. Suspended scaffolds must be securely anchored using devices capable of sustaining 4 times the intended workload.
    b. Suspension ropes (wire, synthetic, or fiber) must be capable of sustaining 6 times the intended workload.
    c. The work platform must be at least 20-inches wide with a maximum of 36-inches.
    d. The platform must be lashed to the building or structure to prevent it from "swinging".
    e. Personnel using a suspended scaffold must use a body harness attached to an individual lifeline.

M. LADDER JACK SCAFFOLDS must be used with the following guidelines:
    a. Ladder jack scaffolds must only be used for light-duty purposes

b. The height must not exceed 20 feet
c. Heavy duty (Type "1A") ladders must be used to support the platform and workload
d. The ladder jack shall bear on the side rails. If this is not possible, then 10 inches of bearing on the rung is necessary
e. The platform used must be a minimum of 18-inches wide
f. If wood planks are used, they must be supported every 8 feet

N. METAL-BRACKET AND FORM SCAFFOLDS must be used with the following guidelines:
   a. Metal-bracket and form scaffolds must be secured in place by welding or being bolted in place
   b. Clip-on or hook-over brackets may only be used if the form walers are secured in place
   c. The maximum span is 8 feet
O. STILTS must be used with the following guidelines:
   a. Stilts must be equipped with skip-resistant feet
   b. Stilts may not be adjusted to a height exceeding 24 inches

SCAFFOLDING INSPECTION FORM

AREA:_____INSPECTION DATE: _____

PERFORMED BY: _____

DESCRIPTION	STATUS	CORRECTIVE ACTION
Design to withstand four times maximum intended load		
Scaffold access by ladder		
Guard rails for scaffolding above 6 feet (CRM Policy) a) Top rail – 42 inches b) Mid rail – 21 inches c) Toe board – 4 inches		
Standard Guard Rails a) Wood Rail - 2x4-construction grade. Post not to exceed 8 feet on center. b) Pipe Rail – 1.5-inch diameter steel pipe. Post not to exceed 8 feet on center. c) Metal Rail – 2x3/8-inch angle iron. Post not to exceed 8 feet on center.		
GUARD RAIL STRENGTH All material used capable of withstanding a minimum loading of 200 pounds in any direction.		

FOOTING Sound, rigid and capable of carrying maximum intended load without settlement or dislodging.		
POLES, LEGS, UPRIGHTS Plumb and securely and rigidly braced to prevent displacement		
PLANKING Scaffold grade not less than 2-inch nominal thickness		
LAPPED PLANKING Each member overlapped a minimum of 12 inches extended over their bearers not less than 6 inches or more than 12 inches		
WIDTH Not less than 18 inches wide		
OVERHEAD PROTECTION When employees working on scaffold are exposed to falling objects		
SCAFFOLD ENCLOSURES Scaffold enclosed on all open sides and ends where persons work under scaffolding or where scaffold is above an access way		
SECURING Scaffold secured and braced to structure: a) every 30 feet horizontally b) every 26 feet vertically		

SWING SCAFFOLDING

PLATFORMS Not less than 20-inches or more than 36-inches wide. Secured to hangers by U-bolts.		
ROOF IRONS OR HOOKS Constructed of mild steel. Securely installed and anchored.		
The backs installed as a secondary means or anchorage and secured to structurally sound portion of building.		
All ropes, slings, hangers, and platforms inspected before installation and while in use.		
No more than 2 workers on scaffold designed for 500-pound working load.		
No more than 3 workers on scaffold designed for 750-pound working load.		
Each worker protected by safety lanyard or harness attached to lifeline.		
Lifeline attached to structure and not to scaffold.		

A - ACCEPTABLE

C - CORRECTIVE ACTION NEEDED

N/A - NOT APPLICABLE

2. Aerial Lifts

A. No modification or alteration of any Aerial Lift shall be made without prior written approval from the manufacture.

B. Inspections shall be performed pre-shift every working day including general, and all functional controls described in the operator manual.

   a. A written checklist shall be utilized for these inspections.

   b. More detailed inspections shall occur monthly, quarterly and

   c. an annual inspection shall be performed by a qualified person, mechanic or lift manufacturer representative.

C. A survey of the work area shall be performed. This survey will act as a hazard assessment for safe lift operations. This survey will include but not limited to, ground conditions for slopes, bumps, manholes, obstructions, debris, and adequate surfaces to support the lift.

D. Each Aerial Lift shall have a current copy of the operator manual and the current ANSI Standard for that particular Lift.

E. Aerial Lifts shall be operated by Certified and authorized personal only.

F. Loads limits shall be posted and not exceeded at any time.

G. Aerial Lifts shall have a working back up alarm and or have a spotter when applicable.

H. Keep all equipment at least 10 feet from energized power lines.

I. Always keep feet on the floor of the basket.

J. Proper Fall Protection shall be worn by the User and attached to a proper anchorage point when required. This could be a full body harness with a lanyard, retractable lifeline or other fall restraint device.

K. Only charge Aerial lift batteries in a safe well-ventilated area.

L. Aerial lifts must be equipped with a functioning emergency stop and emergency lowering device. Employees are to be trained on these functions.

M. Any modifications or alterations made to the lift must before being made, be approved in writing by the manufacturer.

3. 11.3 Aerial Lift Training

A. Aerial lift operators/trainees must be trained by a qualified person that is familiar with the aerial lift used in training.

B. They must be trained in a safe location in order to become familiar with that particular lift.

C. Trainees must be given and made aware of their duties and responsibilities as an operator.

D. Training will always include classroom, situational awareness, and a hands-on evaluation for all types of equipment.

E. Training will expire three years from the original date of training. Refresher training will be done as needed.

4. Safe Use

A. There shall be a 10 feet minimum distance for the lift or any object on the lift from coming into contact with energized conductors up to 50KV. For ratings over 50kv the user shall add .4 inches for every 1kv over. It is recommended that for voltages over 50kv, a distance of 35 feet should be used.

B. Aerial Lifts shall not be used as cranes. Most have an unrestricted capacity of 500 lbs. Some have a restricted capacity of 750. Know your equipment and its limitations.

C. Only properly secured tool and material that can be safely handled by the operator are permitted to be moved by the lift.

D. Employees are not to leave an elevated platform unless it is through the gate with 100% fall protection. Use manufacturer's instructions.

E. Follow the current ANSI and manufacturer's recommendations.

12. FLOOR & WALL OPENINGS / BARRICADES

General Requirements

A. A standard railing and toe-boards or cover shall guard floor coverings. In general, the railing shall be provided on all exposed sides, except at entrances to stairways.

i. Ladder way floor openings or platforms shall be guarded on all exposed sides, except at entrance to opening, with the passage through the railing either provided with a swinging gate or so offset person cannot walk directly into the opening.

ii. Hatchways and chute floor openings shall be guarded by one of the following:

iii. Hinged covers and a standard railing with only one exposed side.

iv. A removable standard railing with toe-board on not more than two sides and fixed standard railings with toe boards on all other exposed sides.

v. Wall openings, from which there is a drop of more than four feet, and the bottom of the opening is less than three feet above the working surface, shall be guarded as follows:

a. A standard rail if that will effectively reduce the danger of falling. If the bottom of a wall opening is less than four inches above the working surface, a toe-board or an enclosing screen shall also be provided.

b. A standard railing or equivalent shall guard every open-sided floor or platform four feet or more above adjacent floor or ground level. A toe-board shall be provided wherever, beneath the open sides, persons can pass or there is moving machinery or there is equipment with which falling material could create a hazard.

Standard Specifications

A. Standard railing shall consist of top rail, intermediate rail, toe-board, and posts, and shall have a vertical height of approximately 42 inches. Reference 29 CFR 1910.23 (e)(1), 1926- 500 (f)(1).

a. The intermediate rail shall be halfway between the top rail and the floor, platform runway or ramp.

b. Posts shall be spaced not more than eight feet on centers.

c. A completed railing structure shall be capable of withstanding a load of at least 200 pounds applied in any direction at any point on the top rail, with a minimum of deflection.

B. A standard handrail shall be of a construction similar to a standard rail except that it is mounted on a wall or partition and does not include an intermediate rail. Reference 1910.23 (e)(4)(ii), 29 CFR 1926-500 (f)(4)).

   a. The height of handrails shall be not more than 34 inches nor less than 30 inches from top surface to tread or ramp.

   b. 2.Handrails and railings shall be provided with a clearance of approximately three inches between the rail and any other object.

C. Floor opening covers shall be of any material that meets the following strength requirements: (Reference 1910.23 (7)(i)(ii)(iii), 29 CFR 1926.500 (f) (5)).

   a. 1.The cover, when located in roadways or vehicular aisles, shall be designed to carry a truck rear axle load of at least two times the maximum intended load.

   b. 2.The floor opening cover shall be capable of supporting the maximum intended load and so installed as to prevent accidental displacement.

   c. Wall opening protection shall meet the following requirements: (Reference 1910.23 (a)(1), 29 CFR 1926.500 (f) (7)).

D. Barriers shall be of such construction and mounting that, when in place, they are capable of withstanding a load of a least 200 pounds applied in any direction (except upward) with a minimum deflection.

Low-Pitched Roof Perimeters

A. During the performance of built-up roofing work on low-pitched roofs, employees shall be protected at all open sides and edges as follows:

B. Employees working in a roof-edge material handling or materials storage area, located on a low-pitched roof, shall be protected from falling by the use of a motion-stopping-safety system along all unprotected sides and edges.

Barricades

A. Install and maintain signs, signals, and barricades to detour passage of persons and vehicles at location where potential hazards exist.

   1. Barricades must be 42 inches high, square, and level

   2. Barricades should be kept four feet back from the edge of excavations, holes, and platforms and six feet back from the edge of low-pitched roofs.

   3. Barricades with flashing lights shall be provided at night.

DEFINITIONS

Motion-stopping-safety systems: Fall protection using the following equipment singly or in combination:

a. Standard railings

b. Scaffold or platforms with guardrails

c. Safety nets

d. Safety harness systems

13. HOUSEKEEPING

Governmental Requirements

29 CFR 1910.141, "Sanitation", and 1926.35, "Housekeeping".

General Requirements

A. A high standard of housekeeping on the job location at all times as an integral part of the work. The purpose of this requirement is to ensure the safety of all personnel entering the job location.

B. Every effort will be made to keep wastes, trash, and scrap materials to a minimum.

C. The following requirements represent the minimum acceptable standard or housekeeping.

1. Daily clean-up of work, fabrication and personnel areas are required.
2. All equipment and in plant materials shall be stored in an orderly manner in storage areas.
3. All designated lay-down areas utilized for temporary storage of materials not in use shall be properly barricaded.
4. All scrap materials and waste shall be picked up and disposed of at least daily. Debris is to be placed into waste containers provided and recycled when available. Each employee shall be made aware of the proper disposal methods.
5. Form wood and other lumber shall be neatly stored when not in use. All nails shall be removed or bent over to prevent puncture wounds.
6. Stairways, walkways, ladder cages and scaffolds shall be kept clear of all cords, cables, hoses, materials, and anything else that might hinder personnel access.
7. Cords, cables and hoses at stairways, walkways and scaffolds shall be supported at least seven feet overhead or laid flat outside of walkways.
8. All spills of oil, solvents, chemicals, and any regulated liquids shall be reported immediately. Dumping of these materials into floor drains, sanitary sewers, storm sewers, drainage ditches or other open ground is forbidden.
9. Keep all location roads free from all debris resulting from their performance of the work.
10. Storage of combustible and flammable materials shall not be located under overhead pipelines and utilities.
11. Loose materials on roofs or other overhead structures shall be removed or secured to prevent being blown or bumped off.
12. Accumulation of materials that may create a fire hazard shall not be permitted.
13. Storage of materials shall be at least eight feet from the center of railroad tracks.

14. HOT WORK - WELDING, CUTTING, & BRAZING

General Requirements for Fire Watch

1. Locations where other than a minor fire might develop
2. Combustible materials closer than 35 ft. to point of operation
3. Combustibles that are 35 ft. or more away but are easily ignited
4. Where there are wall and floor openings within a 35' radius of the hot work
5. Combustible materials area adjacent to the opposite side of partitions, ceilings, or roof

General Requirements

1. A hot work permit shall be required for welding, cutting and brazing operations unless the area where the hot work is being performed has been inspected, is free of fire hazard and has been identified as a "permit not required" area.
2. Suitable fire extinguishing equipment shall be immediately available in all welding, cutting and brazing work areas.
3. A fire watch shall be provided as required by location procedures and shall be maintained for at least 60 minutes after completion of the job.
4. Objects to be welded, cut, or heated shall be moved to a designated safe location, or, if they cannot be readily moved, all movable fire hazards in the vicinity shall be taken to a safe place. If fire hazards cannot be removed, positive means shall be taken to confine the heat, sparks, and slag and to protect the immovable fire hazards from them.
5. Spark containment shall be utilized during all welding, burning, and grinding operations. Spark containment may include laying fire blankets, placing barricades, totally enclosing the spark producing operation, or by the use of fire watch. Employees working around or below the welding, burning, or grinding operation shall be protected from falling or flying sparks.
6. Welding, cutting, and heating may normally be done without mechanical ventilation or respiratory equipment, but where an unsafe accumulation of contaminants exists, suitable mechanical ventilation or respiratory protective equipment shall be provided.
7. Whenever welding, cutting, or heating is performed in a confined space, exhaust ventilation shall be provided. When sufficient ventilation cannot be provided, airline respirators shall protect employees.
8. First aid equipment shall be available at all times.

Gas Welding and Cutting

1. All hoses and torches in use carrying acetylene; oxygen, fuel gas or any substance, which may ignite or be harmful to employees, shall be inspected at the beginning of each working shift. Defective hoses and torches shall be tagged "Do Not Use" and immediately removed from service.

2. Torches shall be lighted from friction lighters and not by matches, cigarette lighters, or from hot work.

3. Directional gas flow fittings (flash backs) shall be provided on hoses to prevent reverse gas flow or back flow.

4. Torches shall be turned off and removed from confined spaces when not in use.

Arc Welding and Cutting

1. Arc welding and cutting operations shall be shielded by non-combustible or flameproof screens which will protect employees and other persons working in the vicinity from the direct rays of the arc.

2. Arc welding and cutting cables shall be of the completely insulated, flexible type, capable of handling the maximum current requirements of the work in progress. Cables in need of repair shall not be used.

3. When the welder or cutter has occasion to leave work or to stop work for any appreciable length of time, or when the welding or cutting machine is to be moved, the power supply switch to the equipment shall be opened.

a. Ground connections shall be made directly to the material being welding.

b. If, after welding and the operator must leave his station, he shall mark the item which was welded and still hot as "HOT" with a paint stick or a sign stating the material is still "HOT".

15. SLINGS, CHAINFALLS, & COME-ALONGS

Governmental Requirements

Shall comply with all requirements of 29 CFR 1910.184, "Slings", 1926.251.

A. Slings

a. Slings shall not be loaded in excess of their rated capacities.

b. Slings shall be padded or protected from sharp edges of loads and shall not be pulled from under a load when the load is resting on the sling.

c. Each day prior to use, slings and all fastenings and attachments shall be inspected for damage or defects. Damaged or defective slings shall be tagged "Do Not Use" and immediately removed from service.

d. Wire rope slings shall be removed from service if any of the following conditions are present:

i. Ten randomly distributed broken wires in one rope lay or five broken wires in one strand in one rope lay.

ii. Wear or scraping of one-third the original diameter of outside individual wires.

iii. Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure.

iv. Evidence of heat damage.

v. End attachments that are cracked, deformed, or worn.

vi. Hooks that have been opened more than 15 percent of the normal throat opening measure of the narrowest point or twisted more than 10 degrees from the plane of the unbent hook.

e. Corrosion of the rope or end attachments.

f. Acid or caustic burns.

g. Melting or charring of any part of the sling surface.

h. Snags, punctures, tears, or cuts.

i. Broken or worn stitches.

j. Distortion of fittings.

B. Chain falls and Come Alongs

a. Safety latches shall be installed and functional on hanging hooks and load hooks.

b. Chains, cables, and hooks shall be in good physical condition.

c. Hanging hooks shall be free to pivot when lifting or pulling a load.

d. Load chains and cables shall not be used as slings.

e. Capacities of chain-falls and come alongs shall be inspected annually, and the most recent inspection date shall be clearly indicated on the equipment.

16. HAND & POWER TOOLS

Governmental Requirements

29 CFR 1910.242,243 and 244, "Hand and Portable Powered Tools and Equipment", and 1926 Subpart I, "Tools—Hand and Power".

General Requirements

A. All portable power tools, electrical cords and pneumatic hoses shall be maintained in good condition and proper working order. Faulty or damaged tools, cords and hoses shall be tagged "Do Not Use" and removed from service immediately.

B. When power-operated tools are designed to accommodate guards, they shall be equipped with the manufacturer's guards in operable and original condition, when the tool is in use.

C. Cords and hoses shall be protected from damage and shall be routed through the job location such that they are not tripping hazards.

D. Employees using portable 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 and use the particular personal protective equipment necessary to protect them from the hazard.

Tools

A. Electric power operated tools and power cords shall have the third wire ground whole and in place. Double insulated tools shall be clearly marked. Protection against electrical shock shall be ensured by using:

   a. All 120-volt single-phase, 15-and 20-ampere receptacle outlets, which are not a part of the permanent wiring of the building or structure, and which are in use by

employees, shall have approved ground-fault circuit interrupters for personnel protection.

b. All electric powered hand operated tools and power cords when used shall have approved ground-fault circuit interrupters for personal protection.

B. Pneumatic power tools shall be secured to the hose or whip by some positive means to prevent the tool from becoming accidentally disconnected. Tools shall not be hoisted or lowered by their hoses.

a. All pneumatically driven nailers, staplers and other similar equipment provided with automatic fastener feed, which operate at more than 100 psi pressure at the tool, shall have a safety device on the muzzle to prevent the tool from ejecting fasteners, unless the muzzle is in contact with the work surface.

C. Power-actuated tools shall be operated only by employees who have been trained in the operation of the particular tool in use. Reference 29 CFR 1926-302(e),

D. Hand tools shall be kept in good condition – sharp, clean, oiled, dressed, and not abused.

E. Tools subject to impact (chisels, star drills, caulking irons) tend to "mushroom" and shall be kept dressed to avoid flying spalls.

F. Tools shall not be used beyond their capacity; use of "cheaters" with tools is prohibited. Use the proper tool for the job.

G. Wooden handles of tools shall be kept free of splinters and cracks and be kept tight in the tool.

17. FIRE PROTECTION & PREVENTION

Governmental Requirements

29 CFR 1926 Subpart F, "Fire Protection and Prevention", and 29 CFR 1910.157, "Portable Fire Extinguishers".

General Requirements:

ALL *Mechanical Services & Design Inc.* EMPLOYEES SHALL BE TRAINED IN THE USE OF FIRE EXTINGUISHERS, FIRE WATCH TRAINED AND REFRESHED ANNUALLY.

A. Access to firefighting equipment shall be maintained at all times. Access for fire control and emergency vehicles shall be maintained at all times.

B. Familiarize employees with the methods used at the location for reporting a fire, the location fire alarm system, and the regulations for the conduct of personnel in the event of an alarm. Location alarm codes shall be conspicuously posted for maximum visibility in the project location.

C. Provide necessary fire extinguishers for protection for temporary facilities and the job location.

Fire Extinguishers

A. A fire extinguisher rated not less than 2A shall be provided for every 3,000 square feet of building area. Travel distance to the nearest extinguisher shall be 75 feet or less.

B. Fire extinguishers shall be located on each floor and adjacent to stairwells on multi- story buildings.

C. A fire extinguisher rated not less that 10B shall be provided within 50 feet of flammable or combustible liquids or flammable gas in quantities or more than 5 gallons or 5 pounds.

a. Fire extinguishers shall be listed by a nationally recognized testing laboratory.

b. Fire extinguishers shall be inspected monthly and shall receive an annual maintenance check.

c. Fire extinguishers with a broken seal shall be reported to a supervisor or shop manager for inspection and servicing.

Fire Prevention

A. Electrical wiring shall meet the following requirements:

   a. NFPA 70 E, "National Electric Code"

   b. ANSI C2, "National Electric Safety Code"

   c. 29 CFR 1926 Subpart K, "Electrical"

   d. 29 CFR 1910 Subpart S "Electrical"

   e. Any other applicable regulations.

B. Management shall approve temporary heating devices.

C. Smoking is permitted in designated areas only.

D. Approved metal safety cans shall be used for handling flammable liquids in quantities greater than 1 gallon.

E. Storage areas of, and tanks containing, flammable and combustible liquids shall be located not nearer than 50 feet to any overhead pipelines or utilities.

F. Indoor storage of flammable and combustible liquids shall meet the following requirements:

   a. Quantities of 25 gallons or more shall be stored in an approved cabinet and not more than 25 gallons shall be outside of an approved container.

b. Not more than 60 gallons of flammable or 120 gallons of combustible liquids shall be stored in any one cabinet, and not more than three cabinets shall be in a single storage area.

c. Cabinets shall be labeled "Flammables" – Keep Fire Away.

G. Outside storage of flammable and combustible liquids shall meet the following requirements:

a. Storage of containers (not more than 60 gallons each) shall not exceed 1,100 gallons in any on area and shall not be nearer than 25 feet to a building. Groups containing 1,100 gallons shall be separated by five-foot clearance.

b. The storage area shall be graded in a manner to divert possible spills away from buildings or shall be surrounded by a curb or earth dike at least 12 inches high.

c. Portable tanks shall not be nearer than 25 feet to any building and a five-foot clear area shall separate individual tanks exceeding 1,100 gallons.

d. The vehicle fueling station shall be a minimum of 50 feet from buildings or other important structures.

e. Portable tanks and containers shall be grounded.

f. Storage tanks shall be properly vented. Reference API Standard 2000, "Venting Atmospheric or Low-Pressure Tanks".

H. Flammable and combustible liquids shall be dispensed in accordance with 29 CFR 1926.152(e), "Dispensing Liquids".

I. Flammable and combustible liquids shall be kept in closed containers when not in use and shall not be allowed, under any circumstances, within 50 feet of an open flame or ignition source.

J. Tank trucks for refueling shall meet the requirements of the standard for tank vehicles for flammable and combustible liquids, NFPA No. 385, "Flammable and Combustible Liquid Tank Vehicles".

K. Tanks and dispensing equipment or pumps and any controls shall be physically protected from vehicle impact and damage. Service and refueling areas shall meet requirements or 29 CFR 1926.51(g), 29 1910.178 (f) "Service and Refueling Area".

DEFINITIONS

Combustible Liquids:	Any liquid having a flash point above 100 Fahrenheit (60 Celsius).
Flammable Liquids:	Any liquid having a flash point below 100 Fahrenheit (60 Celsius).

18. ELECTRICAL SAFETY

ELECTRICAL RELATED SAFE WORK PRACTICES

1.0 Scope

This safety procedure was developed and implemented to establish minimum acceptable guidelines and Mechanical Services & Design Inc. policy under normal conditions to protect Mechanical Services & Design Inc. personnel, contractors, and visitors from the hazards associated with electrical equipment. More stringent requirements may augment this standard for any situation. There is always the potential for shock, arc, and blast injuries or even death resulting from work around electrical wiring and fixtures, working on utility poles, operating mobile equipment around high voltage overhead service lines, and working on energized electrical equipment. These guidelines are intended to assist in minimizing the potential risks and help identify problems.

This standard does not apply to high voltage linemen; reference the 2012 edition of NFPA 70E, Section I-1.2 under Scope. High voltage linemen shall abide by 29 CFR 1910.269 or other appropriate standards.

2.0 References

- Occupational Safety and Health Standards, CFR Parts 1910.147, 1910.331 through 1910.335, and 1926.404.
- NFPA 70 - National Electric Code
- NFPA 70B - Recommended Practice for Electrical Equipment Maintenance
- NFPA 70E - Standard for Electrical Safety Requirements for Employee Workplaces
- ASTM Standards
- Mechanical Services & Design Inc. Safety & Health Program
- Mechanical Services & Design Inc. - Lockout/Tryout Program

3.0 RECORDS & DOCUMENTS

- Training Records
- **Inspection Records (Rubber goods, insulated-line tools, meter calibration)**
- SJP (Safe Job Procedures)

4.0 GENERAL RESPONSIBILITIES

It is the responsibility of each manager, supervisor, employee, contractor, and visitor to ensure implementation of Mechanical Services & Design Inc. policy and procedure on Electrical Related Safe Work Practices. It is also the responsibility of each person to stop and report immediately any unsafe act or condition to his or her supervisor or Safety Manager.

5.1 DEFINITIONS

5.2 **Authorized Person** – A person who is given permission or directed by management to work on or near electrical equipment.

5.3 **Barrier** – A physical obstruction that is intended to prevent contact with equipment or non-insulated energized parts or to prevent unauthorized access to a hazardous area.

5.4 **De-energized** – Free from any electrical connection to a source of electrical energy and from electrical charge; not having a potential different from that of the earth.

5.5 **Electrical Hazard** – A dangerous condition such that contact, or equipment failure can result in electric shock, arc flash burn, and thermal burn, or blast.

5.6 **Electrically Safe Work Condition** – State in which the conductor or circuit part to be worked on or near has been disconnected from energized parts, locked out in accordance with established standards, tested to ensure the absence of voltage, and grounded if determined necessary. The work zone shall be identified and marked appropriately as necessary.

5.7 **Enclosed** – Surrounded by a case, housing, fence, or walls that will prevent persons from accidental contact with energized parts.

5.8 **Enclosure** – A case or housing of apparatus, or the fence or walls surrounding an installation to prevent personnel from accidental contact with energized parts, or protect the equipment from physical damage.

5.9 **Energized** – (Same as live.) Connected to a source of electrical energy.

5.10 **Exposed** – (As applied to energized parts.) Capable of being inadvertently touched or approached nearer than a safe distance by a person. It is applied to parts that are not suitably guarded, isolated, or insulated. Also (as applied to wiring methods) on or attached to the surface or behind panels designed to allow access.

5.11 **Flash Hazard** – A dangerous condition associated with the release of energy caused by an electric arc.

5.12 **Ground-Fault Circuit-Interrupter (GFCI)** – A device intended for the protection of personnel that functions to de-energize a circuit or portion thereof within an established period of time when a current to ground exceeds some predetermined value that is less than the required to operate the over-current protective device of the supply circuit.

5.13 **Ground-Fault Protection –** A system intended to provide protection of equipment from damaging line-to ground fault currents by operating to cause a disconnecting means to open all ungrounded conductors of the faulted circuit. This protection is provided at current levels less than those required to protect conductors from damage through the operation of a supply circuit overcurrent device.

5.14 **Hazardous Locations –** Locations where fire or explosion hazards may exist due to flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings.

5.15 **Insulated** – Separated from other conducting surfaces by a dielectric (including air space) offering a high resistance to passage of current. **Note:** When an object is said to be insulated, it is understood to be insulated for the condition to which it is normally subject. Otherwise, it is, within the purpose of this rule, uninsulated.

5.16 **Limited Approach Boundary** - A shock protection boundary to be crossed by only qualified persons (at a distance from a non-insulated energized part), which is not to be crossed by unqualified persons unless escorted by a qualified person.

5.17 **Live Parts** – Energized conductive components. Note: the NEC has changed the definition of "live" in the 2002 revision. It no longer refers to just non-insulated parts, it includes any energized part even if it is insulated.

5.18 **Motor Control Center** – an assembly of one or more enclosed sections having a common power bus and principally containing motor control units.

5.19 **Prohibited Approach Boundary -** A shock protection boundary to be crossed by only qualified persons (at a distance from a non-insulated energized part) which, when crossed by a body part or object, requires the same protection as if direct contact is made with a non-insulated energized part.

5.20 **Qualified Person** – One familiar with the construction and operation of the equipment and the hazards involved. Will possess the skills and techniques necessary to distinguish non-insulated energized electrical parts from other parts of electrical equipment as well as determine the nominal voltage present in non- insulated energized parts and has been trained in electrical safe work practices.

5.21 **Restricted Approach Boundary -** A shock protection boundary to be crossed by only qualified persons (at distance from a non-insulated energized part) which, due to its proximity to a shock hazard, requires the use of shock protection techniques and equipment when crossed.

5.22 **Shock Hazard** – A dangerous condition associated with possible release of energy caused by contact or approach to non-insulated energized parts.

5.23 **Switchgear** – Assemblies of switching and interrupting devices, along with control, metering, protective, and regulating equipment.

5.24 **Working on (Non-Insulated Energized Parts)** – Coming in contact with non- insulated energized parts with the hands, feet, or other body parts, with tools, probes, or with test equipment, regardless of the personal protective equipment a person is wearing.

6.1 Safety Training

6.2 These training requirements shall apply to individuals who face a risk of electrical hazards. They shall be trained to understand the specific hazards associated with electrical energy that may be encountered in their job tasks or assignments. These individuals shall be trained to identify and understand the relationship between electrical hazards and possible injury.

6.2.1 Only qualified electrical workers shall perform any type of electrical work. Employees shall never face a risk of electrical shock without training, planning, and reducing risk to a safe level. No HOT WORK shall be performed unless it is absolutely necessary, then and only then only qualified workers, properly trained for that specific task, with proper PPE and monitoring equipment, shall be allowed to perform such work activities.

6.3 Emergency Procedures

6.3.1 Individuals working on or near exposed energized electrical conductors or circuit parts shall be trained in methods of release of victims from contact with exposed energized conductors or circuit parts.

6.4 Qualified Persons

6.4.1 Qualified persons shall be trained and knowledgeable of the construction and operation of equipment or a specific work method and be trained to recognize and avoid the electrical hazards that might be present with respect to that equipment or work method.

6.4.2 They shall be familiar with the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools and test equipment.

6.4.3 A person can be considered qualified with respect to certain equipment and methods but still are unqualified for others. Such persons, who are permitted to work within the limited approach boundary of exposed

energized conductors and circuit parts shall, at a minimum, be additionally trained in all the following:

6.4.3.1 The skills and techniques necessary to distinguish exposed energized parts from other parts of electric equipment.

6.4.3.2 The skills and techniques necessary to determine the nominal voltage of exposed energized parts.

6.4.3.3 The approach distances specified in Attachment "A" and the corresponding voltages to which the Qualified Person will be exposed.

6.4.3.4 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.

6.5 Unqualified Persons

6.5.1 Unqualified persons shall be trained in and be familiar with any of the electrical safety-related practices that might not be addressed specifically in this practice but are necessary for their safety.

6.6 Documentation

6.6.1 All training must be documented with the employee's name, and date of training along with the signature of the person conducting training and specific subject areas covered.

6.6.2 Records shall be maintained within the Safety Managers Office.

7.1 GENERAL REQUIREMENTS

7.2 WORKING ON OR NEAR ELECTRICAL CONDUCTORS OR CIRCUIT PARTS

7.2.1 Every attempt shall be made to work on electrical equipment while it is de-energized. Exposed parts where an electrical hazard exists shall be put into an electrically safe work condition before an employee works on or near them, unless:

7.2.1.1 De-energizing introduces additional or increased hazards;

7.2.1.2 De-energizing is infeasible due to equipment design or operational limitations;

7.2.1.3 De-energizing will not allow for testing or measurement.

Note 1: Examples of increased or additional hazards include interruption of life support equipment, deactivation of emergency alarm systems, shutdown of hazardous location ventilation equipment, or removal of illumination for an area.

Note 2: Examples of work that may be performed on or near energized circuits parts because of infeasibility due to equipment design or operational limitations include testing of electric circuits that form an integral part of a continuous industrial process that would otherwise need to be completely shut down in order to permit work on one circuit or piece of equipment.

7.3 Non-insulated conductive parts that operate at less than 50 volts to ground need not be de-energized if there will be no increased exposure to electrical burns or to explosion due to electric arcs.

7.4 Only authorized and qualified personnel are allowed to make electrical connections or repair electrical equipment and wiring.

7.4.1 Only authorized and qualified personnel may:

7.4.1.1 Work on equipment in areas containing unguarded, non-insulated energized lines or parts of equipment at 50 volts or more;

7.4.1.2 Work on energized parts that must be worked on in an energized state, or do not have the capability of being locked out. Only qualified persons may work on electric circuit parts or equipment that has not been de-energized. Such persons shall be made familiar with the use of special precautionary techniques, PPE, insulating & shielding materials, and insulated tools

7.4.1.3 Work in areas classified as hazardous locations.

7.4.1.4 This section applies to all work performed on exposed live parts, (involving either direct contact or by means of tools or materials) or near enough to them for employees to be exposed to any hazard they present.

7.5 An electrically safe work conditions shall be achieved when performed in accordance with Mechanical Services & Design Inc. Lockout/Tryout Procedures and verified by the following:

7.5.1 Determine all possible sources of electrical supply to specific equipment. Check applicable up-to-date drawings, diagrams, and identification tags; Energy Isolation also applies to any or all sources of energy- steam, hydraulics, gravity, etc.

7.5.2 After properly interrupting the load current, open the disconnecting device(s) for each source;

7.5.3 Where it is possible, visually verify that all blades of the disconnecting devices are fully open or that draw out type circuit breakers are withdrawn to the fully disconnected position;

7.5.4 Apply lockout devices and verify lockout in accordance with Mechanical Services & Design Inc. Lockout/Tryout Program;

7.5.5 Use a Mechanical Services & Design Inc. approved, properly rated voltage meter to test each phase conductor or circuit part to verify they are de-energized;

7.5.6 Where the possibility of induced voltages or stored electrical energy exists, ground the phase conductors or circuit parts before touching them. Where it could be reasonably anticipated that the conductors or circuit parts being de- energized could contact other exposed energized conductors or circuit parts, apply ground connecting devices rated for the available fault duty.

7.6 Testing for Voltage

7.6.1 Prior to beginning work and before coming in working contact with electrical circuits, they must be tested with an adequately rated voltage detector to verify that each phase conductor or circuit part is de-energized.

7.6.1.1 Prior to use, inspect the test equipment and determine that the voltage meter is operating satisfactorily, and ensure that all associated test leads, cables, power cords, probes, and connectors are visually inspected for external defects and damage. Test meter on known energized source prior to each use to verify meter is reading properly.

7.6.1.2 Ensure the voltage meter and all accessories are properly rated for the circuits and equipment to which they shall be connected and are designed for the environment in which they will be used;

7.6.1.3 Make certain you know what type of voltage you are testing for, either AC or DC, and what level of voltage is in the circuits you are testing. Pocket sized light stick voltage detectors are not to be utilized as a **primary** testing device.

7.6.1.4 Once you have tested the circuits with the test equipment and determined the electrical state (energized or non-energized), the test equipment shall be re-tested to confirm that it was working correctly.

7.7 Tasks and Work Practices

7.7.1 Standard safe work practices (i.e., SJP, etc.) apply for voltages of 0-50 volts AC (rms) or DC.

7.7.2 Only authorized and qualified personnel may troubleshoot, repair, and/or test electrical devices at 480 AC/300 DC and below.

7.7.3 Only electric service personnel (i.e., Electric Power group), qualified contractor personnel, qualified engineers and qualified equipment suppliers who are authorized are permitted to troubleshoot, repair, and/or test electrical devices above 480 AC/300 DC.

7.7.3.1 This includes opening and/or closing switches, disconnects, etc.

7.8 Safe work practices shall be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts when work is performed near or on equipment or circuits which are or may be energized. If non-insulated energized parts are not or cannot be placed in an electrically safe work condition, other safety-related work practices shall be used to protect employees who might be exposed to the electrical hazards involved. Such work practices shall protect each employee from arc flash and from contact with non-insulated energized parts directly with any part of the body or indirectly through some other conductive object. The work practices used shall be suitable for the conditions under which the work is to be performed and for the voltage level of the non-insulated energized parts.

7.8.1 Work practices may include protective shields, protective barriers, or insulating materials to protect each employee from shock, burns, or other electrically related injuries.

7.9 Employees shall use insulated tools and/or handling equipment when working inside the restricted approach boundary of non-insulated energized parts where tools or handling equipment might make accidental contact. Insulated tools shall be protected from damage to the insulating material. Insulated tools shall be rated for the voltages on which they are used. Insulated tools must be marked to indicate their voltage rating.

7.10 Conductive materials, tools, and equipment that are in contact with any part of an employee's body shall be handled in such a manner that will prevent accidental contact with non-insulated energized parts.

7.10.1 Such materials and equipment include but are not limited to long conductive objects, such as ducts, pipes and tubes, conductive hose and rope, metal- lined rules and scales, steel tapes, pulling lines, metal scaffold parts, structural members, bull floats, and chains.

7.10.2 Ladders shall be of the non-conductive type. They shall have non-conductive side rails.

7.11 Fuse or fuse holder handling equipment, insulated for the circuit voltage, shall be used to remove, or install a fuse if the fuse terminals are energized.

7.12 Ropes and hand lines used near non-insulated energized parts shall be nonconductive.

7.13 **Qualified Persons, Safe Approach Distances**: For a person to cross the limited approach boundary and enter the limited space, he or she must be qualified to perform the job/task.

7.13.1 When work is being performed within the limited approach boundary of exposed energized parts, conductive articles of jewelry and clothing (such as watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, metal buttons, metal headgear, or metal glasses) shall not be worn where they present an electrical contact hazard with non-insulated energized parts. All clothing shall be made of natural fabric such as cotton. No synthetic clothing or clothing with synthetic threads, Wedding rings that cannot be removed must be cut off. No jewelry can be worn and covered up.

7.14 **Qualified Persons, Safe Approach Distances**: To cross the restricted approach boundary and enter the restricted space, the qualified person must:

7.14.1 Review existing electrical safe work procedure (SJP, etc.). If no procedure exists, then the qualified person must complete and have approved by authorized management the Electrical Hot Work Permit (see Attachment D).

7.14.2 Use protective clothing and other protective equipment appropriate for working near exposed energized conductors or circuit parts and rated for the voltage and energy level involved (see attachment B).

7.14.3 Be certain that no part of the body shall enter the prohibited space.

7.14.4 Minimize the risk due to inadvertent movement by keeping as much of the body out of the restricted space, using only protected body parts in the space as necessary to accomplish the work.

7.15 **Qualified Persons, Safe Approach Distances**: To cross the prohibited approach boundary and enter the prohibited space is considered the same as making contact with exposed energized conductors or circuit parts. The qualified person must:

7.15.1 Have specified training as outlined in 6.3.3 to work on energized conductors or circuits parts.

7.15.2 Review existing electrical safe work procedure (SJP, etc.). If no procedure exists, then the qualified person must complete and have approved by authorized management the Electrical Hot Work Permit (see Attachment D).

7.15.3 Use protective clothing and other protective equipment appropriate for working near exposed energized conductors or circuit parts and rated for the voltage and energy level involved (see attachment B).

7.16 When working in a confined space or enclosed space (such as a manhole or vault) that contains non-insulated energized parts, protective shields, protective barriers, or insulating materials shall be used as necessary to avoid inadvertent contact with these parts.

7.16.1 Doors, hinged panels, and the like shall be secured to prevent their swinging into an employee and causing the employee to contact live parts or non- insulated energized parts.

7.17 Where non-insulated energized parts present an electrical contact hazard, employees shall not perform housekeeping duties inside the approach boundary where there is a possibility of contact, unless adequate safeguards (such as insulating equipment or barriers) are provided to prevent contact.

7.17.1 Electrically conductive cleaning materials (including conductive solids such as steel wool, metalized cloth, and silicone carbide, as well as conductive liquid solutions) shall not be used inside the approach boundary unless procedures to prevent electrical contact are followed.

7.18 Barricades shall be used in conjunction with signs where it is necessary to prevent or limit employee access to work areas containing non-insulated energized parts.

7.18.1 Conductive barricades shall not be used where it might cause an electrical hazard.

7.18.2 Barricades shall be placed no closer than the limited approach boundary given in "Attachment A".

7.19 Employees may not enter spaces containing exposed energized parts unless adequate illumination is provided that enables the employees to work safely. For general construction area lighting the minimum is 5 foot-candles. For General construction plant and shops, the minimum is 10 foot-candles.

8.1 Working Near Overhead Lines

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

8.2.1 If the lines are to be deenergized, arrangements shall be made with the person or organization that operates or controls the electric circuits involved to deenergize and ground them.

8.2.2 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.

8.2.2.1 Unqualified persons are prohibited from installing insulating devices on overhead power transmission or distribution lines.

8.3 When an unqualified person is working in an elevated position near overhead lines, the location shall be such that the person and the longest conductive object he or she may contact cannot come closer to any unguarded, energized overhead line than the following distances:

8.3.1 For voltages to ground 50kV or below – 10 feet.

8.3.2 For voltages to ground over 50kV – 10 feet plus 4 inches for every 10kV over 50kV.

8.3.3 The workers must be made aware of these hazards in these conditions.

8.4 When an unqualified person is working on the ground in the vicinity of overhead lines, the person may not bring any conductive object closer to unguarded, energized overhead lines than the distances given in 8.2 of this section.

8.4.1 For voltages normally encountered with overhead power lines, objects, which do not have an insulating rating for the voltage involved, are considered to be conductive.

8.5 When a qualified person is working in the vicinity of overhead lines, whether in an elevated position or on the ground, the person may not approach or take any conductive object without an approved insulating handle closer to exposed energized parts than shown in "Attachment C" unless:

8.5.1 The person is insulated from the energized part (gloves, with sleeves, if necessary, rated for the voltage involved are considered to be insulation of the person from the energized part on which work is performed), or

8.5.2 The energized part is insulated both from all other conductive objects at a different potential and from the person, or

8.5.3 The person is insulated from all conductive objects at a potential different from that of the energized part.

8.6 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 feet is maintained.

8.6.1 If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage. However, under any of the following conditions, the clearance may be reduced:

8.6.1.1 If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4 feet.

8.5.1.1.1 If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage.

8.6.1.2 If insulating barriers are installed to prevent contact with the lines, and if the barriers are rated for the voltage of the line being guarded and are not a part of or an attachment to the vehicle or its raised structure, the clearance may be reduced to a distance within the designed working dimensions of the insulating barrier.

8.6.1.3 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 uninsulated portion of the aerial lift and the power line) may be reduced to the distance given in "Attachment C".

8.7 Employees standing on the ground may not contact the vehicle or mechanical equipment or any of its attachments, unless:

8.7.1 The employee is using protective equipment rated for the voltage; or

8.7.2 The equipment is located so that no uninsulated part of its structure (that portion of the structure that provides a conductive path to employees on the ground) can come closer to the line than permitted in section 8.5.

8.7.3 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 may not stand at the grounding location whenever there is a possibility of overhead line contact.

8.7.3.1 Additional precautions, such as the use of barricades or insulation, shall be taken to protect employees from hazardous ground potentials, depending on earth resistivity and fault currents, which can develop within the first few feet or more outward from the grounding point.

9.1 Personal Protective Equipment (PPE)

9.2 The appropriate PPE (based on the voltages present, PPE chart, and the work to be performed) shall be worn by employees when working within the applicable approach boundary, but in all cases, PPE must be worn while working within a 4- foot boundary of unguarded energized parts.

9.3 PPE shall be visually inspected prior to each use.

9.4 PPE (i.e., gloves, sleeves, etc.) shall be tested per 29 CFR 1910.137 (b) (2) (viii) or replaced every six months.

9.5 Undergarments should be 100% natural fiber (cotton or wool) or other approved fabric.

10.1 Electrical Safety by Design for New Installations

10.2 For all new installations, refer to Mechanical Services & Design Inc. Corporation Engineering Specifications.

11.1 Approved Voltage Meter for Use at Mechanical Services & Design Inc.

11.2 Any voltage meter used must have a minimum of a Category III insulation (1000 V).

Attachment "A" - Approach Boundaries

Approach Boundaries to Live Parts for Shock Protection

(1)	(2)	(3)	(4)	(5)
	Limited Approach[1] Boundary		*Restricted Approach*[2] Boundary	
Nominal System Voltage Range, Phase to Phase	Exposed Movable Conductor	Exposed Fixed Circuit Part	Includes Inadvertent Movement Adder	Prohibited[3] Approach Boundary
0 to 50	Not Specified	Not Specified	Not Specified	Not Specified
51 to 300	10 ft 0 in.	3 ft 6 in.	Avoid Contact	Avoid Contact
301 to 750	10 ft 0 in.	3 ft 6 in.	1 ft 0 in.	0 ft 1 in.
751 to 15kV	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	10ft 0 in.	8 ft 0 in.	3 ft 3 in.	2 ft 1 in.
72.6 kV to 121 kV	10 ft 8 in.	8 ft 0 in.	3 ft 2 in.	2 ft 8 in.
138 kV to 145 kV	11 ft 9 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 362 kV	15 ft 4 in.	15 ft 4 in.	8 ft 6 in.	8 ft 0 in.
500 kV to 550 kV	19 ft 0 in.	19 ft 0 in.	11 ft 3in.	10 ft 9 in.
765 kV to 800 kV	23 ft 9 in.	23 ft 9 in.	14 ft 11 in.	14 ft 5 in.

1 A shock protection boundary to be crossed by only qualified persons (at a distance from a non-insulated energized part), which is not to be crossed by unqualified persons unless escorted by a qualified person.

2 A shock protection boundary to be crossed by only qualified persons (at a distance from a non-insulated energized part) that, due to its proximity to a shock hazard, require the use of shock protection techniques and equipment when crossed.

3 A shock protection boundary to be crossed by only qualified persons (at a distance from a non-insulated energized part) which, when crossed by a body part or object, requires the same protection as if direct contact is made with a non-insulated energized part.

Attachment "B" - Hazard Risk Category

Hazard Risk Category Classification

- Listed in the following tables are a number of common work tasks with the respective Hazard/Risk Category associated with each task. Once the Hazard/Risk Category has been identified, refer to the Protective Clothing and Personal Protective Equipment (PPE) Matrix.

- The Protective Clothing and Personal Protective Equipment (PPE) Matrix lists the requirements for protective clothing and other protective equipment based on Hazard/Risk Category numbers 1 through 4. This clothing and equipment shall be used when working on or near energized equipment within the Flash Protection Boundary of 4 foot.

51V – 240V

TASK (ASSUMES EQUIPMENT IS ENERGIZED AND WORK IS DONE WITHIN THE FLASH PROTECTION BOUNDARY).	Hazard/Risk Category	V-Rated Gloves	V-Rated Tools
PANELBOARDS 240V AND BELOW			
CIRCUIT BREAKER (CB) OR FUSED SWITCH OPERATION WITH COVERS ON	2	N	N
CB OR FUSED SWITCH OPERATION WITH COVERS OFF	2	N	N
WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING	2	Y	Y
REMOVE/INSTALL CBs OR FUSED SWITCH	2	Y	Y
REMOVAL OF BOLTED COVERS (TO EXPOSE BARE, ENERGIZED PARTS)	2	N	N
OPENING HINGED COVERS (TO EXPOSE BARE, ENERGIZED PARTS)	2	N	N

- If your particular job/task is not listed the Personal Protective Equipment Requirement Is Category 2*.

- 2* means that a double-layer switching hood and/or arc visor and hearing protection are required for this task in addition to the other Hazard/Risk Category 2 requirements in this table.

VII. 240V – 600V

TASK (ASSUMES EQUIPMENT IS ENERGIZED AND WORK IS DONE WITHIN THE FLASH PROTECTION BOUNDARY).	Hazard/Risk Category	V-Rated Gloves	V-Rated Tools
PANELBOARDS OR SWITCHBOARDS RATED >240V AND UP TO 600V (WITH MOLDED CASE OR INSULATED CASE CIRCUIT BREAKERS)			
CB OR FUSED SWITCH OPERATION WITH COVERS ON	2	N	N
CB OR FUSED SWITCH OPERATION WITH COVERS OFF	2	N	N
WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING	2*	Y	Y
600V CLASS MOTOR CONTROL CENTERS (MCC'S)			
CB OR FUSED SWITCH OR STARTER OPERATION WITH ENCLOSURE DOORS CLOSED	2	N	N
READING A PANEL METER WHILE OPERATING A METER SWITCH	2	N	N
CB OR FUSED SWITCH OR STARTER OPERATION WITH ENCLOSURE DOORS OPEN	2	N	N
WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING	2*	Y	Y
WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS 120V OR BELOW EXPOSED	2	Y	Y
WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS >120V EXPOSED	2*	Y	Y
INSERTION OR REMOVAL OF INDIVIDUAL STARTER "BUCKETS" FROM MCC	3	Y	N

APPLICATION OF SAFETY GROUNDS AFTER VOLTAGE TEST	2*	Y	N
REMOVAL OF BOLTED COVERS (TO EXPOSE BARE, ENERGIZED PARTS)	2*	N	N
OPENING HINGED COVERS (TO EXPOSE BARE, ENERGIZED PARTS)	2	N	N
600V CLASS SWITCHGEAR (WITH POWER CB's OR FUSED SWITCHES)			
CB OR FUSED SWITCH OR STARTER OPERATION WITH ENCLOSURE DOORS CLOSED	2	N	N
READING A PANEL METER WHILE OPERATING A METER SWITCH	2	N	N
CB OR FUSED SWITCH OR STARTER OPERATION WITH ENCLOSURE DOORS OPEN	2	N	N
WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING	2*	Y	Y

VIII. 240V – 600V (Continued)

TASK (ASSUMES EQUIPMENT IS ENERGIZED AND WORK IS DONE WITHIN THE FLASH PROTECTION BOUNDARY).	Hazard/Risk Category	V-Rated Gloves	V-Rated Tools
600V CLASS SWITCHGEAR (WITH POWER CB's OR FUSED SWITCHES)			
WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS 120V OR BELOW EXPOSED	2	Y	Y
WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS >120V EXPOSED	2*	Y	Y
INSERTION OR REMOVAL (RACKING) OF STARTERS FROM CUBICLES DOORS OPEN	3	N	N
INSERTION OR REMOVAL (RACKING) OF STARTERS FROM CUBICLES DOORS CLOSED	2	N	N
APPLICATION OF SAFETY GROUNDS AFTER VOLTAGE TESTING	2*	Y	N
REMOVAL OF BOLTED COVERS (TO EXPOSE BARE, ENERGIZED PARTS)	3	N	N
OPENING HINGED COVERS (TO EXPOSE BARE, ENERGIZED PARTS)	2	N	N
OTHER 600V CLASS EQUIPMENT			
LIGHTING OR SMALL POWER TRANSFORMERS			
REMOVAL OF BOLTED COVERS (TO EXPOSE BARE, ENERGIZED PARTS)	2*	N	N
OPENING HINGED COVERS (TO EXPOSE BARE, ENERGIZED PARTS)	2	N	N

WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING	2*	Y	Y
APPLICATION OF SAFETY GROUNDS AFTER VOLTAGE TESTING	2*	Y	N
REVENUE METERS (Kw-HOUR, AT PRIMARY VOLTAGE AND CURRENT)			
INSERTION OR REMOVAL	2*	Y	N
CABLE TROUGH OR TRAY COVER REMOVAL OR INSTALLATION	2	N	N
MISCELLANEOUS EQUIPMENT COVER REMOVAL OR INSTALLATION	2	N	N
WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING	2*	Y	Y
APPLICATION OF SAFETY GROUNDS AFTER VOLTAGE TESTING	2*	Y	N

- If your job/task is not listed, the Personal Protective Equipment requirement is category 3.

1000V and Up

TASK (ASSUMES EQUIPMENT IS ENERGIZED AND WORK IS DONE WITHIN THE FLASH PROTECTION BOUNDARY).	Hazard/Risk Category	V-Rated Gloves	V-Rated Tools
2.3kV TO 7.2kV (MOTOR STARTERS)			
CONTACTOR OPERATION WITH ENCLOSURE DOORS CLOSED	2	N	N
READING A PANEL METER WHILE OPERATING A METER SWITCH	2	N	N
CONTACTOR OPERATION WITH ENCLOSURE DOORS OPEN	2*	N	N
WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING	4	Y	Y
WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS 120V OR BELOW EXPOSED	2	Y	Y
WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS >120V EXPOSED	4	Y	Y
INSERTION OR REMOVAL (RACKING) OF STARTERS FROM CUBICLES DOORS OPEN	4	N	N
INSERTION OR REMOVAL (RACKING) OF STARTERS FROM CUBICLES DOORS CLOSED	2	N	N
APPLICATION OF SAFETY GROUNDS AFTER VOLTAGE TESTING	4	Y	N
REMOVAL OF BOLTED COVERS (TO EXPOSE BARE, ENERGIZED PARTS)	4	N	N
OPENING HINGED COVERS (TO EXPOSE BARE, ENERGIZED PARTS)	4	N	N
1kV AND ABOVE			

CB OR FUSED SWITCH OPERATION WITH ENCLOSURE DOORS CLOSED	2	Y	N
READING A PANEL METER WHILE OPERATING A METER SWITCH	2	N	N
CB OR FUSED SWITCH OPERATION WITH ENCLOSURE DOORS OPEN	4	Y	N
WORK ON ENERGIZED PARTS, INCLUDING VOLTAGE TESTING	4	Y	Y
WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS 120V OR BELOW EXPOSED	2	Y	Y
WORK ON CONTROL CIRCUITS WITH ENERGIZED PARTS >120V EXPOSED	4	Y	Y
INSERTION OR REMOVAL (RACKING) OF CB'S FROM CUBICALS, DOORS OPEN	4	Y	N

1000V and Up (Continued)

TASK (ASSUMES EQUIPMENT IS ENERGIZED AND WORK IS DONE WITHIN THE FLASH PROTECTION BOUNDARY).	Hazard/Risk Category	V-Rated Gloves	V-Rated Tools
1kV AND ABOVE			
INSERTION OR REMOVAL (RACKING) OF CB'S FROM CUBICALS DOORS CLOSED	2	Y	N
APPLICATION OF SAFETY GROUNDS AFTER VOLTAGE TEST	4	Y	N
REMOVAL OF BOLTED COVERS (TO EXPOSE BARE, ENERGIZED PARTS)	4	N	N
OPENING HINGED COVERS (TO EXPOSE BARE, ENERGIZED PARTS)	4	N	N
OPENING VOLTAGE TRANSFORMER OR CONTROL POWER TRANSFORMER COMPARTMENTS	4	N	N
SWITCH OPERATION, DOOR CLOSED	2	Y	N
INSULATED CABLE EXAMINATION, IN MANHOLE OR OTHER CONFINED SPACE	4	Y	N
INSULATED CABLE EXAMINATION IN OPEN AREA	2	Y	N

- If your job/task is not listed, the Personal Protective Equipment requirement is category 4.

Arc Flash Hazard Category	1	2	3	4
Safety Glasses	X	X	X	X
Hard Hat (Class E & G) if required	X	X	X	X
Clothing				
FR Clothing	X	X	X	X
Cotton Underwear		X	X	X
FR Coverall			X	
Flash Suit				X
Arc Visor or Hood		X[1]		
Hood			X	X
Hearing Protection		X[1]	X	X
Gloves:				
Leather	X[2]	X	X	X
Class OO -500V	X	X[2]		
Class O -1000V		X[5]		X[3]
Class I -7500V			X[5]	X[3]
Class II -17,000V			X[5]	X[3]
Class III – 26,500V			X[5]	X[3]
Class IV –36,000V			X[5]	X[3]

Protective Clothing and Personal Protective Equipment (PPE) Matrix[4]

1. A double-layer switching hood and/or arc visor and hearing protection are required for the tasks designated 2* in the table.

2. Protector gloves may be omitted for Class O gloves, under limited use conditions, where small equipment and parts manipulation require unusually good finger dexterity. Under the same conditions, Class OO gloves may be used without protectors, but only at voltages up to and including 250V AC.

3. Use Insulated gloves rated for the system voltage being worked on. Insulated glove should extend out of the leather protector per the glove manufacturer's recommendation.

4. This is a minimum PPE Requirement unless a Qualified Engineer that results in a reduced PPE requirement performs an Arc Flash Hazard Calculation.

5. Gloves to be used where specified in the PPE Requirement table. If job is not listed in the table, gloves are required.

Attachment "C" - Overhead Lines

Approach Distances for Qualified Employees – Alternating Current

VoltageRange(PhasetoPhase)	Minimum Approach Distance
300Vandless	Avoid contact
Over300V,notover750	1ft.0in.
Over750V,notover2kV	1ft.6in.
Over2kV,notover15kV	2ft.0in.
Over15kV,notover37kV	3ft.0in.
Over37kV,notover87.5kV	3ft.6in.
Over87.5kV,notover121kV	4ft.0in.
Over121kV,notover140kV	4ft.6in.

Attachment "D" - Electrical Hot Work Permit

Electrical Hot Work Permit

- **Reason For Need to Work On Energized Equipment:**

__ De-energizing introduces additional or increased hazards

__ De-energizing is infeasible due to equipment design

__ De-energizing is infeasible due to operational limitations

- **Identification of hazards**

__ Shock

__ Arc

__ Blast

- **Level of Hazard**

__ Voltage _____

__ Short Circuit Amps _____

__ Blast:

- **PPE Requirement**

__ Rubber Gloves

Class: _____

- **Additional Protections:**

__ Flash Clothing

__ Backup Person

__ Live-line Tools

__ Altering Techniques

- **Additional Precautions**

__ Nonconductive Ladders

__ Housekeeping

__ Limited Workspace

__ Temporary Lighting

__ GFCI Use

__ Approach Distances

__ Conductive Material

__ Conductive Apparel

__ Interlocks

__ Switching Technique

__ Test Instruments

__ Leather Protectors

__ Eye Protection

__ Face Protection

__ Head Protection

__ Insulating Materials

> Sleeves

> Blankets

> Mats

> Boots

> Shielding

__ Insulated Tools

__ Blast Shielding

__ Portable Power Tools

__ Flammable Material

__ **Pre-job Briefing Held**

Approval Signature (Electrical Supervisor)

_____

Qualified Person(s)

_____

_____

_____

Change Log

Revision Date	Version	Changes
9/01/2012	0	Original Issue

Governmental Requirements

A. Employers must provide ground-fault circuit interrupters (GFCI's) or ground conductor program to protect employees from ground-fault hazards at outside locations.
   a. All 120-volt, single-phase, 15-and 20-ampere receptacles that are not part of the permanent wiring must be protected by ground-fault circuit interrupters. Receptacles on a two-wire, single-phase portable of vehicle mounted generator rated not more than 5-kilowatts, where the circuit conductors of the generator are insulated from the generator frame and all other grounded surfaces, need not be protected with ground-fault interrupters.

General Requirements for work performed outside of the shop

A. Illumination of construction areas, ramps, runways, corridors, offices, shops and storage areas shall be lighted to not less than the minimum illumination intensities listed in Table D-3 of 29 CFR 1926-56.

B. All lamps for general illumination shall be protected from accidental contact or breakage. Metal-case sockets must be grounded.

C. Temporary lights shall not be suspended by their cords unless they are so designed. Temporary lighting circuits shall be used for lighting only.

D. Extension cords shall be of the three-wire type. Extension cords, and flexible cords used with temporary and portable lights, must be designed for hard or extra-hard use.

E. Employees shall not work near energized electrical circuits unless the employees are protected against electrical shock by de-energizing the circuit and grounding it or by guarding it effectively by insulator or other means.

F. Worn or frayed electrical cords and cables shall not be used. Extension cords shall not be fastened with staples, hung from nails or suspended by wire.

G. Equipment and circuits that are de-energized shall be rendered inoperative and shall have locks and tags attached at all points where the equipment or circuits could be energized. LOCKOUT/TRYOUT.

H. Stripping of wire insulation shall be performed only with the use of cable strippers or appropriate stripping knives. Use of hunting or jack knives is prohibited. The slicing actions shall be away from the employee.

Inspections

A. Equipment except cord sets and receptacles, which are fixed and not exposed to damage, must be inspected before each day's use for visible damage or defects. Faulty equipment found on inspection must be removed from service immediately and not to be used until repaired and retested.

Success of Program

A. Responsibility lies with Management

1. Management must designate one or more persons to implement the program. (By definition: one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees and who has the authorization to take prompt corrective action to eliminate them.)

19. ELECTRICAL SAFETY, NON-QUALIFIED WORKERS

OBJECTIVE

To explain common electrical hazards, and ways to use electricity safely to prevent shock, burns and fires. This training is not meant for electricians; it is meant for employees whose work with electrical equipment is incidental to their primary job. This training will provide you with some basic information about electrical safety.

SUGGESTED MATERIALS TO HAVE ON HAND

* Indoor and outdoor extension cords with two and three prong plugs
* Ground Fault Circuit Interrupters (GFCIs)
* Multi-outlet cord set for computers

INTRODUCTION

Electricity is common in the workplace and this common exposure can lead to indifference to its hazards, which could lead to easily avoided injuries. Electrical hazards are often the least visible yet most deadly in the workplace. Electricity causes 10% of work-related deaths, as well as many serious injuries. The use of simple precautions and protections will allow for a safer workplace and reduced accidents.

HAZARDS

When you get a shock, your body has become part of an electric circuit. The longer and stronger the shock, the greater the risk, especially if near your heart. Electric shock can cause many effects, from tingly skin to death. Electrical fires and explosions can happen when circuits or equipment overheat. Electrical burns are usually serious, because the electricity is passing through your body and can burn your internal tissues and organs. Electrical shock, while not always strong enough to kill or injure, can cause secondary accidents, such as falls. Water increases the potential electrical hazard.

Always report and avoid existing or potential electrical hazards. These could include:

* Loose electrical connections
* Missing guards on live electrical parts
* Improperly grounded plugs
* Improperly installed covers and conduit on permanent wiring
* Improper protection to wires entering boxes, cabinets, or fittings

Watch for the following warnings of existing and potential electrical hazards:

* Loose electrical connections
* Cords with missing or frayed insulation
* Plugs that don't match the outlet
* Indoor extension cords used outside
* Equipment running over capacity
* Power tools that smoke, smell, spark, or shock
* Wires or cords running across floors
* Cords near water, hot equipment, flammable, or explosive materials
* Continuous use of extension cords instead of permanent wiring
* Exposed or unprotected wiring

SAFEGUARDS

Always use the right equipment for the job. Extension cords are only for temporary use. If you have to use an extension cord continuously for more than 30 days, then permanent wiring should be installed. One exception to this is multi-outlet cord sets for computers. These can be used indefinitely, but only with computer equipment.

Indoor extension cords (light cords, usually with only two prong plugs) can only be used indoors and are meant for light duty use only. Heavy duty outdoor extension cords, with three prong plugs, are a better choice for all uses and required when used outdoors. Always try to ground electrical equipment. If the ground prong has been broken off a three-prong plug, then it should be repaired.

Use ground fault circuit interrupters (GFCIs) in wet or damp areas, and on all construction sites. A GFCI is a switch that can be attached to most powered equipment. While all electrical wiring is supposed to be grounded and have a fuse or breaker in case of overload, grounds can be broken, and fuses and breakers are designed to protect wiring, not people. A GFCI will open the circuit early and quickly enough to protect a worker from electrical exposures. They are one of the best tools for protecting workers from electrical hazards.

All permanent wiring should be enclosed and protected from damage. Parts should be de- energized whenever doing work on or near electrical equipment.

Never handle electrical equipment with wet hands. In case of an electrical fire, make sure any fire extinguishers used are rated for use on electrical fires (look for Class C on the label), and try to get the power shut off.

Listed below are safety procedures that should be used around electrical equipment:

* Inspect equipment and wires for insulation, grounding, and tight connection
* Use lockout/tagout procedures before working on electrical equipment
* Remove jewelry and watches
* Follow the manufacturer's instructions when working on equipment
* Minimize use of extension cords. Install permanent wiring when necessary
* Keep hands clean and dry
* Don't use equipment or power tools that smell, smoke, spark, or shock. Get this equipment repaired or replaced
* Watch for combustibles in the work area and store them in a safe area away from electrical equipment
* Stay away from high voltage equipment
* Avoid power lines. Always check for overhead power lines and never excavate without checking for utilities already buried (MISS DIG)
* Keep cords untangled and out of traffic

Assured Grounding Program

Because construction sites often have temporary wiring, construction workers must follow an Assured Equipment Grounding Conductor Program.

1. All conductors shall be tested for continuity and shall be electronically continuous.
2. Each receptacle and attachment cap or plug shall be tested for correct attachment of the equipment grounding conductors.
3. The equipment grounding conductor shall be connected to its proper terminal- before each use, before equipment is returned to service after repairs, before equipment is used such as when a cord has been run over, At intervals not to exceed 3 months, each test shall be recorded as to identify each receptacle, cord set, and cord & plug connected equipment that passed the test and shall indicate the last date tested or interval for which it was tested. These test records shall be maintained using logbooks, color coding or other effective means & shall be maintained until replaced by a more current record

4. All records shall be made readily available at the jobsite for inspection for all concerned.

WRAP-UP

Electricity is an essential part of modern-day life, which we could not do without. Don't let the commonness of electricity make you complacent to the potential hazards it brings. Always check to make sure you, and those around you, are working safely. Report and avoid equipment that is or appears to be unsafe. Don't take unnecessary chances with your or your co-workers' safety.
Remember, the most important person watching out for your safety, is you. SUGGESTED

DISCUSSION QUESTIONS

1. What are some commonly encountered electrical hazards?
2. What are some warning signs that an electrical hazard is present?
3. How long can an extension cord be continuously used before it should be replaced by permanent wiring?
4. What is a ground fault circuit interrupter (GFCI)?
5. What is an Assured Equipment Grounding Conductor Program, and what is an easy way to comply with this requirement?

Electrical Work, Controlled Access Zones, Prohibited Boundary Work is to be performed exclusively by Qualified Electrical Workers!

20. HEAVY MOBILE EQUIPMENT

1. Only trained, qualified, and authorized personnel shall operate mobile equipment.

2. No piece of equipment or load shall come within 10 feet of overhead energized power lines.

3. Equipment with an elevated load or running shall not be left unattended. All loads must be lowered to the ground, the equipment turned off, and parking brake set anytime equipment is unattended.
    1. Equipment is considered unattended anytime the operator is more than 25 feet away or any time the operator is not in view of the equipment.

4. Defective equipment shall be tagged and immediately removed from service.

5. In the event equipment is left unattended at night, adjacent to a highway, or construction areas where work is in progress, the equipment shall have appropriate lights or reflectors, or equipment shall be barricaded with appropriate lights and or reflectors to identify its location.

6. Protection shall be provided when inflating, mounting, or dismounting tires installed on split rims, or rims equipped with locking rings or similar devices.

7. Only trained and qualified person shall perform maintenance on heavy equipment and must use proper blocking or cribbing techniques to prevent falling or shifting slings, hoists, jacks, etc.

21. CRANES & HOISTING EQUIPMENT

Governmental Requirements

29 CFR 1910.180, "Crawler, Locomotive and Truck Cranes", 1926.550, "Cranes and Derricks", and ANSI B30.5, "Mobile and Locomotive and Truck Cranes".

Training

A. Crane operator qualification or certification must meet NCCCO or its equivalent.

B. It is the policy of MSD to permit only properly trained, and qualified or certified personnel to operate cranes, for performing rigging, riggers during assembly/disassembly, or riggers who attach or detach lifting equipment to loads or lifting loads, and/or signaling tasks, inspections, etc.

General Requirements

A. Cranes and hoisting equipment shall be maintained and inspected in accordance with the requirements specified in 29 CFR 1926-550(a) and 1910-180(d).

   a. Cranes and hoisting equipment shall be inspected by a competent person prior to each use, and during use, to make sure it is in safe operating condition. Deficiencies shall be repaired, or defective parts replaced, before continued use.

   b. A thorough, annual inspection of hoisting equipment shall be made by a competent person, or by a government or private agency recognized by the U.S. Department of Labor.

B. Equipment must not be assembled or used unless ground conditions are firm, drained, and graded to sufficient extent so that, in conjunction, if necessary, with the use of supporting materials, the equipment manufacturers specifications for adequate support and degree of level of equipment are met.

C. Riding of crane hooks and headache balls is prohibited.

D. Outriggers must be fully extended, and pedestals lowered for any lift.

E. When making a lift with a crane:

   a. One person shall be designated to supervise the lift.

b. Only one person, knowledgeable in the standard crane signals, shall be designated to perform signally.

c. The crane operator and the signalman shall maintain continuous visual contact during the lifting operations.

d. The area shall be cleared, roped, or barricaded off.

e. No one shall stand or pass under suspended loads.

f. Tag lines shall be used for controlling loads.

F. Shall comply with location procedures for critical lifts. These procedures address such hazards as lifts over process equipment, heavy lifts (10 tons or more), etc. A documented lift plan for all critical lifts shall be reviewed and approved prior to initiating a critical lift.

a. Rigging equipment shall be certified and inspected prior to use, and as necessary during its use, to ensure that it is safe.

b. All required inspections/maintenance for rigging equipment shall be performed by qualified/competent personnel.

G. While operating cranes near overhead-suspended power lines in accordance with location requirements, and, as a minimum, meet the requirements listed below.

a. This procedure applies to overhead suspended electrical power lines, which exceed 50K volts to ground that are insulated or uninsulated. This procedure does not apply to power lines protected in cable tray, armor, or conduit.

i. Complete a pre-job plan prior to transporting, positioning, or operating a crane or hoisting equipment in the vicinity of power lines.

ii. Cranes are prohibited from operating or hoisting equipment near power lines unless:

1. The line is de-energized, tagged, locked out and grounded.
2. The crane is positioned and operated such that when near uninsulated power lines, neither the boom (fully extended hydraulic) nor any part of the load line or load can, under any situation, be maneuvered to or fall within 10 feet of lines rated to 50 KV or 10 feet plus 0.4 inches each KV over 50 KV.

iii. Whenever a crane, boom truck or other similar lifting equipment is in transit with no load and with boom lowered, equipment clearances shall be:

1. A minimum of four feet for voltages of 150 volts up to 50 KV
2. 10 feet if the voltage is greater than 50 KV up to and including 345 KV
3. 16 feet of the voltage is greater than 345 KV up to and including 750 KV

iv. A qualified person shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means.

H. Cranes and derricks shall not be refueled while in operation.

I. Cranes and derricks not in use shall be properly secured.

J. Hydraulic booms shall be retracted.

K. Whip lines shall be secured.

L. Refer to crane suspended personnel platforms in accordance with 29 CFR 1926-550 (g), "Crane and Derrick Suspended Personnel Platforms".

M. Rated load capacities and recommended operating speeds, special hazard warnings or instruction, shall be conspicuously posted on all equipment. Instructions or warnings shall be visible to the operator while he/she is at his/her control station.

N. Hand signals to crane and derrick operators shall be those prescribed by the applicable ANSI standard for the type of crane in use. An illustration of the signals shall be posted at the job location.

O. Accessible areas within the swing radius of the rear of the rotating superstructure or the crane, either permanently or temporarily mounted, shall be barricaded in such a manner as to prevent an employee from being struck or crushed by the crane.

CRANE LIFT PROCEDURE

General

This procedure provides guidance for control of lifts with cranes, which are considered to be critical and repetitive lifts. Lifts that fall into the category are those lifts which:

A. Exceeds 75% of the crane's rated capacity for the crane configuration

B. Requires two cranes to make the lift

C. Is located such that the load or the crane boom could fall on electric lines, transformers, pipelines, vessels, or reactors containing flammable, explosive, or hazardous gases or liquids etc.

D. Utilize poles and derricks that have been erected for a specific lift

Interpretation

Crane configuration as used in this procedure refers to such variables of the crane as boom length, boom angle, counterweight, outriggers extended and set/tracks extended or retracted and attachments (jib, headache ball, load block, lifting devices, etc.). All above items affect the gross capacity of the crane and shall be taken into consideration prior to life.

Guidelines

If in completing the permit it is determined the lift equals or exceeds 95% or the crane configuration capacity for the greatest radius the load will achieve during pick, swing or set, the lift will not be made.

If by changing the crane configuration within manufacturing specifications a greater gross capacity may be gained, the change shall be made. If not a larger capacity crane shall be obtained and used.

Responsibilities

The Crane Lift Permit, Form 504-1 will be completed prior to the "critical lift" by the supervisor of the lift or Safety Manager. After the supervisor has completed the permit, supervision or the Safety Manager will review and sign off on the lift permit in the order listed on the permit. A copy of the permit will be placed in the cab of the lift-crane with the original field in the Safety Dept.

Other Hazards

For any electrical or other hazards involved or associated with the operations the appropriate hazard permit will also be completed prior to the lift. Each item below corresponds to the block on the form.

1. Enter the name of project.
2. Enter division and project number
3. Enter date the lift will be made
4. Enter time of day the lift will be made
5. Indicate location of plant or construction site of lift
6. Enter the manufacturer's name of the crane used to perform lift
7. Enter the manufacturer's model number of the crane used to perform the lift
8. Enter the manufacturer's serial number of the crane used to perform the lift
9. Indicate the length of the main boom land the length of jib (if equipped) that will be in crane at time of lift.
10. Indicate the maximum radius the load will achieve during the lift cycle of pick, swing and set.
11. Indicate the crane's swing direction (right or left) and degree of swing

12. Indicate the maximum and minimum elevation in feet the load will be required to reach.
13. Indicate the crane's boom angle at the beginning (pick) and end (set) or the lift.
14. Check () one of the boxes "yes" or "no". If "yes" is checked, complete the jib length and weight spaces for the configuration of the jib. Then check () one, erected or stowed.
15. Indicate the gross capacity of the crane from the manufacturer's capacity chart with the parameters as indicated in blocks 9 through 14. If the jib/boom extension will not be used to perform the lift, do no deduct its weight from the main boom capacity rating in block 15. It will be deducted as a part of block 16.
16. Indicates the crane manufacturer's recommended weight reduction for each item listed and total.
17. Describe the load to be lifted and the weight of it.
18. Enter the name of the person who determined the load's weight and how this determination was made (shipping bill-of-lading, scale, etc.)
19. Indicate the total weight of the load by adding blocks 16 and 17 together.
20. Indicate the percentage of the crane's lift capacity by dividing block 15 by block 19 if load/capacity percentage equals or exceeds 95%, the lift will not be made.
21. Verify that the rigging equipment (shackles, chokers, etc.) used to perform the lift has a 5 to 1 safety factor. If all rigging items are determined to have a capacity rating 5 times the load supported, enter a check mark () in the "yes" block, if not enter a check mark () in the "no" block.
22. Enter the size of chokers and shackles used for the lift and their physical conditions.

23. Enter a check mark () in the appropriate box if a tag line will be used.
24. Enter the number of parts in the load handling line during the lift.
25. Indicate the weather conditions during the lift, with emphasis on wind velocity and direction, the amount of voltage, height above ground lines, above or below ground, etc.
26. Indicate whether any electrical hazard is within the vicinity of the lift area (pick, swing, or set crane movements) by entering a check mark () in the appropriate box. If "yes", indicate the distance to the electrical hazard and in which direction, the amount of voltage, height above ground lines, above or below ground, etc.
27. Indicate type of soil in area of lift: loose, compacted or virgin earth; moisture content; adjacent excavations (distance from outriggers/tracts and depth); etc.
28. Indicate whether there are any existing underground hazards in the crane set-up area. If "yes", explain what type of hazard (water, sewage, drainage, electrical, etc.) and at what depth.
29. Indicate whether there are any other hazards located in the lift area that would interfere with the lift operations. If "yes", state the type of hazard involved and the distance to it.
30. Enter a check mark () to indicate whether a pre-lift meeting will be conducted with all involved persons.
31. Enter the rigger's name.
32. Enter the flagman's name.
33. Have the six individuals indicated on the Crane Lift Permit, Form 504-1, sign the form in the order that they appear.

SUSPENDED WORK BASKET/PLATFORM

General

The following procedure shall be used when employees are required to work from a workbasket suspended from a crane. It further serves to ensure that methods are in effect to maintain such a program

that meets all requirements set forth by Federal and State regulations.

A. SAFE WORK PRACTICES

a. This method shall be used only when other means of access to the work are extremely hazardous or are not possible because of structural design or site work conditions. Alternate methods and safety requirements shall be investigated before using the workbasket as an option.

b. The use of the workbasket will require approval by the supervisor, equipment supervisor, project or construction manager, and the safety manager or his designee.

c. In no case is a workbasket to be used as an elevator.

d. Employees shall keep all parts or their bodies inside the workbasket during raising, lowering, and positioning.

e. Hoisting of employees shall be discontinued upon indications of any dangerous weather conditions or other impending danger.

f. The work basket shall be hoisted just above the ground and inspected to assure that it is secure and properly balanced before employees are allowed to occupy the work basket.

g. Employees being hoisted shall be in continuous sight or and in communication with the crane operator or signal person. If at any time, the operator cannot see hand signals or hear radio-relayed signals; he/she shall stop all operations until he/she can receive signals.

h. Employees occupying the workbasket shall wear a safety belt/harness with a lanyard appropriately attached to a structural member within the workbasket.

B. DESIGN GUIDELINES

a. Work baskets shall be designed by a qualified engineer who is competent in

structural design. The basket will be designed and constructed for the specific purpose of hoisting personnel by means of a crane.

b. Lifting bridles on the workbasket shall be designed to minimize tipping of the basket due to the movement of employees occupying the basket. The basket shall be at least four feet square, headroom should be provided which allows employees to stand upright in the platform and be of weld construction with a safety factor of five.

c. A 42-inch-high guardrail for perimeter protection of personnel within the workbasket shall be maintained.

22. CONFINED SPACE

Purpose

The Confined Space Entry Procedure is designed to create a safe work environment when work is performed in a confined space. The procedure is to be used whenever employees are required to enter a confined space as defined within this procedure.

General Definition

A confined or enclosed space is any space having a limited means of access and egress, such as a manhole or other restricted opening. Confined or enclosed spaces include, but are not limited to storage tanks, vessels, bins, boilers, ducts, sewers, underground utility vaults, tunnels, pipelines, and open top spaces more than four feet in depth, such as pits, tubs, vaults, caissons, and vessels or any other space which is subject to the accumulation of toxic or flammable contaminates or has potential for an oxygen deficient atmosphere.

THE 3 BASIC CONDITIONS FOR CLASSIFING A CONFINED SPACE

a. Large enough to enter

b. Limited means of access or egress

c. Not designed for continuous occupancy

Confined Space Definitions

A. Permit-required confined space (permit space) means a confined space that has on or more of the following characteristics:

   a. Contains or has potential to contain a hazardous atmosphere;

   b. Contains a material that has the potential for engulfing an entrant;

   c. Has and internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or

   d. Contains any other recognized serious safety or health hazard.

B. Non-permit confined space: a confined space that does not contain, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harms.

C. Oxygen deficient atmosphere: an atmosphere containing less than 19.5 percent oxygen by volume.

D. Oxygen enriched atmosphere: an atmosphere containing more than 22.5 percent oxygen by volume.

E. Double block and bleed: the closure of a line, duct, or pipe by closing and locking or tagging two in line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

F. Emergency: any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants.

G. Engulfment: the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, construction, or crushing.

H. Entry: the action by which a person passes through an opening into a permit required confined space.

    a. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

I. (permit) means the written or printed document that is provided by the employer to allow and control entry into a permit space.

J. Entry supervisor: the person (such as the employer, foreman, or crew chief)

responsible for determining if acceptable entry conditions are present as a permit space where entry is planned, for authorized entry and overseeing entry operation, and for terminating entry as required by this section.

a. An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as requested by this section for each role he or she fills.
b. The duties of entry supervisor may be passed from on individual to another during the course of an entry operation.

K. An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space, injury, or acute illness from one or more of the following causes:

a. Flammable gases, vapor, or mist in excess of 5% of its lower explosive limit (LEL)
b. Airborne combustible dust at a concentration that meets or exceeds its LEL
    i. This concentration may be approximated as condition in which the dust obscures visions at a distance of 5 feet (1.52m) or less.
c. Atmospheric oxygen concentration below 19.5 percent or above 22.5 percent.
    i. Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or Subpart Z, Toxic and Hazardous Substances, of 29 CFR 1910 and which could result in employee exposure in excess of its dose or permissible exposure limit:
    ii. An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury or acute illness due to its health effects is not covered by this provision.
d. Any other atmospheric condition that is immediately dangerous to life or health.

i. For air contaminants, for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard 1910.1200 published information and internal documents can provide guidance in establishing acceptable atmospheric conditions.

L. Hot work permit: the employer's written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

M. Immediately dangerous to life or health (IDLH): any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.

a. Some materials – hydrogen fluoride gas and cadmium vapor, for example – may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possible fatal collapse 12-72 hours after exposure. The victim "feels normal" from recovery from transient effects until collapse. Such material in hazardous quantities is considered to be "immediately" dangerous to life or health.

N. Inerting: the displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen argon) to such an extent that the resulting atmosphere is non- combustible.

a. This procedure produces an IDHL oxygen-deficient atmosphere.

O. Isolation: the process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding, misaligning, or removing sections of lines, pipes, or ducts, a double block and bleed system, lockout or Tag/Out of all sources or energy or blocking or disconnecting all mechanical linkages.

P. Line breaking: the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

Q. Prohibited condition: any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

R. Rescue service: the personnel designated to rescue employees from permit spaces.

S. Retrieval system: the equipment (including a retrieval line, chest, or full body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

T. Testing: the process by which the hazards that may confront entrants of a permit space is identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

U. Lower Explosive Limit (LEL): the lowest concentration (air-fuel mixture) at which a gas can ignite. Concentrations below this limit are too lean to burn.

    a. A gas is only combustible between its LEL and UEL, but any concentration of combustible gas should be a concern. Lean mixtures can collect in an area and reach a combustible level, or rich mixtures can be diluted with air to become combustible.

Training

A. **Mechanical Services & Design Inc.**, will provide training so that all employees whose work is regulated under 29 1910.146, acquire the understanding, knowledge, and skills necessary for the safe performance of their assigned duties.

B. Training shall be provided to each affected employee-

    a. Before the employee is assigned their duties

    b. Before there is a change in assigned duties

c. Whenever there is a change in operations that introduces a new hazard, for what training has not occurred

d. Whenever there are inadequacies in performance

C. The training shall establish employee proficiency in their duties. Retraining shall do done as needed to keep employees current with their duties.

D. All training shall be certified, and records kept including, names, addresses, date of training, test scores, name of trainer. These records must be kept available to employees and their reps.

E. Training shall include-

a. Employees Entering Confined Spaces:

i. Nature of known and potential hazards involved.

ii. Proper use of required equipment specified on the permit or by the entry supervisor.

iii. Communication with attendant.

iv. Emergency Procedures.

b. Entry Attendants

i. Nature of known and potential hazards involved.

ii. Effects of hazard exposure.

iii. In use of Sign In/Sign Out Logs to account for entrants.

iv. The necessity of continually monitoring the entry.

v. Necessary communications with entrants and emergency services in case of rescue.

vi. Conditions, which require evacuation.

vii. Actions to prevent unauthorized entry.

viii. Non-entry rescue techniques.

c. Entry Supervisors

i. Nature of known and potential hazards involved.

ii. Permit procedures.

iii. Atmospheric Testing.

iv. Knowledgeable in attendant responsibilities.

v. Knowledgeable in entrant's responsibilities.

Atmospheric Testing

A. Before entry of any confined or enclosed spaces suspected of having mixtures or concentrations of flammable and/or toxic air contaminants or deficiencies of oxygen, appropriate test of the atmosphere shall be made.

a. Atmosphere must be less than 5% LEL on a combustible gas detector before entry is permitted.

i. Atmosphere must be between 19.5% and 22.5% oxygen content as measured with an 02/LEL meter.

ii. Toxicity of various substances and products must be considered before confined space entry.

B. Any confined or enclosed space found to have or suspected of having oxygen deficiency or exceeding toxic or flammable limits shall be:

a. Promptly reported to the Safety Manager

b. Posted with appropriate warning signs (i.e., KEEP OUT, FLAMMABLE, TOXIC, etc.).

c. Ventilated/exhausted if appropriate

d. Re-checked by approved methods prior to entry in accordance with Item 4.1 and 4.6

C. During inert gas welding, portable and/or fixed oxygen analyzers with visual/audible alarms

shall be provided in areas where oxygen-deficient atmosphere may occur. In addition, continuous oxygen monitoring devices, equipped with appropriate warning alarms may be provided in areas designated by the Safety Department or the job site supervisor.

D. All monitoring and air sampling equipment will be maintained and calibrated in accordance with the manufacturer's specifications and shall be coordinated by the Safety Department.

E. Any confined space deemed to be IDLH shall not be entered.

F. If entry is required to determine the environment conditions/atmospheric concentrations (02/LEL) the maximum respiratory protection (Air Line, SCBA) and retrieval system attached to lifeline harness with emergency rescue personnel standing by.

G. Atmospheric test results shall be stipulated on the Confined Space Entry Permit.

Personal Protective Equipment

1. Suitable and necessary work/rescue equipment, including lifelines, belts, harnesses, respiratory equipment, or hoists, etc., shall be immediately available at all times.
    a. This equipment shall be selected with the potential hazards of possible contingencies anticipated during the work operations.
2. Appropriate eye, face and ear protection, protective clothing, shall be worn by employees.
3. Respirator Protection shall be determined by the following criteria:
    a. Air Sampling (02/LEL meter, air sampling pumps, detector tubes, etc.)
    b. Nature of work tasks to be performed.
    c. Known or potential health hazards associated with the space.
4. All appropriate personal protective equipment shall be specified on the Confined Space Entry Permit.

Ventilation and Exhaust Systems

I. When ventilation is used as an engineering control method in maintaining acceptable concentration of flammable and toxic contaminants (such as dust, fumes, mists, vapors and gases), this section will be used as a guide in the installation and operation of ventilation systems.

II. Ventilation and exhaust systems will be designed, constructed, maintained, and operated as to

ensure the required protection by maintaining a volume and velocity of exhaust air sufficient to gather dust, fumes, vapors, or gases from the confined or enclosed space and to convey them to suitable points of safe disposal, thereby preventing their dispersion in harmful concentrations into other atmospheres where employees are or will be working during ventilation operations.

III. Periodic air sampling as required by the Confined Space Entry Permit, for flammable and toxic materials and oxygen deficiencies shall be done before, during and after employee work assignments in the confined or enclosed space or ensure toxic limits are not exceeded and a safe environment is maintained.

IV. A competent supervisor shall be responsible for making appropriate tests and advising the employees doing the confined space work when the breathing air meets requirements.

V. Mechanical heaters used to heat, and enclosed or confined space must be approved for this purpose. Heaters are not allowed to be located within the confined space. If heating of an enclosed space is required where the potential of flammable vapors is present, heating must be by ducted forced air.

Electrical Lighting

A. Lighting will be provided in areas where sufficient natural light does meet requirements.

B. For work areas that may contain concentrations, which could exceed explosive limits of flammable materials, appropriate lighting systems, such as explosion-proof fixture/switches or equipment otherwise designed for explosive atmospheres, shall be used when specified in the Confined Space Entry Permit.

C. Emergency lighting shall be provided at all points of access and egress. When this is no practical, explosion-proof flashlights shall be provided to persons required to enter confined or enclosed spaces, which are subject to blackout.

D. In areas where moisture exists, portable electric lighting shall be operated at a maximum of 12 volts

and as defined within the OSHA Regulations and the National Electric Codes for Electrical installations in hazardous locations (NFPA).

Communications/Outside Watch

Communications as stipulated by the Confined Space Entry Permit shall be maintained with all personnel in enclosed or confined spaces by personnel outside those areas. This shall be accomplished by utilizing one and/or more of the following methods:

1. Visual
2. Voice
3. Telephone
4. Two-way
5. Air Horn

Proper selection shall be dictated as to whether an explosive atmosphere exists in areas of intended use.

Fire Protection

The following conditions shall be assured in confined or enclosed spaces at all times.

1. Access and egress will be maintained at all times while work is being performed in a confined or enclosed space.
2. Flammable liquids (i.e., acetone, alcohol, etc.) must be stored in approved (UL or FM) flammable liquid containers or dispensers. The amount of such flammable liquid(s) shall not be in excess of the amount necessary to perform the work each shift.
3. Properly rated fire extinguishers shall be immediately available. In instances where extreme fire potential exists, a charged fire hose shall be readily available for immediate use.
4. Cylinders containing oxygen, acetylene, or other fuel gases, shall not be taken into confined or enclosed spaces. Torches and hoses shall be removed when work is stopped, and the space is vacated for any amount of time. Oxygen and acetylene/propane hose must be disconnected from

the regulators as well.

5. All rags, brushes, wipes, gloves, etc., shall be stored in metal containers with lids outside the space.
6. All trained workers shall be the fire watch during all welding, during and heating operations to monitor for fires.
7. All flammable gas equipment, hoses, torches, etc. shall be free of defects and inspected by the crew foreman and the users prior to such operations or are adequately protected to prevent ignition.
8. All fire prevention precautions stipulated on the Confined Space Entry Permit are to be implemented prior to and during the hot work activities.

Isolation

A. All lines, pipes, or other conveyance of flammable and/or toxic materials shall be positively blinded, locked out and tagged in accordance with the Lockout/Tryout Procedure.

B. All sources of hazardous energy shall be isolated, secured and locked out at the points of control. Hazardous energy sources consist of, but are not limited to:

   a. Mechanical Motion
      i. (Rotation)
      ii. (Translation)
      iii. (Linear)
      iv. (Oscillation)
   b. Electrical
   c. Thermal
      i. (Steam)
   d. Potential

i. (Pressure)

ii. (Gravity)

iii. (Springs)

C. All isolation requirements shall be specified on the Confined Space Entry Permit.

Permits and Records

A. A Confined Space Entry Permit is to be completed by the authorized person or entry supervisor after visual inspection and before entrance is made into a confined space as defined in this procedure.

B. If the scope of work should change after work has been commenced, the authorized person shall be notified immediately by the entry supervisor, attendant or employees performing the work.

C. A Confined Space Entry Permit shall be retained for a minimum of one year after cancellation of the permit.

Emergency and Rescue

A. Rescue equipment such as but not limited to respirators, lifelines, safety harnesses, wristlets, hoisting equipment when an employee must be lifted vertically, and other equipment that may be specified on the Confined Space Entry Permit.

B. Personnel with rescue training, basic first aid and CPR must be in the vicinity of the confined space and must be readily available to render emergency assistance if required.

C. Entry rescue will be performed by emergency and rescue services provided be the host employer or contracted from professional service.

a. Each authorized entrant shall use a full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, or above the entrant's head. Wristlets may be used in lieu of the chest or full body harness if the employer can demonstrate that

the use of a chest or full body harness is infeasible or creates a greater hazard and that the use of wristlets is the safest and most effective alternative.

b. The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device shall be available to retrieve personnel from the vertical type of permit spaces more than 5 feet deep.

    i. If an injured entrant is exposed to a substance for which a Safety Data Sheet (SDS) or other similar written information is required to be kept at the worksite, that SDS or written information shall be made available to the medical facility treating the exposed entrant.

23. INORGANIC ARSENIC CONTROL

Purpose

The purpose of this operating procedure is to prevent exposure to inorganic arsenic by means of engineering and work practice controls.

Program Elements

A. Operations that involve the application of heat to the internal parts of coal fueled boilers, precipitators, air heaters, duct work, fan housings, etc., have been known to release concentrations of inorganic arsenic. These operational tasks include, but not limited to the following:

   a. Burning or cutting
   b. Welding
   c. Grinding
   d. Arc Gouging

B. By applying engineering controls, levels of inorganic arsenic can be reduced. Before and during operations suspected of inorganic arsenic exposure, the following engineering controls are recommended:

   a. Vacuum areas scheduled for work.
   b. Wash down areas scheduled for work.
   c. Ventilate and circulate the air while work is being conducted.

C. Upon commencement of any project where the possibility of exposure to inorganic arsenic exists, monitoring is required to determine the airborne concentration of inorganic arsenic to which employees may be exposed. The following guidelines for monitoring are in

compliance with OSHA Standard CFR 1910.1018, (e)(1)(2)(3)(4), which have been identified as being applicable to the construction industry,

a. Initial monitoring shall be conducted.
b. Representative sample of employee exposure shall be taken.
c. Samples shall be taken over an 8-hour time period (for at least 7 continuous hours).
d. All employees working in regulated areas while the monitoring process is being conducted and before inorganic arsenic levels have been determined, will be provided with the appropriate personal protective equipment.
    i. Respirator, high efficiency particulate air filter (HEPA.) – 99.97 PCT efficiency against 0.3 micrometer mono-disperse diethyl-hexyl phthalate (DOP) particles.
    ii. Disposable Tyvek type full body coveralls.
    iii. Gloves
    iv. Vented goggles when necessary to prevent eye irritation.
e. If the initial monitoring reveals exposure to be below the action level of five micrograms per cubic meter of air, measurements need not be repeated, and the Inorganic Arsenic Control Program may be discontinued.
f. If initial monitoring reveals employee exposure to be above the action level and below the permissible exposure limit, re-monitoring must be performed at least every six months. If levels do not reach or exceed the permissible exposure limit, personal protective equipment and shower facilities are no required.
g. If initial monitoring reveals employee exposure to be at or above the permissible exposure limit of ten micrograms per cubic meter of air, re-monitoring must be

performed at least every three months. When levels of inorganic arsenic are at or above the permissible exposure limit, personal protective equipment as prescribed in program elements III, D. of this standard operating procedure shall apply.

h. Re-monitoring shall be conducted at required frequency (three months or six months) until at least two consecutive measurements, taken at least seven days apart are below the action level at which time monitoring may be discontinued for that employee.

i. Whenever there has been a production, process, control, or personal change which may result in new or additional exposure to inorganic arsenic, or whenever the employee has any other reason to suspect a change which may result in new additional exposure to inorganic arsenic, additional monitoring which complies with this standard operating procedure will be conducted.

D. Employee Notification:

a. Within five working days after receipt of monitoring results, the Safety Manager will supply the shop with written notification to be posted in a conspicuous location for employees to read.

E. Regulated Areas:

a. Signs will designate areas in which there is a possibility of exposure to inorganic arsenic and unauthorized personnel will be equipped with the appropriate protective equipment.

F. Prohibited activities in regulated areas:

a. No food or beverage consumed.

b. No smoking.

c. No chewing tobacco or snuff.

d. No chewing gum.

G. Change Rooms:

a. Clean change rooms shall be provided for storage of street clothes and separate storage facilities for protective clothing and equipment.

H. Field Sanitation:

a. Shower facilities shall be provided and all personnel working in regulated areas shall take a shower at the end of the work shift.

b. Lunch facilities will be provided for personnel working in regulated areas.

c. Employees shall wash hands and face prior to eating.

24. HOT TAPPING

Guidelines

A. Both hot tap permit and hot work permit shall be required prior to starting this task.

B. To maintain control of the conditions under which welding or hot tapping can be done, responsible supervision in charge will:

   a. Determine that the contents of the system will permit welding. Hot work on lines or vessels containing corrosive or toxic materials shall be given special consideration. Certain materials may cause metallurgical or chemical changes in the heat zone. Carbon steel, for example, is changed metallurgically at elevated temperatures in the presence of caustic or elemental sulfur. Welding should never be performed on equipment, which is operating above its rated working pressure and temperature, atmospheric pressure.

   b. No heating or welding on in-service airlines will be permitted. Heating compressed-air lines or vessels may cause detonation if lubricating oil has been vaporized and distributed through the system. These lines or vessels usually can be removed from service and cleaned prior to hot work.

   c. Determine if the equipment is metallurgically suitable for welding. For example, hydrogen embrittlement or attack would make it impossible to complete the weld. Some steels and thicknesses require stress relieving. Special treatment is required for high-tensile alloy steels, and special welding rods must be used.

   d. State conditions under which welding may be done and establish a safe procedure. The individual responsible for authorizing welding operations should inspect the job, and he should designate precautions to be followed before granting

authorization to proceed. A gas test of the hot work area may be required. An inspection of the parent metal is necessary.

e. Observe the operation to make sure the foregoing conditions are followed during performance of the job.

f. Determine the suitability of the hot-tapping machine. Hot-tapping machines, depending upon their design, are limited to use up to their maximum pressure-temperature ratings.

g. Make sure the correct equipment or line has been selected to be welded or hot-tapped (e.g., correct flange rating, etc.).

h. Obtain approval from the operations supervisor or unit operator, area maintenance supervisor and the Safety Manager, and obtaining a hot tap permit and hot work authorization from an authorized person prior to starting.

i. Provide either a suitable fire extinguisher (preferably dry chemical) and/or a pressurized fire hose as directed on the hot work authorization.

j. Determine by inspection and by the use of approved thickness measuring devices by a qualified person that the equipment to be welded or hot-tapped is of sufficient strength and thickness to receive the connection. Previous inspection records and data on corrosion rates will be helpful in making this determination.

    i. Studies have indicated that most steels should be preheated prior to welding when the fluid or metal temperature is less than 50 F.

Special Consideration

A. Pipelines

a. In performing hot work jobs below grade level, excavations should permit quick access and exist by personnel. If necessary to remove fumes or flammable vapors, an air siphon or some other positive means of ventilation should be provided. If the job is above ground in a congested area, necessary precautions should be taken to prevent the trapping of personnel.

b. Flow in the lines shall be maintained, at least until after welding operations have been complete. If the line is long and heat can be dissipated without flow, the flow maybe discontinued. Generally, lines in overland transmission service would be considered long lines. Lines in refineries, plants, etc., would usually be considered short.

c. In certain cases, such as flare lines with insufficient flow or without flow in the line with inert gas, or hydrocarbon gas. Such gas should be kept flowing through the lines during the welding operation.

d. If an underground line runs through a casing, be sure that welding is done on the proper line and not on the casing.

B. Tanks

a. The following precautions are recommended to prevent either ignition of a flammable atmosphere in the vapor space due to application of external heat or release of flammable vapors from vents, which may create a hazard at the hot work location.

i. **All Tanks.** Never pump in or out of tanks or agitate the contents of tanks while hot work is in progress. The agitator switches should be tagged "OPEN". Close and tag all valves on produce lines at the tanks. Avoid any

procedures associated with operation of gas-blanketing valves or heater coil valve, which would cause venting to occur. A hand/tape gauge of the tank contents should be made.

ii. **Cone-Roof Tanks.** Maintain at least 3' of liquid above the hot work area when welding or similar hot work is being done.

iii. **Floating-Roof Tanks.** Welding may be performed on the outside of the tank shell 3' or more below the liquid level. Never perform welding or similar hot work on the roof, on the sleeves of the roof legs, or on pontoon hatches.

25. LEAD CONTROL

Purpose

The purpose of this operating procedure is to prevent over exposure to lead by means of engineering, work practice and administrative controls outlined in this program and procedure. This written program, work practices, procedures, abatement methods, exposure routes, monitoring results are to be reviewed and the written program is to be revised every 6 months. Each and every site will develop a written site-specific compliance program to be developed and implemented to reduce exposures at or below the permissible exposure limit. Where feasible, the Action Level.

I. Scope

a. Operations that generate lead dust and fumes include but are not limited to the following:

   i. Flame-torch cutting, welding, and grinding of lead painted surfaces in repair, construction, reconstruction, dismantling and demolition work;

   ii. Abrasive blasting of bridges and other steel structures containing lead-based paints;

   iii. Using torches, heat guns, and sanding machines during abatement of lead-based paint;

b. Operations that involve exposure to lead-containing products include but are not limited to:

   i. Spray painting bridges and other structural steel with lead-based paints and primers;

   ii. Using solder in plumbing and electrical work.

II. Program Elements

a. Determination of Presence

i. When advise by a competent authority, such as the Safety Manager, that a potential lead hazard exists or if management suspects it, supervision, or any employee, the following steps shall be taken:

1. Obtain all Material Safety Data Sheets relevant to any paint coating or substance containing lead or suspected of containing lead in order to determine the presence of lead, chromium, zinc or any other heavy metal contaminate that may be present in the material.
2. Make every effort to obtain any and all test results conducted by the owner or any other responsible party.
3. Make use of lead check test kit to provide a convenient method for detection of lead on painted metal surfaces.
4. Conduct exposure monitoring of the air during work operations. (See section 3.5 of this program).

III. Administrative Controls

a. Once the presence of lead has been established and the scope of work defined, the following administrative actions shall be taken:

i. Employee Training-

1. All affected employees shall be trained under the requirements of 29 CFR1926.62, The OSHA Lead Standard for Construction.
2. Where needed they will be trained under the guidelines of the EPA Accreditation for Lead Removal.

3. All Employees will be informed as to their rights to be trained and the content of 1926.62-Lead, Appendix A to 1926.62 Substance Data Sheet for Occupational Exposure to Lead, Appendix B to 1926.62- Employee Standard Summary and Appendix C to 1926.62- Medical Surveillance Guidelines.
4. Training is to take place for affected employees, prior to the time of assignment, and repeated annually. The Employer shall ensure employee participation.
5. The Employees should be informed of the specific nature of the operations which could result in exposure to lead above the action level and for whom the possibility of skin or eye irritation exists.
6. Employees should be informed of the purpose, proper selection, fitting and use and limitations of respirators.
7. Employees shall be informed of Engineering Controls and work practices associated with the employee's job assignment.
8. The Employees shall be informed of the purpose & description of the medical surveillance program & the medical removal program including information concerning the adverse health effects associated with excessive exposure to lead, with particular attention to the adverse reproductive effects on both males and females.
9. Employees shall be informed that Lead Paint can cause adverse effects on the reproductive system.

10. Employees shall be trained about potential exposure to airborne lead at any level prior to the time of initial job assignment.
11. Employees shall be informed on the contents of any compliance plan in effect.
12. Employees shall be informed that chelating agents should not routinely be used to remove lead from their bodies and should not be used at all except under the direction of a licensed physician

b. Access to information-

i. **Mechanical Services & Design Inc.** shall make readily available to all affected employees a copy of this standard and its appendices.

ii. **Mechanical Services & Design Inc.** shall provide, upon request, all materials relating to the employee information and training program to the Assistant Secretary and the Director.

iii. **Mechanical Services & Design Inc.** will train on and provide a copy of materials pertaining to the Occupational Safety and Health Act.

c. Hazard Communication

i. All information provided in the Material Safety Data Sheets, the substance data sheet for occupational exposure to lead as specified by O.S.H.A. Standard 29 CFR 1926.62 Appendix A and Appendix B Employee Standard Summary.

ii. The content of the O.S.H.A. Standard pertaining to lead (29 CFR 1926.62).

iii. Specific nature of the operations, which could result in exposure to lead.

iv. The purpose, proper selection, fitting, use and limitations or respiratory protection.

v. Engineering controls and work practices associated with employee job assignments.

vi. The contents of any site-specific job or safety execution plan.

vii. The purpose and a description of the medical surveillance program, and information concerning the adverse health effects associated with excessive exposure. (Both male and female.)

IV. Medical Surveillance and Biological Monitoring

a. Prior to placing a worker in a job with a potential for exposure to lead at or above the action level for 30 days or more per year, a licensed physician shall evaluate and document the workers baseline health status by collecting medical, environmental, and occupational histories by performing a physical examination and by requesting physiological and laboratory tests appropriate for the anticipated occupational risks. ALL medical surveillance is provided without cost to the employee and at a reasonable time and place.

i. Physician Instruction

1. A complete and retailed work history is important in the initial evaluation. This initial evaluation can be used as a baseline to evaluate future exposures. A listing of previous employment with information on work process, exposure to fumes or dust, known exposure to lead or other toxic substances, respiratory protection used, and previous medical surveillance should be used in the

worker's record. Smoking or eating habits in work areas, laundry procedures, and use of any protective clothing or respiratory equipment should be noted.

2. The medical will include a listing of all past and current conditions; any current medication; previous surgeries and hospitalizations; allergies, smoking history, alcohol consumption and non- occupational lead exposures from hobbies or other activities.
3. The medical examination, both initial and periodic, should include the following:
    a. A thorough physical examination that pays particular attention to hematological, gastrointestinal, renal, cardiovascular, and neurological systems.
    b. An evaluation of pulmonary status to determine whether the worker is capable of wearing a respirator.
    c. Blood pressure measurement.
    d. A blood sample for analysis to determine lead blood levels, hemoglobin and hematocrit, blood urea nitrogen, serum creatinine and zinc protoporphyrin.
    e. A routine urinalysis with microscopic examinations.
    f. Pregnancy testing for laboratory evaluation of fertility.
    g. Any laboratory or other test that is recommended by the examining physician.

b. Biological Monitoring Frequency

i. All employees performing work where the potential for lead exposure exists shall receive a baseline examination as defined.

ii. All employees performing work for a continuous period of thirty days shall be re-evaluated with blood test every 6 months.

iii. All employees with blood level indicating levels above 40 ug/dl of whole blood shall be re-evaluated at least every two months. This frequency shall continue until two consecutive blood samples and analyses indicate a blood level below 40 ug/dl of whole blood. And at least monthly during the removal period of each employee removed from exposure to lead due to an elevated blood test level.

iv. Any employee with blood levels indicating levels above 50 ug/dl of whole blood shall be removed for the restricted lead affected area. Biological monitoring shall continue monthly until levels are below 40 ug/dl of whole blood.

v. Whenever the results of a blood lead level test indicate that an employee's blood lead level is at or above the numerical criterion for medical removal, Mechanical Services & Design Inc. shall provide a second (follow up) blood sampling test within two weeks after the employer receives the results of the first blood sampling test.

c. Employee Notification- Within five working days after the receipt of biological monitoring results, Mechanical Services & Design Inc. shall notify in writing each employee whose blood lead level is at or above 40ug/100g, of that employee's blood lead level. At this point, the standard requires temporary medical removal

with Medical Removal Protection benefits when an employee's blood lead level is at or above the numerical criterion for medical removal.

V. Work Practice Controls

a. Areas in which there is a possibility of exposure to airborne lead at or above the action level, the area will be designated by, signs, barricades and unauthorized personnel will be restricted. All efforts through engineering and administrative controls shall be made to keep all exposures below the Action Level of 30 micrograms per cubic meter of air. All authorized personnel will be equipped with the appropriate protective equipment, receive baseline medical monitoring, and required training per this program. The signs shall state WARNING: LEAD WORK AREA POISON NO SMOKING OR EATING.

b. Engineering controls such as wet methods, ventilation, paint stripper, negative air, etc., shall be used to control lead exposure. Documentation of all air monitoring including the source of the lead is required. A description of each operation in which lead is emitted should be outlined (i.e. machinery used, materials used, materials processed, controls in place, crew size, & employees job duties).

i. When flame-torch cutting/burning, or arc welding is required on metal surfaces coated or painted with a lead-bearing substance the following shall be required:

ii. If possible, increase the length of the cutting torch, thereby increasing the distance of the worker from the source of contamination.

iii. Strip back the lead-bearing paint coating at least four inches from the area of heat application. This shall be done by the use of a hand-held rotary

penning machine, needle gun or grinder, all shall be equipped with a high-efficiency particulate air filtering vacuum system. Dust collection and capture shall be accomplished at the point of generation.

iv. Work upwind of cutting torch operating when configuration of the job permits.

v. Make cold cuts using tools such as porta-band saws.

vi. Use wet method to reduce the spread of dust when possible.

vii. Personal Protective Equipment

c. PPE

i. Gloves, hats, vented goggles, shoes or disposable shoe covers and other PPE shall be provided by the employer at no cost to the employee. PPE shall be cleaned, laundered, properly disposed of and repaired and or replaced as necessary.

ii. During the exposure monitoring process conducted in the initial determination period all employees shall be required to wear respiratory, face and eye protection and full-body coveralls.

iii. PPE shall be decontaminated before entering clean areas.

iv. After exposure monitoring has been considered, the airborne concentrates revealed shall determine respiratory protection.

d. Respiratory Protection Guidelines/Exposure Limits

i. No employee shall be exposed to lead concentrations greater than 50 micrograms per cubic meter of air averaged over an 8-hour period. Airborne exposure and personnel exposure levels are to be established by air

monitoring. When lead levels are reaching the Action Level, additional Engineering controls and PPE shall be utilized.

ii. Personal sampling shall be collected in the employees breathing zone.

1. LEAD (PEL) Permissible exposure limits = 50 ug/m3
2. LEAD (AL) Action Level = 30 ug/m3
3. Less than 10 x PEL – half-mask air purifying respirator equipped with (HEPA) high efficiency particulate air filters.

a. Protection of employees during exposure assessment air monitoring where lead containing coatings or paint are present and tasks are to be performed such as: manual demolition of structures, manual scraping, manual sanding, heat fun applications, and power tool cleaning with dust collection systems, respiratory protection as defined in item A shall be required while engineering and work practice controls are instituted. Respirators are to be worn if work cannot be controlled under the action level.

i. 10 to 50 x PEL = full-face piece equipped with (HEPA) high efficiency particulate air filters.

b. Protection of employees during exposure assessment air monitoring where lead containing coatings or paint are present during rivet busting, power tool cleaning without dust collection systems, lead burning, clean-up activities where dry expendable abrasives are used, abrasive blasting

containment removal or movement and the use of lead containing mortar, respiratory protection as defined in Item 2 shall be required.

i. 50 to 100 x PEL = supplied air respirator operated in positive pressure, or demand mode.

c. Protection of employees during exposure assessment air monitoring where lead containing coatings or paint are present on structures when performing abrasive blasting, welding, cutting or torch burning on steel that lead containing paint were not previously removed, respiratory protection as defined in Item 3 shall be required.

4. All employees required to wear a respirator shall be properly trained, fitted and medically able to perform work in the specified respiratory protection. All respirators shall be NIOSH approved. Employees have the right to choose a Powered Air Purifying Respirator at no extra cost to the employee. Appropriate Respiratory Protection shall be used during the time period necessary to install or implement engineering or work practice controls

e. Hygiene Practices

i. Shower facilities shall be provided and all personnel working in regulated areas shall take a shower at the end of the work shift. Decontamination (decon) areas shall be located between the work/regulated area and the clean or changing area. Clean area shall be provided for employees to change clothes.

ii. The following activities are prohibited in the regulated area:

1. Eating/drinking food or beverage
2. Smoking
3. Chewing tobacco or snuff
4. Chewing gum

iii. Employees shall wash hands and face prior to eating.

iv. Disposable protective coveralls shall be disposed of in a container or bag labeled caution: clothing contaminated with lead. Dispose of in accordance with applicable local, state, or federal regulations.

v. Shaking or blowing equipment or clothing to disperse lead dust shall be prohibited.

vi. To clean surfaces, floor, or equipment, using a vacuum, equipped with a high efficiency filter, shall only do the task.

VI. Exposure Monitoring

a. Upon commencement of any task where the possibility of exposure to airborne lead exists, air monitoring is required to determine the following:

i. Identify sources of exposure

ii. Select appropriate respiratory protection (See section 3.4.2. of this program)

iii. Determine the effectiveness of work practices in controlling exposures.

iv. Recognize the need for modifying exposure/control practices including the need for additional engineering control.

v. Determine the need for medical monitoring.

b. Frequency and Procedure

i. Initial monitoring shall be conducted using air-sampling pumps.

ii. Representative sample of employee exposure shall be taken and documented to include date of sample; location within the worksite, the name and SSN of each employee monitored.

iii. Samples shall be taken over an 8-hour time period, for at least 7 continuous hours.

    1. If the initial monitoring reveals exposure to be below the action level of thirty micrograms per cubic meter of air (30 ug/m3), measurements need not be repeated.

    2. If the initial monitoring reveals exposure to be above the action level (30 ug/m3) and below the permissible exposure level (50 ug/m3), re-monitoring must be performed at least every six months.

iv. If monitoring reveals exposure to be above the permissible exposure limit (50 ug/m3) the employer shall repeat monitoring quarterly.

v. Monitoring shall continue at the required frequency (three months or six months) until at least two consecutive measurements, taken at least 7 days apart are below the action level at which time monitoring may be discontinued for that employee.

vi. Whenever there has been a production, process, control, or personnel change, which may result in new or additional exposure to lead, or whenever the employer has any other reason to suspect a change which may result in new or additional exposure to lead additional monitoring in accordance with procedure shall be conducted.

1. Measurements of airborne lead made in the preceding 12 months may be used to satisfy these requirements if the sampling, analytical method, and work task are the same.

VII. Employee Notification

a. Within 5 working days after receipt of monitoring results, the Safety Manager will supply the job site with written notification to be posted in a conspicuous location. All records pertaining to this program and procedure will be made available upon request to affected employees.

26. HAZARD COMMUNICATION PROGRAM

Approved by: Safety Manager

Date_____ Date_____

- INTRODUCTION

Our scope of work is Mechanical Contracting. We have little turnover, and few temporary workers are employed sporadically.

All chemicals are shipped to us from major chemical manufacturers. Safety data sheets (SDS) are on hand for all chemicals and all containers are clearly identified with prominent labels. We do not prepare our own SDSs but rely on the data sheets provided by these dependable suppliers.

It is our practice to actively communicate to employees the chemical hazards associated with their work and the necessary job safety precautions, safety equipment, or personal protective devices to be utilized. On the job this information is communicated through supervisors and job trainers.

Our safety manager reviews the chemicals we use with any new hires and the safety precautions required in handling the chemicals. Safety data sheets are also reviewed, and employees are shown where these SDSs are available to. Personal protective equipment is provided for use in working with chemicals.

It is each employee's responsibility to follow safe working practices as outlined in our plant safety rules and local operating procedures or to follow the safe working practices outlined in the SDS.

- GENERAL

This Hazard Communication Program is designed to comply with the Occupational Safety and Health (OSHA Hazard Communication Standard, 29 CFR 1910.1200. The objective of this program is three-fold:

1. To maintain a hazard communication program which meets or exceeds the OSHA Hazard Communication Standard.
2. To make hazardous material health and safety information available to employees and contractors; and
3. To provide employee training on chemical hazards, safe work practices, and protective measures.

4. This written HCP includes:

   4.1 A copy of the most recent materials and chemicals inventory for the facility (See Appendix

   4.2 Attendance lists of employees (and contractors' employees) who have been trained in the Hazard Communication Standard (See Appendix B).

   4.3 A copy of the federal Hazard Communication Standard (See Appendix C).

   This Hazard Communication Program (HCP) summarizes and reinforces our regular safety committee activities. The effectiveness of this program depends on the active support and involvement of all personnel.

PROGRAM MANAGEMENT

The owner of the company has the overall responsibility for this program with assistance from the Safety Manager and other members of management. We will draw on other resources if necessary to implement and maintain the program.

The supervisors are designated as the company's hazard communication coordinators.

Program Administrator (Safety Manager or designee)

- Coordinating the company's overall compliance with the Standard.
- Maintain the program and review of its effectiveness.
- Oversees updating of the hazardous material list, maintenance of material safety datasheets notebooks, periodic monitoring of the in-house labeling program, employee training and maintenance of training records.

Hazard Communication Coordinator (Safety Manager or designee):

- Directing the taking of the basic chemical inventory, adding, or deleting from the inventory as new chemicals are added or no longer used in the facility.
- Will follow up, if necessary, to obtain SDSs on new materials or revised
- SDSs for changed materials.
- Assisting in developing safe handling procedures with any
- Non-routine chemical handling.
- Arranging to provide contractors with information on materials and chemicals used in this location should their work bring them near any of these chemicals.

- Coordinating emergency and hazardous spill procedures, fire drills, and fire department activities related to hazardous chemicals.
- Coordinating new employee training and any transferred employees who have not had the training, as required under the Standard.
- Providing for employee training when involved in non-routine activities.
- Perform an annual audit or review of the effectiveness of the program.

Shipping and Receiving Coordinator

- Responsible for reviewing and ensuring proper labeling and safety data sheet on incoming and outgoing materials.

EMPLOYEE

- It is the responsibility of all company employees to be familiar with the material with which they work or may be exposed to and handle those materials properly.

CHEMICAL INVENTORY

A list of hazardous material present at the facility is maintained in Safety Data Sheet (SDS) electronic library. The identity of the substance used on the list is the same as that which appears on the manufacturer's labels, the in-house label, and the Safety Data Sheet for that substance.
This inventory is updated as new chemicals are added or individual chemicals are deleted from our inventory.

HAZARD DETERMINATION

We do not prepare our own Safety Data Sheets, nor do we determine each material's hazards, but rely on the data sheets provided by these dependable suppliers.

SAFETY DATA SHEETS (SDS)

SDSs are provided by our suppliers to outline the special precautions and controls necessary for handling hazardous materials.

A binder of SDSs is maintained by supervisors. This binder is readily available to supervisors and employees and to the safety committee. SDS's are in English. If one is needed in a different language, one will be provided for that language and made sure it is understood.

SDSs are available to employees who work with these materials for review on request. If an employee who works with these materials or his or her physician wishes to obtain a copy, one will be provided in response to a written request. Since these are generic chemicals, we do not have concerns about trade secrecy with the chemicals.

When new or revised substances come into our company, an SDS, if not provided with the initial shipment, will be obtained and employees will be trained in its use.

When a substance arrives without an SDS or without a properly completed SDS, the company response is two-fold:

1. The manufacturer is made aware of the deficiency and that an appropriate SDS must be supplied, and
2. The product is not used until an SDS is obtained from the manufacturer or third-party supplier.

LABELING

Labels provide information to employees concerning the potential hazards of chemicals in use at the facility. All manufacturers' labels, including the name and address, will remain on drums and containers coming to the plant.

At a minimum, each label contains the following information:

- Identification of material in the container
- Appropriate hazard warnings, such as fire hazard, health potential, etc.
- Name and address of manufacturer or supplier

The chemical manufacturer already affixes labels to containers of chemicals we receive. We advise these outside suppliers of any irregularities we see. These will be in English and other languages as needed.

Labels may not be defaced or removed. When improper labeling or a container's label is defaced, the product will be labeled with the correct identification and appropriate hazard warnings for internal use. Improperly labeled material/product cannot be used until it is properly labeled.

Pipes and piping systems will be labeled and/or color-coded identifying the transfer of chemicals at this facility.

Secondary containers into which hazardous materials are transferred from labeled containers and which are intended only for **immediate use of the employee who performs the transfer** are not labeled, as outlined in the Standard. To meet the definition of "immediate use" the container must be under the control of the employee performing the transfer and to be used within the work shift when the transfer was made.

Trained employees will label secondary containers that are not for immediate use of the employee who performs the transfer with the chemical or product name and appropriate hazard warning.

TRAINING

Employees receive hazard communication training during initial orientation. The initial orientation discusses:

1. The scope and content of the OSHA Hazard Communication Standard.
2. The availability of the written hazard communication program, the hazardous material list, and SDSs.
3. Interpretation of SDS and labels; and
4. The physical and health hazards of the materials to be encountered during the employee's duties, proper handling procedures, appropriate personal protective equipment, ways to detect the presence of the hazardous material, and special precautions.

Employees to document that hazard communication training has been provided complete a sign-up sheet. Sign-up sheets will be filed with the Safety Manager.

Refresher training is provided when an employee may be exposed to a new hazard as a result of job transfer or the addition of a new hazardous chemical. The same sign-up sheet is used and filed.

CONTRACTORS (sub-contractors are included)

Contractors are responsible for properly performing work under their contract with the company. This responsibility includes compliance with all applicable local, state, and federal safety and health regulations. To ensure that contractors know what is expected of them, contract specifications include the following:

1. Designation of a contact person to represent the contractor;
2. A statement identifying the contractor's responsibility to comply with all local, state, and federal safety and health regulations;
3. The contractor's requirement to provide and enforce the use of personal protective equipment as appropriate; and,
4. A request for a list of any hazardous chemicals the contractor will introduce into the company workplace or job-site.

Each contractor bringing a hazardous substance on-site provides the company with pertinent information on the substance, the labeling system in use, and the precautionary measures to be taken in working with the substance. This information is supplied to and reviewed by the Safety Manager before the contractor brings the material on-site.

Outside contractors are responsible for training their employees on the chemical hazards to which they might be exposed. The company identifies to the contractor the chemicals and associated

hazards that could be present in the area in which they will work and the appropriate protective measures required to minimize their exposure.

- NON-ROUTINE OPERATIONS

Methods will be documented as how and by whom employees will be informed of the hazards of non-routine tasks and the hazards associated with chemicals such as those contained in unlabeled pipes in their work areas.

In the event that any employee is required to engage in a non-routine task that could result in exposure to hazardous materials, the area supervisor notifies the employee of the following before the task is initiated:

1. Nature of the hazardous material likely to be encountered,
2. Hazards associated with exposure to the materials,
3. Requirements for protective measures and equipment, and
4. Special precautionary measures.

- ANNUAL REVIEW

Although not specifically required under HCS, we conduct an annual review of the requirements of the Hazard Communications Standard. This activity also provides an opportunity for employees to ask questions about the Standard and our program of compliance with the Standard.

27. SEVERE WEATHER PLAN

Objective

- To provide early notification of impending severe weather.
- To provide for the safety and welfare of employees.
- To prevent or reduce project damage or loss.

Definitions (Severe Weather)

Lightning – All large-scale, high tension, natural, electrical discharge in the atmosphere; the visible flash of light accompanying such discharge.

High Winds and Rain – When the winds or rain become a hazard to the work force, or the work being performed. Wind approximately 30 mph and rain limiting visibility or footing.

Tornado – A rotating column of air usually accompanied by a funnel-shaped downward extension of a cumulonimbus cloud having a vortex several hundred yards in diameter whirling destructively at speeds up to 300 mph. Severe thunderstorm can create tornadoes.

Responsibilities

Management responsibilities during severe weather conditions will be consistent with normal line supervision functions. Decisions as to the plan to be followed, timing, curtailment, shutdown, etc., will be made by the highest-ranking member of management on hand or at customer directive.

1. Safety Manager (or designee) Responsibilities
    a. The Safety Manager will notify the staff of impending severe weather conditions when reported by the U.S. Weather Bureau.
    b. Safety Manager will keep staff updated as to location and intensity of a storm on a routine basis.
    c. Maintain communication.
    d. Severe Weather Directions
        i. Lightning

1. Avoid exposing personnel at high elevations such as on structural steel members, pipe racks, rooftops, process columns, antennas, etc.
2. Make sure that personnel do not group together and/or huddle under or near tall structures.
3. Avoid a depression withstanding or running water or a stream.
4. Have all crane booms lowered to the ground or retracted to the shortest boom length.
5. All cranes, derricks, gin poles, and erection rigs unable to be boomed down must be grounded from their booms to the ground.

ii. High winds and/or rain

1. When high wind (>20 MPH) creates a hazard to technicians or work being performed, i.e., instability in elevated areas, limited visibility due to dust or particles in the air, unmanageable materials, etc., supervision will stop work activities, re-assign work and area, properly store and secure material which might blow away, injure or damage. Lower/tie down crane booms and obtain further instruction from site manager.
2. When rain creates a hazard to technicians on work being performed i.e., un-stable footing conditions due to slippery structural steel, muddy and flooded work environments, unstable trenches or excavations, poor visibility due to rain or eye protection, supervision will stop specific work due to hazard, re-assign work duties and/or areas, and obtain further instructions from management.

iii. Tornadoes

1. Employees should be encouraged to report funnel clouds to management immediately. The following information should be reported.
    a. Name and location.
    b. Telephone number.
    c. Approximate location of tornado from your location (north, east, northwest, etc.).
    d. The direction of movement of the tornado.
    e. Approximate size of the funnel cloud.
    f. Approximate size in inches of hail, if any.
2. Advise employees as to which areas of the facility offer the best protection. The best areas are underground shelters, basements, interior small rooms, or hallways, preferably on the structure's lowest floor. Employees should be able to reach these areas within two to three minutes of an alert.
3. Advise employees not to open windows during an alert. The national weather service states that it is not a change in pressure that does damage during a tornado, but the force of the wind.
4. Advise employees to leave mobile homes or vehicles and seek a sturdier structure. If there is no shelter, lie flat in the nearest ditch.

5. Advise employees that if they are caught out in the open, they should look for a funnel-shaped cloud with obvious rotational movement. They should listen for a roaring noise.
6. Advise employees that if a tornado is spotted and appears not to be moving or in fact heading straight at them, they should take cover immediately.
7. Advise employees to take a battery-operated radio, extra batteries, water, and a first aid kit to the shelter area. The radio will advise when it is safe to leave the shelter. If the area is damaged, turn the volume to its maximum to attract rescue workers.

e. Post tornado clean up and construction start up
    i. Although the storm/tornado has passed, hazards may still exist because of unstable structures or other hazardous conditions. Therefore, a safety and project damage/loss assessment inspection shall be conducted on the project by supervision and reported to the Safety Manager (or designee) for planned clean up prior to start-us or normal maintenance or construction activities.

EMPLOYEES REQUIRED TO VISIT OTHER SITES

Summary:

This Emergency Action Plan is for any Mechanical Services & Design Inc. employee(s) who are required to perform work at another company's work site for duration of more than 1 week. The Supervisor for Mechanical Services & Design Inc. is to have a written Emergency Action Plan based on the customer's emergency procedures. The Plan may be a copy of the customers' plan with the addition of emergency contact numbers and specific employee emergency response actions if different or in addition to those actions proscribed for the customers employees within their own plan. The Emergency Action plan is to be communicated to all persons upon their initial visit to the site. Periodic retraining shall be performed if necessary (OSHA 29 CFR 1910.38)

Responsibility:

Prior to performing work at a customer's site, the Mechanical Services & Design Inc. Supervisor is to request and receive a copy of the customer's Emergency Plan. In coordination with the customer's Safety Officer an Emergency Action Plan is to be developed which meets the Standard.

The plan may be generated by the Supervisor or by the Safety Manager.

The Safety Manager (or designee) is to review the plan prior to its' implementation at the customer's site.

MECHANICAL SERVICES & DESIGN INC. SHALL ABIDE TO ALL THE APPLICIABLE SAFETY STANDARDS FOR A HOST COMPANY (CUSTOMER). PRIOR TO WORKING AT ANY OTHER FACILITY, A COPY OF THE HOST COMPANY'S SAFETY POLICIES SHALL BE OBTAINED AND ALL AFFECTED EMPLOYEES OF MECHANICAL SERVICES & DESIGN INC. SHALL BE TRAINED IN THOSE SAFETY POLICYS FOR THE HOST COMPANY.

Standard:

A site specific, written Emergency Action plan will be developed and communicated to all employees entering the customer worksite. Post all required emergency phone numbers near phones. The customer must approve the Emergency Action Plan prior to commencing work.

Each plan should address the following:

- Selected medical service groups – names, addresses, telephone numbers, etc.
- Site notification procedures for fire, medical, and environmental spill emergencies

- Employer responses to medical and fire emergencies, facility process upsets, power failures, bomb threats, inclement weather, and workplace violence
- Emergency equipment necessary to implement the emergency plan including communication devices (radios, phones, etc.)
- Evacuation routes and assembly points
- Designated Person(s)-In-Charge and specific duties of the responders
- Employee notification to return to work (all clear notification)
- Alarm systems for notification
- Training requirements for implementing this policy

Mechanical Services & Design Inc. employees are not to talk to news media without proper authority. The owner has the responsibility of reporting facility incidents.

28. LOCKOUT & VERIFICATION PROCEDURE

This procedure establishes the minimum requirements for the isolation of electrical, liquids, and mechanical energy sources to ensure the safety and health or employees where unexpected start-up or release of stored or residual energy could cause injury. The following principles must apply to energy isolation tasks to ensure an appropriate level of safety and compliance with Safety Standards. A **ZERO MECHANICAL STATE** is our goal.

A. LOCKOUT / TAGOUT STEPS

1) Prepare for the shutdown – **IDENTIFY** the types of energy sources used, potential hazards, and all control devices.

2) **NOTIFY** all affected employees

3) **TURN OFF** all the operating controls

4) **LOCATE** all energy sources

5) **ISOLATE** all energy sources (blocking, bleeding, venting stored energy)

6) **LOCKOUT** all switches and energy controls in the "OFF" or "SAFE" position.

7) **TEST (VERIFY)** operating controls. Put all controls in the "ON" position. Be sure all personnel are cleared of the area and not in harm's way.

8) **RETURN** all operating controls to the "OFF" position.

9) **PERFORM** required task.

10) **REMOVE** lockout devices only after the equipment is fully assembled and all affected employees have been notified. Each lockout device must be removed by the person who put it on.

B. LOCKS and LOCKOUT

1) Only individually keyed padlocks shall be used. Padlocks will be colored red and numbered.

2) Lockout locks will be issued to employees and are to be used for lockout purposes only. No employee's personal locks will be permitted.

3) A lockout device of the standard scissor type that will allow the placing of more than one padlock can be used.

4) The use of a piece of chain, cable, or some other type of lockout device may be necessary to complete a lockout on some valves or controls and shall be used wherever needed.

5) Employees are not permitted to work under the protection of another employee's lock. Employees must place and remove their own locks.

6) The location of lock out points on equipment or system will be identified and labeled. There will be a designed lock that will be labeled and correspond to the lockout point on the equipment or system.

7) Where more than one person – **Group Lockout/Tagout** - is assigned to work on a piece of equipment or system, each person shall be responsible for applying their own individually keyed lock to each lockout device.

8) A lock box system may be used to affect a lock out when locking out a plant system or equipment that has many lockout points. The lock box program will work in the following manner:

   a. A lock box with at least one see through side will be used.

   b. The keys to the locks used to accomplish the lockout will be placed inside the box.

   c. The box will have the capability to accept a lock or locks that will make it impossible to remove the keys inside without removing the lock(s) from the outside of the box.

   d. A control lock will be utilized on the outside of the lock box to ensure the integrity of the lock out and the control lock key shall be maintained by supervision.

C. CONTRACTORS

1) Whenever contractors and other outside servicing personnel perform tasks covered by the Lockout/Tagout standards, they must adhere to all the standards requirements.
2) The contractor our outside employer and the on-sire employer must inform each other of their respective lockout or tagout procedures.
3) The on-sire employer must ensure that his/her employees understand and comply with their restrictions and prohibitions of the outside employer's energy control program.

D. SHIFT CHANGE

1) Notify employees that the equipment is out of service.

2) Ensure an orderly transfer of lockout or tagout device protection between outgoing and incoming shifts to control hazardous energy. When lockout or tagout devices remain on energy-isolation devices from a previous shift, the incoming shift members must verify for themselves that the machinery is effectively isolated and deenergized.

E. VERIFICATION

1) After placing a lock on a piece of equipment, device, electrical panel, valve, or a lock box, the employee must try to activate the system (or read the verification papers the authorized employee has filled out) that they have locked out before they start work.

   Note: No device, valve, switch, control, or piece of equipment shall be operated with locks attached regardless of circumstances.

F. PROCEDURE

If device, valve, switch, control, or piece of equipment is being worked on, it shall be locked out.

1) Only the person who placed the lock shall remove it without special authorization from the Safety Manager or Supervision.

2) Padlocks shall be color coded red for Identification and shall only be used by for lockout purposes, i.e., Valves, switches, controls, electrical, etc.

3) Any employee(s) or person(s) found to have removed another's lock without authorization shall be terminated.

G. OPERATING FACILITIES AND EQUIPMENT

All systems covered under this section (e.g., electrical, mechanical, or others), are considered to be systems in the care of:

1) Owners' responsibility

   a) Only authorized employees of Mechanical Services & Design Inc. shall de-energize any system

   b) Mechanical Services & Design Inc. employees verifies that the systems are de-energized

   c) Mechanical Services & Design Inc. employees shall perform lockout tag-out

   d) Mechanical Services & Design Inc. employees shall remove the affected locks and then re-energize the system

H. LOCK CUTTING OR REMOVAL

In the event it becomes necessary to remove an employee's lock, due to his/her absence from the job, either by family emergency, sudden illness, or the employee forgot, the LOCK CUTTING REMOVAL procedure shall be strictly adhered to, and the LOCK CUTTING/REMOVAL FORM completed with all the mandatory signatures or designee signature acquired.

1) To initiate:

   a) The employee's supervisor is to be contacted and informed as to the reason for the request.
   b) If the machine that is locked out does not need to be operated, the lock can be left on until the affected employee returns to work.

   c) The Site Manager, Safety Manager (or designee) shall complete the LOCK CUTTING REMOVAL FORM. This form lists:

      1. Lock owners name and assigned lock #

      2. Name of the person requesting removal

3. Reason's for requesting

4. Attempt to contact the owner of the lock by checking the time clock, visual inspection of the workplace, or by telephone

5. Authorizing signatures

A copy of the completed form is to be kept in the Safety Dept. When the employee shows up for work on the next scheduled turn, he/she shall be informed that their lock had to be cut off and they shall sign the form.

LOCK CUTTING REMOVAL FORM

DATE_____ TIME_____ LOCK #_____

SUPERVISOR_____

Reason for Safety Lock Removal:_____

_____
_____
_____

Location and Name of Circuit or Equipment Locked Out:_____

_____
_____
_____

Locked Out By: (Name)_____

Removed By: (Name)_____

Witnessed By (Name)_____

What efforts were taken to contact the individual named on the lock?

_____
_____
_____

Describe the inspection of the control circuit or piece of equipment that the lock is being removed from:__

_____

IMPORTANT!!!!!! You must inspect the equipment or control circuit prior to the lock being removed to insure there are no tools, employees, slings, etc. are in harm's way after the lock has been removed and that the switches are in a NEUTRAL position or in the OFF position.

29. EXCAVATION, TRENCHING, & PITS

Objectives: To provide a safe means of performing excavating and trenching; to prevent accidents; to prevent injury; to protect personnel from cave-ins.

Responsibility: Excavators; Field Supervisors; Project Managers; Management; Safety Manager.

Procedure:

1. All excavation and trenching procedures must be performed and supervised by a Competent Person on each crew performing excavation and trenching operations.

2. The Ohio Utility Protection Service (OUPS) must be contacted at least forty-eight (48) hours prior to any digging at 811. Refer to local requirements when working out of the state of Ohio.

3. Utilities, such as sewer, telephone, fuel, electric, water lines, or any other underground installations must be identified. Utilities are color-coded as follows:

    a. *Yellow* *Gas or Oil*

    b. *Red* *Electricity*

    c. *Orange* *Communications*

    d. *Blue* *Water*

    e. *Green* *Sewer*

4. While an excavation is open, underground installation and utilities must be protected, supported, or removed, as necessary, to safeguard personnel.

5. The soil classification must be determined by a Competent Person (Field Supervisor) using the following criteria:

    a. Type "A" – Cohesive soils with an unconfined compressive strength of 1.5 tons of pressure per square foot (tsf) or greater. However, no soil is Type "A" if the soil is fissured, subject to vibration, has been previously disturbed or part of a sloped layered system where layers dip in the excavation on a slope of 4:1.

    b. Type "B" – Cohesive soil with an unconfined compressive strength greater than 0.5 tsf, but less than 1.5 tsf.

    c. Type "C" – Cohesive soil with an unconfined compressive strength of 0.5 tsf or less.

6. Safe means of access and egress must be located in trench excavations of four (4) feet in depth or more so as to require no more than 25 feet of lateral travel for workers.

7. NO personnel are permitted underneath loads handled by lifting or digging equipment.

8. When mobile equipment is used adjacent to an excavation, a warning system is required when the operator's vision is obstructed, or he/she does not have a direct view into excavation.

9. Personnel must not work in excavations in which there is accumulated water without necessary safety precautions.

10. Adequate protection must be provided to protect personnel from loose rock or soil by placing and keeping such materials at least two (2) feet from the edge of excavations.

11. If personnel are required to cross over excavations, substantial walkways or bridges with standard guardrails must be provided.

12. Daily inspections of excavations, the adjacent areas, and protective systems must be made by a Competent Person (Field Supervisor) for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. This inspection must be conducted prior to the start of work and as needed throughout the shift. Inspections must also be made after every rainstorm or other hazard-increasing occurrence. These inspections must include daily trenching log, soil classification forms completed as part of the inspections and kept in job file on site for inspection.

13. If a Competent Person or Supervisor finds evidence of a situation that could result in a possible cave-in, exposed personnel must be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

14. Personnel in an excavation must be protected from cave-ins by an adequate protective system except when:

    a. Excavations are made entirely in stable rock, or

    b. Excavations are less than five (5) feet in depth and examination of the ground by a Competent Person (Field Supervisor) provides no indication of a potential cave-in.

    c. Excavations less than five (5) feet in depth must be inspected by a Competent Person and proper protection provided.

15. A Protective System is a method of protecting personnel from cave-ins, from materials that could fall or roll from an excavation face or into an excavation, or

from the collapse of adjacent structures. Protection includes sloping, shoring, benching, or shielding.

16. Tests should be conducted for air contaminants including- low oxygen levels, methane or other flammable gasses, hydrogen sulfide, etc., and provide ventilation where necessary.

Shoring

Less than five feet??

You're digging for a footing or underground pipe, say at a four-foot depth. No shoring is required by OSHA, right? Well, a closer examination of the actual regulation can put you at risk.

The OSHA regulation currently in effect (adopted in 1989) Standards-Excavations, Final Rule states the following:

§1926.652 Requirements for protective systems.

(a) Protection of employees in excavations.

[1] Each employee in an excavation shall be protected from cave-ins by an adequate protective system except when – (ii) Excavations are less than 5-feet in depth and examination or the ground by a competent person provides *no indication of a potential cave-in*.

In an effort to clarify this information with OSHA, their comments are as follows:

"If working in an excavation [or trench] let's say four foot in depth. If there is presence of moisture [or] seepage, or if the soil is non-cohesive and shows any signs of cave-in, collapse, sliding, cracking, weakening, crumbling, etc., [as with Type B & Type C soils], then a *potential hazard* exists for the workers within the trench – especially those who are bent over or down on their knees. A compliance officer would address the issue on a case- by-case basis."

When asked if there had been any occurrences in which a contractor was, in fact *in violation* for not shoring an area or excavation less than five feet in depth, the answer can confidently and without hesitation: "YES".

While there are no specific guidelines to follow regarding a less than five-foot situation, a careful review of the trenched area for possible bad soil conditions or cave-in should be made.

The Bottom Line

- **You may still need to protect trenches and excavations less than 5 feet in depth.**

•Review any trench for integrity. Use your best judgment. CHECKLIST FOR

UNDERGROUND UTILITIES INFORMATION

1. Have the following checklist ready before you call Ohio Utilities Protection Service (OUPS) 811. Follow local requirements when working outside the state of Ohio.
2. Call 48 hours or 2 working days before you dig or start work.
3. You must call OUPS (or local agency when working outside the state of Ohio) before starting any job. (NOTE: Some utility owners do not belong to the one call service. Example: Some cities, gas transmission companies, or in-plant or private companies) OUPS will give you a list of those utilities listed with and without them. It is your responsibility to call those that are not listed with OUPS.
4. Know before you call – OUPS will ask.
   (a) County, City or Township (usually found on cover sheets of plans)
   (b) Location of work (street address)
   (c) Nearest intersecting streets/roads
   (d) Extent of work location – Front/Rear/Both Sides
   (e) Date of excavation
   (f) Starting time of excavation
   (g) Type of work
   (h) Caller's name
   (i) Contact person/additional information
   (j) If job is small or it is practical to do so, mark the area where you will be digging with white paint so Locators will know exactly where you will be digging.
5. After your initial call to OUPS
   (a) Notify the Safety Manager or the Plant Manager and give him/her your information
      1) Name of job with the reference number
      2) Let him/her know if you need an update on the project as being on-going

3) Let him/her know if you need a re-marking of a utility that has already been marked

4) Let him/her know when project is finished, or updates are no longer needed

5. Know the uniform color codes.

UTILITY LOCATION & COORDINATION COUNCIL UNIFORM COLOR CODE

RED	Electric Power Lines, Cables, Conduit and Lighting Cables
YELLOW	Gas, Oil, Steam, Petroleum, or Gaseous Materials
ORANGE	Communication, Alarm or Signal Lines, Cables or Conduit
BLUE	Potable Water
PURPLE	Reclaimed Water, Irrigation and Slurry Lines
GREEN	Sewers and Drain Lines
PINK	Temporary Survey Markings
WHITE	Proposed Excavating

30. GENERAL INSTRUCTIONS FOR MSD EMPLOYEES

01 – General

For your protection, KNOW AND FOLLOW THE SAFETY AND HEALTH RULES AND INSTRUCTIONS. If you always plan and think of the safe way to do a job, you will act and work safely. Get in the habit of asking yourself "What If" before taking that next job step. If you are not sure, ask someone who knows.

1.1 Violation of any Safety and Health Rules, Orders or Safe Practices may be cause for disciplinary action.

1.2 Any injury, illness, near miss accident, or incident, must be reported to your supervisor or Safety Manager immediately.

1.3 Report all unsafe conditions, such as tools, equipment, work areas and structures, to your supervisor or Safety manager immediately. These conditions shall include all existing and predictable physical, health, and ergonomic hazards.

1.4 Be alert to the safety of visitors, new employees, and co-workers. Do not hesitate to tell them if they are in danger.

1.5 Entering Buildings - When entering a building, stop and look around for possible movement of overhead cranes or other mobile equipment before proceeding. Always read and observe warning signs. Do not assume that crane or mobile equipment operators can see you.

1.5.1 Entry/Exit man doors shall be used for routine entry or exit of buildings. Roll up doors shall only be used when there is no entry/exit man door present.

1.6 Observe the Safety Rules where you work. Stay in your work area; don't wonder to other areas, especially if the machine you are operating is in a running mode.

1.7 Warning signs and warning signal systems have been established. Know and obey the signs and signals of the area where you work and those of any area that your work requires you to enter.

1.8 Signals - Make sure you know the Emergency Signals and Evacuation Plans in each area where you work.

1.9 Horseplay, startling, teasing, throwing of objects, scuffling, or distracting another employee is strictly prohibited.

1.10 Always drink from regular water fountains or approved water coolers. Water from any other

source may be unsuitable to drink. To assure water quality, only authorized personnel are to make repairs to drinking water lines and equipment.

1.11 Never lean against or sit on temporary or permanent hand railings or guard railings of any kind.

1.12 Rain, snow, ice, or over-hanging icicles may represent slipping or struck-by hazards. When such hazards exist in your work area, report them to your Supervisor or Safety Manager immediately.

1.13 Never dispose of empty aerosol cans or gas cylinders in dumpsters or containers in which they could be exposed to heat.

1.13.1 Disposal of Propane and Calibration Gas Bottles. Depressurize each bottle to atmospheric pressure; clearly mark the bottle EMPTY with a Semi Permanent Marker. The bottles can then be placed into a trash disposal container.

1.14 Only trained and authorized employees may use fire extinguishers, fire hoses, SCBA (self-contained breathing apparatus) and other emergency equipment.

02 – Blank

03 - Personal Protection

You are responsible for the proper use of all personal protective equipment issued to you. Alterations of personal protective equipment in any way, is strictly prohibited. Always check your equipment before use and replace if needed. Report defects to your Supervisor or Safety Manager immediately.

3.1 Only approved safety toed leather boots or shoes conforming to safety standard, ASTM 2413, in good repair, and properly laced and tied, may be worn in the plant.

3.2 Only approved safety glasses can be worn in the plant. Safety glasses with permanently attached side shields must meet the ANSI Z87.1 Industrial Standard. The Safety manager will specify which plastic frame styles are acceptable for non-prescription and prescription safety glasses. Additional eye protection, such as face shields, welding helmets, goggles, etc., may be required for specific jobs. Always wear the eye protection prescribed for the job.

3.3 Sunglasses such as Colobar, Tru Color, Photogrey, or photo-sun, etc., are not permitted for plant use without a medical condition documented in writing by the employee's doctor and approved by the Safety Manager, the Plant designated Physician and/or the Safety Manager. Employees performing jobs requiring dark lenses will be provided the appropriate clip-ons, flip

downs, goggles, face shields, or hoods.

3.4 Employees with vision in one eye only, or who are considered industrially blind in one eye, shall wear approved eye protection at all times while on plant property.

3.5 If wearing a respirator is required, you must be medically evaluated, fit tested and properly trained. To ensure an adequate seal and proper function of the respirator, facial hair or stubble must be trimmed or shaved to conform to the Mechanical Services & Design Inc. facial hair policy. Facial hair, including stubble, is never permitted between the sealing surface and the skin on tight fitting respirators. The facial hair policy does not apply to the use of dust masks.

3.6 Additional personal protection, such as gloves, arm protectors, fire resistant/retardant clothing, aprons, leggings, protective cream, etc., may be required for certain jobs. Always wear the additional protection when it is prescribed for the job.

3.7 Employees assigned as safety lookouts, safety watch, lock-out coordinator, fire watch, confined space attendants or any other designated safety position: shall wear the appropriate colored vest designated by (SJP) procedure.

3.8 Good personal hygiene is a requirement in all jobs for your safety and health and the safety and health of your co-workers.

3.9 The Safe Job Procedures (SJP) will specify the type of hand protection, personal protective equipment (PPE) that is required for each specific job. Contact your supervisor or Safety Manager to confirm PPE requirements before starting a new job that you are unfamiliar with, or a job where conditions have changed and may require additional PPE.

3.10 Employees required visiting outside processor and/or vendor manufacturing facilities are required to wear, safety glasses with side-shields, and safety toed boots or shoes. Additional personal protection, such as hearing protection, must also be worn if required by the facility.

04 – Personal Clothing / Jewelry

4.1 Employees' bodies shall be covered during working hours to comply with company regulations. Only approved apparel, worn in the proper manner shall be permitted on the job.

4.1.1 Trousers must extend at least to the ankles.

4.1.2 Shirts are required in all operating areas. The shirt shall be tucked into the trousers. Exceptions to this rule, permitting short sleeves, will be documented in writing, and approved by the Safety Manager. The specific SJP will specify if a short sleeve shirt is required for a specific task.

4.2 Flame retardant / flame resistant clothing is required to be worn where burning, cutting, and welding are taking place and in any other operation specifically designated by the company rules and the Safety Manager.

4.3 Insulated underwear and outerwear, when worn around sparks, high radiant heat devices, etc.,

must be fire resistant natural fiber (cotton, wool, denim) or an approved fire-retardant material.

4.4 Synthetic clothing, including under clothing, shall not be worn in hot areas or when exposed to burning, welding, flame, and high radiant heat areas.

4.5 Work clothes shall not be cleaned in flammable liquids, such as gasoline, kerosene, or similar fluids. Flame-retardant clothing may not be boiled or steam-washed.

4.6 Wearing of jewelry of any kind, while physically performing work is prohibited in all operating areas.

4.7 Do not wear clothing that is loose fitting, torn, or ragged to avoid being caught on projections or being caught in moving machinery.

05 – Use & Care of Hand Tools

5.1 All hand tools must be inspected each time before use. Mushroomed, cracked, or chipped heads and rough, splintered or badly worn handles must be turned in for repair or replacement. Never use a defective tool or leave defective tools where others might use them.

5.2 If you use your own personal tools, repair, or replace them as soon as they become worn or defective. All tools are subject to periodic inspection by supervision and must be replaced or repaired if found to be unsafe.

5.3 Use the right tool for the job and keep tools clean. Never use tools and equipment for purposes for which they were not designed or intended.

5.4 Tools shall be transported in toolboxes, tool belts, tool pouches, etc. designed for such use. Do not carry hand tools in pants or shirt pockets.

5.5 Never throw tools, equipment, or parts from one location to another, from one employee to another, or from one level to another level.

5.6 Do not leave tools, equipment, or materials in elevated places from which they may fall or be knocked off.

5.7 Maintain secure footing and balance and position yourself while applying pressure on a wrench or other tool, so that you won't fall if the tool suddenly moves or slips from its bite. When possible, grasp something that is firmly secure with your free hand to assist in maintaining your balance. Always work away from your body and away from co-workers. If necessary, reposition yourself and co-workers out of the working path of the tool.

5.8 Do not force tools beyond their capacity or use "cheaters" to increase their capacity.

5.9 Do not fabricate hand tools. Do not modify or in any way alter the design of existing hand tools unless they have had a non-destructive test, or a magna-flux particle test performed on them.

5.10 Only Safety approved lock blade pocketknives are permitted in the plant. Always cut in the direction away from yourself. Proper wire stripping tools must be used when preparing electrical wire.

5.10.1 Wire stripping tools shall be used when preparing electrical wire.

5.10.2 Alternate tools, other than open blade knives, shall be used to cut materials whenever possible.

06 – Powered Hand Tools & Equipment

6.1 All powered tools and equipment must be inspected before each use. All tools must be physically and mechanically sound, and appropriate for the job. If any defects are detected, the tool must be removed from service immediately. Only properly trained and authorized personnel are permitted to operate these types of equipment.

6.2 Electric tools or equipment with broken three-prong grounding plugs must be replaced or repaired before use.

6.3 Double insulated portable electric tools must be identified as double insulated so they will not be confused with grounded tools. All portable cord and plug electric tools must be connected to G.F.C.I. (Ground Fault Circuit Interrupter).

6.4 Electrical power tools are not to be used in hazardous locations as defined by the National Electric Code unless the tool is approved for service in that environment.

6.5 Guards or Shields specifically designed for portable power tools must be installed before use. Never use tools and equipment when guards or shields are defective or have been removed. Report the condition to your supervisor or Safety Manager immediately.

6.6 Temporary electric extension cords must be of the three-wire type and shall be designed for industrial usage.

6.6.1 Temporary electric cords must be inspected for kinks, worn insulation, and exposed strands of wire before use.

6.6.2 Temporary electric cords must be protected from physical damage and installed to be out of walkways, stairways, aisles, and areas where they present a trip hazard.

6.6.3 Temporary electric cords must be protected by G.F.C.I. (ground fault circuit interrupters).

6.6.4 Temporary work lighting must be protected by G.F.C.I. (ground fault circuit interrupters) and shall be protected from accidental contact or breakage.

6.7 Pneumatic Power Tools and Hose. Pneumatic power tools must be connected only to designated airlines. They shall be secured to the hose by a positive means to prevent the tool from becoming accidentally disconnected. Safety clips or retainers shall be installed on pneumatic tools to prevent the attachments from flying off. When you are finished with air- powered tools, disconnect the air hose, and release the air in the tool by pressing the trigger.

6.7.1 All hoses, fittings, and clamps must be of specific design for the use of pneumatic power tools and follow manufactures recommendations for their assembly.

6.7.2 Pneumatic hose sections must be wired together at each coupling connection.

6.8 Approved Safety side shield glasses with full-face shield shall be worn when using air operated drills, jackhammers, grinders, sanders, and cut-off saws.

6.9 Compressed Air - Never direct compressed air toward yourself or anyone else for any reason. Never connect, or allow others to connect, to plant air as a source of breathing air unless it is connected through an approved breathing air purification system.

6.9.1 Compressed air used for cleaning purposes shall not exceed 30 PSI and then only with effective chip guarding and personal protective equipment.

6.9.2 Never hook up to an unidentified line.

6.9.3 Never use compressed air to clean your person, clothing being worn, or that of another person.

6.10 Never use fixed or portable grinders without the use of protective shielding and proper eye protection. A pedestal grinder tool rest must not be more than 1/8" away from the grinding wheel and the upper tongue guard not more than 1/4" from the grinding wheel.

6.10.1 Prior to mounting, grinding wheels shall be inspected for damage by a trained and authorized person. This inspection will include a ring test when appropriate. Always check for the proper (RPM) revolutions per minute, and that it matches the specific pedestal grinder.

6.10.2 The spindle speed of the machine shall be checked before mounting of the wheel to be certain that it does not exceed the maximum operating speed marked on the wheel

6.10.3 You should not use any grinding wheel unless you have been properly instructed in its use and authorized by your supervisor.

6.10.4 Gloves should not be worn when using a pedestal or bench grinder.

6.11 Hydraulic powered tools and jacks are required to be visually inspected before and after each use.

6.11.1 Hydraulic powered tools and jacks shall have a documented thorough inspection every 6 months. The inspection records will be maintained in the department for the life of the tool or jack.

6.11.2 Hydraulic powered tools and jacks shall be permanently marked with a department number and identification number.

6.11.3 The rated load shall be legibly and permanently marked in a prominent location on the jack.

6.11.4 Hydraulic powered tools and jacks shall not be used in a manner that will exceed the rated load or any other capacity of the tool.

07 – Walkways, Roadways, & Stairs

7.1 Follow designated walkways and aisles to and from work. Walk, don't run. Be alert for moving vehicles. Look where you are going. Do not walk backward. Always glance at the walking surface ahead of you. Look both ways before crossing roads or railroad crossings or tracks.

7.2 Driving your car on company premises is a privilege. For your own safety, wear your seat belt at all times while driving.

7.3 Use stairways and walkways as provided. Do not take short cuts through stocking areas, over run-out tables or conveyors, or through any posted restricted areas. Go around or use crossover walkways where they have been provided. Do not climb over handrails or equipment.

7.4 When walking on or alongside roadways, walk facing oncoming traffic. Be constantly alert for vehicle traffic. Move to the side; do not force a vehicle to swerve to avoid striking you.

7.4.1 When walking to and from the lunchrooms, locker rooms, etc. To your work location, approved and authorized walkways must be used.

7.5 Use handrails when going up or down stairs. If carrying an object, one hand must be free for the handrail. Walk, do not run, do not go up or down more than one step at a time.

7.6 When walking through the shop maintain your balance and use handrails to assure that you do not come in contact with moving machinery or belts.

7.7 When coming out of buildings adjacent to roadways, be extremely cautious to avoid being struck by an approaching vehicle. Always look both ways before stepping onto the roadway.

08 – Welding, Burning, & Cutting Equipment

8.1 Welding, Burning, and Cutting Equipment - Only trained and authorized personnel are permitted to use gas cutting or electric welding equipment. Appropriate welders' hoods, goggles, and/or face shields must be worn for protection from flashes or sparks. An approved flame retardant jacket, burning/welding gloves, ear protection, and flame retardant clothing must be worn when burning or welding. Additional Personal Protective Equipment such as ear protection, etc. may also be required depending on work situations and department rules. Work must be shielded when welding or burning to protect others from the arc, flash, or ultraviolet rays. Always check burning equipment for leaks before use. If you leave an item that is hot, mark it as hot before you leave the station.

8.2 Hot Work Permit - Specific areas in the shop will be designated for hot work such as burning, welding, and grinding. If an area is not designed and designated for hot work; a hot work permit must be filled out before hot work can begin. The permit may require the use of fire blankets, other means of spark containment, removal of fire hazards, air quality tests, fire watch, etc., to protect other employees and surrounding property.

8.2.1 Your Supervisor or Safety Manager will designate an individual responsible for authorizing burning, welding, grinding, and other hot work operations in areas not specifically designed or approved for such operations. The work area must be inspected, and the hot work permit signed before work can begin.

8.3 If it is necessary for you to be in an area where welding or cutting is being done, exercise caution. Never look directly at the intense light generated by welding or cutting. Check your clothing to be sure you are not carrying sparks, which might set your clothing afire. Grease and/or oil on your clothes are especially dangerous if you are working around oxygen. Oxygen can cause the grease or oil to ignite.

8.4 Cylinders Containing Compressed Gases - Oxygen, acetylene, and other compressed gases must be considered dangerous fire hazards because they support or increase the rate of combustion. When handling cylinders containing any kind of compressed gas, observe the following rules and specific instructions of your supervisor: If clothes are contaminated with grease, or oil, or solvents, they must be changed before performing any burning or welding.

8.4.1 Transporting

8.4.1.1 Caps shall be in place on compressed gas cylinders unless they are in use. Always replace the caps on full or empty cylinders after regulators have been removed. It is especially important to have the caps in place while transporting cylinders to protect the valve.

8.4.1.2 Compressed gas cylinders must be transported in special containers or carriers provided for that purpose. At a minimum the carriers shall have toe guards and a retainer system to secure the cylinder from falling during transport. Do not handle cylinders with crane slings or magnets. Use good judgment when handling or moving cylinders and do not lift beyond your capabilities.

8.4.1.3 Compressed gas cylinders must always be securely tied off in a vertical position.

8.4.1.4 Do not transport compressed gas cylinders in passenger elevators.

8.4.2 Storage:

8.4.2.1 Compressed gas cylinders shall be stored with regulators removed and the cylinder caps installed and tightened.

8.4.2.2 Compressed gas cylinders shall not be stored near any area where they will be subjected to high temperatures. They must not be stored where they can make unexpected contact with electrical equipment or conductors if they should slip, roll or fall. Do not store cylinders within 20 feet of entrance/exit areas, or in stairwells.

8.4.2.3 Oxygen cylinders must not be stored in a confined or enclosed space with acetylene, liquid flammables, oils, or grease. A leaking cylinder can cause spontaneous combustion of these materials.

8.4.2.4 Acetylene cylinders must always be stored vertically and used vertically with the valve end up.

8.4.2.5 Oxygen shall be separated from fuel-gas cylinders or combustible materials at a

minimum of 20 feet or by a noncombustible barrier at least five feet high having a one-half hour fire resistance rating.

8.4.2.6 All burning carts shall have a noncombustible barrier, 1/8-inch plate between the fuel and the oxygen, which extends above the regulators. The approved cart shall also have a fire extinguisher mounted to the cart.

8.4.3 Using Cylinders:

8.4.3.1 Never use oil or grease to lubricate any part of oxygen, acetylene or other gas cylinder or regulator. Do not touch them if you have oil or grease on your hands or gloves.

8.4.3.2 If a leaking cylinder is found, remove it to the outside immediately and keep it away from any flames or combustible materials. Notify your supervisor.

8.4.3.3 Hoses for Acetylene-Oxygen Rigs - GREEN hose is for oxygen; RED hose is for all fuel gas. Never use compressed air to blow out these hoses. To prevent tripping hazards and hose damage, keep excess hose lengths coiled and lines arranged in orderly fashion.

8.4.3.4 Never bring cylinders into or store cylinders in confined spaces, unventilated rooms, or other closed quarters. Storage areas must be open or ventilated to prevent a buildup of gas.

8.4.3.5 All torches must have either flashback arrestors built into the torch or units connected between the hoses and the torch.

8.5 Repair of cutting and welding equipment must be done only by authorized personnel.

8.6 Hoses, which are damaged, shall be cut in two and taken out of service to prevent injury. Branching or using T-fittings in oxygen or fuel gas hoses is prohibited.

8.7 All burning carts shall have a fire extinguisher attached to the cart.

09 - Operating, Repairing, or Servicing Equipment

9.1 Only a trained operator or maintenance person may energize/de-energize and operate a machine. Do not operate, repair, or test any machinery, electrical apparatus, or other equipment unless it is part of your assigned duties. Do not lubricate, clean, repair, inspect or operate a machine you do not understand. When in doubt, ask your supervisor. If you are authorized to operate machinery, follow all safe procedures including the Safe Job Procedures, Rules, and Manufacturer's recommendations established for the machine or equipment.

9.2 Energy control procedures, which include de-energize, Lockout/Tryout must be performed by authorized employees before servicing and/or maintenance of machines and equipment.

Normal production operations (i.e., minor tool changes, adjustments, and other minor servicing) that are routine, repetitive and integral to the use of the machine and/or equipment, do not require energy control, lockout/tryout procedures provided no employee places themselves into a point of operation or associated danger zone on the machine or equipment. All employees will comply with the provisions of the "Lockout/Tryout Procedures".

9.3 It is the Operator's responsibility to see that everyone is in the clear before starting any machine.

9.4 Operators of machines, cranes, and other equipment must secure the equipment under established procedure before leaving the job unless relieved on the job by another operator.

9.5 Any machine that is unsafe to operate must be de-energized and locked out . Notify a supervisor or the Safety Manager of any broken or unsafe machinery or equipment.

9.6 When opening an electric safety or disconnect switch, do not pull a switch under load. Make sure the power is shut off to the equipment by pushing the stop button or otherwise assuring that no current is flowing in the disconnect switch circuit. Pulling a switch under load could result in an explosion or an electrical shock.

9.6.1 When opening or closing electric safety switches use your left hand. Whenever possible, stand to the right of the switch box, not directly in front of it. In all cases stay away from the front of the box and keep your face turned away as you throw the switch. There may be sparking or flashing.

Note: If it is not possible to stand clear from the front of the box, contact your supervisor or the Safety Manager.

9.6.2 Only electrically qualified and authorized personnel are permitted to open a disconnect switch to verify that the knife blades are in the open position.

9.7 Do not remove any personal safety lock unless you placed it. Remove only your lock only after you are sure all personnel are in the clear. Do not remove any DANGER or CAUTION signs unless you placed them and then only after you are sure the dangerous condition has been corrected. If a lock must be removed and the person who placed it cannot be found, contact your supervisor or Safety Manager. The lock shall be removed by following Specific procedures.

9.8 Only authorized personnel are permitted to adjust machinery while in motion, and then only when proper written procedures have been established. If you are authorized to make minor production adjustments on machines, follow the procedures that have been approved. Be sure to guard against unexpected movement of parts or machinery, which might injure you or others. Lockout/Tryout procedures must be followed during the service or maintenance of the equipment.

9.9 Machinery must not be operated if guards have been removed for repairs or adjustments. Do not remove locks or energize equipment until all guards and safety devices are replaced and

operable.

9.10 Pressure must be bled off prior to repair or service work on hydraulic, steam, gas, air, oil, or water lines or connected equipment. Flow valves must be closed and locked, and pressure relief valves must be locked in the open position. Accumulators must be discharged.

9.10.1 Valve lockouts must be made in accordance with Lockout/Tryout procedures before any repair or service is done.

9.10.2 Before the flow of steam, gas, air, oil, or water is restored to a system, the

person doing so must make certain that no one is in a position to be injured as the systems are activated.

9.11 Use only approved locks when locking out equipment. We will designate a specific color for the approved locks, and that color will be standardized throughout the plant.

9.11.1 Designated lockout locks shall not be used for any other purpose.

9.11.2 Second or duplicate keys for designated lockout locks shall be destroyed.

9.11.3 Individually owned lockout locks shall be identified by permanently marking with at least the employee's name.

9.12 Green locks shall be used only as equipment control for idled equipment and where no work is being performed.

9.12.1 Idled equipment is defined as equipment that is no longer in use or that will be out of service for a lengthy period of time.

9.15 Moving rolls shall not be touched at any time.

9.16.1 Personal Protective Equipment required for handling or working in close proximity to strip, scrap, samples, and bands, will include cut resistant gloves with substantial gantlets and/or cut resistant wristlets, and long sleeve shirts or cut resistant sleeves shall include Kevlar cut resistant sleeves worn with cut resistant gloves with substantial gauntlets. The sleeves shall, at a minimum, extend from the glove to above the elbow. The SJP shall reflect the PPE to be worn.

10 – Electrical Hazards

10.1 Only authorized and qualified personnel are allowed to make electrical connections or repair electrical equipment and wiring. Before beginning work, always use a testing device to determine if lines or equipment are live. The proper PPE, including di-electric gloves and face shield and Flame Retardant clothing, must be worn while making these tests. All jewelry and metallic belt buckles are prohibited when working on energized parts.

Caution: Make sure the testing device is properly rated for the voltage being tested, and that it is working properly.

10.1.1 Only qualified and authorized employees may work in areas containing unguarded, un-insulated energized lines or parts of equipment at 50 volts or more.

10.1.2 Only qualified and authorized employees may work on energized parts that must be worked on in an energized state, or do not have the capability of being locked out.

10.2 Consider all wires live until it is positively known that they are dead. Do not touch any exposed or dangling wires. Report exposed wires and open electrical components to your supervisor or Safety Manager.

10.3 Do not use extension cords that are defective. Examine them carefully for worn insulation and exposed strands of wire before use. Connect extension cords only to G.F.C.I. outlets or adapters. Do not place extension cords over sharp edges or across aisles where mobile equipment can damage them. Do not create a tripping hazard with extension cords.

Note: Extension cords are for temporary use only. Not to exceed 90 days.

10.4 Do not overload electric circuits. When fuses blow continually or circuit breakers kick out, report the condition to your supervisor.

10.5 Heed all warning signs and signals concerning the hazards of electrical equipment or lines.

10.6 Unauthorized personnel are not permitted to enter rooms or vaults containing live electrical lines or equipment, such as supply stations, substations, motor rooms, control houses, or any room containing high voltage equipment unless instructed to do so by Supervision and accompanied by a trained and authorized individual.

Note: Only Electric Services personnel, qualified Engineers, qualified contractor personnel, and qualified equipment suppliers are permitted to work with devices of 600 AC / 250 DC volts or more

10.7 Nominal 480 VAC (i.e.: 440 VAC, 460 VAC, 480, VAC) Plug and Receptacle Systems shall be de-energized before plugging or unplugging the equipment.

10.7.1 Nominal 480 VAC Receptacles shall be integral to a disconnect switch to facilitate de-energization and lockout.

11 – Crane Material Handling

11.1. Only trained and authorized personnel are allowed to operate any kind of crane. Qualification as a crane operator shall be based on medical certification, training and demonstrated ability to operate any crane to which the employee may be assigned. Cranes shall be operated in a competent manner in strict compliance with government regulations and all applicable crane safety rules.

11.1.1 Personnel, other than qualified crane operators, shall not be permitted on cranes or in crane cabs without the authorization of supervision or the Safety Manager.

11.2 The following rules apply to employees in areas where overhead travel cranes, mobile cranes, locomotive cranes, and other hoisting equipment operate. There are additional rules, regulations and special instructions for crane operators, floor personnel and maintenance personnel listed in specific manuals and job procedures for each position.

11.2.1 Crane Operators shall not make a lift unless signaled to do so by authorized personnel. Signals shall be taken only from those authorized to give them. Only one person shall be authorized to give signals for a given lift. Crane Operators must not make a lift or move their crane in any way, regardless of signals, if their judgment indicates someone is in a hazardous position or it is an unsafe lift.

11.2.2 Except for designated crane operations, which are handled without a floor person or signal person in accordance with shop procedures, a crane operator, must not move a lift without standard hand signals or approved radio communication from a designated person.

11.2.3 Qualified floor personnel must visually inspect auxiliary lifting equipment such as chains, cables, slings, tongs, forks, etc. before use to assure they are in good condition. Never use a defective lifting device or overload a lifting device. Remove an unsafe lifting device from service and tag it as defective, then report it to supervision immediately.

11.2.3.1 Cable and sling eyes shall be cut, and the device scrapped when found to be defective.

11.2.3.2 Lifting devices and slings with defective or missing safety latches shall not be used.

11.2.4 Floor personnel must assure that no one is in a hazardous position before signaling a lift to be moved and must prevent personnel from entering the hazard area during movement of the lift.

11.2.5 Tag lines, hand hooks or equivalent "hands free" tools must be used as directed by the department for guiding and positioning lifts. Keep all parts of the body in the clear of lifts while tension is being applied. Never use your feet to hold cables or chains in place while the hoist is being raised or lowered or to steady or guide lifts.

11.2.6 Riding crane loads, lifting equipment, or crane hooks by employees is strictly prohibited.

11.2.7 Never walk, stand, or work under loads suspended from cranes. Maintain a safe distance from a suspended load.

11.2.7.1 Do not stand or walk under the empty hook of a crane.

11.2.7.2 Do not walk in the path of a moving crane load.

11.2.8 No lift shall be made with chains, cables, or slings while a magnet or other auxiliary lifting device is still attached to the hook.

11.2.9 Departmental Safety Rules shall identify specifically the type of lifts that may not be handled with electromagnets. Do not carry magnet loads over machinery unless such movement has been approved by supervision.

11.2.10 When a railroad car is being loaded or unloaded by either overhead crane, gantry crane, mobile crane, or locomotive crane; workers in the car must keep a minimum distance of 10 feet from the lift in motion until such time as the lift is stationary and no higher than 6 inches above the blocking or the bottom of the car. The position of the worker must be such that the lift is not moving toward them.

11.2.11 Where the minimum distance cannot be maintained, the worker is to get out of the car until the lift has either cleared the car or is stationary no higher than 6 inches above the blocking or the bottom of the car.

11.2.12 To the extent possible, the movement of the lift being loaded or unloaded must be made at right angles to the car. It must never be made directly toward the worker in the car.

11.2.13 Workers shall not be permitted on the bed of trucks being loaded or unloaded by a crane except for hooking and unhooking a lift. However, when loading, once the lift is stationary and no more than 6 inches above the blocking, the worker is permitted on the truck bed if necessary for final placement of the lift.

11.2.13.1 When loading and unloading a truck by crane, insure the driver remains out of the cab and in the clear of the truck.

11.2.13.2 When loading, once the lift is stationary and no more than 6 inches above the blocking, the truck driver is permitted on the truck bed if necessary for final placement of the lift.

11.2.14 Workers shall not be in the railroad car or truck while they are being loaded or unloaded with crane magnets, dirt boxes, grab buckets, clam-shells, or similar equipment.

11.2.15 When using magnets, buckets, special hooks, etc., maintain distance and control movement to avoid damage to railroad cars and trucks. Pay particular attention to safety grab irons, steps, and brake wheels. Report any damage to your supervisor.

11.2.16 Overhead cranes shall not be used for side pulls except when specifically authorized by a designated responsible supervisor and then only after all possible alternatives have been investigated.

11.2.16.1 A SJP shall be written for each side pull situation and will include securing the load and hoist, evacuation of the area, conditions to stop the side pull, and an inspection of the crane and cables immediately upon completion of the side pull.

11.2.16.2 The side-pull will not be made if the responsible supervisor determines that the crane and/or the lifting mechanism will be over stressed.

11.2.16.3 Overhead cranes shall not be used to move railroad cars.

11.2.17 Crane hook safety latches, chains, or devices shall be in good operating condition and shall be latched or fastened before the lift is made.

11.2.18 Each Crane Operator must complete the Crane Safety Checklist at the start of their turn. Do not operate the crane if an unsafe condition exists.

11.2.18.1 The crane operator shall test all limit switches before starting to operate. No hoist shall be operated if the limit switch is found to be defective.

11.2.18.2 Crane hoist upper limit switches shall never be used for intentionally stopping the hoist during operations.

11.2.19 Crane Operators must not hoist loads exceeding the safe load limit of their cranes. All EOT cranes, monorail hoists, jib cranes, crane blocks, and lifting devices must have their lifting capacities clearly marked in a location visible to the operator and floor personnel.

11.2.19.1 The weight of the load plus the weight of the lifting device must be combined and be less than the capacity of the lifting equipment rating.

11.2.20 Crane Operators must sound crane signal while transferring material from one area to another. Never carry any type of load over personnel or operating equipment.

11.2.20.1 Suspended loads shall not be left unattended. Crane operators shall not leave their position at the crane controls while the load is suspended.

11.2.20.2 Crane operators shall not engage in any activity that might divert their attention from a suspended load.

11.2.21 Prescribed routes must be followed to and from cranes.

11.2.22 When working in the area of a Mobile Cranes keep clear of the lifting beam or boom and swinging crane cab or counterweight identified by markings, which signify the swing radius.

11.2.22.1 Barriers will be set up to prevent accidental access to the hazard area created by the swing radius of the crane cab or counterweight.

11.2.23 Only employees who have been trained and are qualified shall be permitted to operate overhead Radio Remote Control or Pendant Control Cranes.

11.2.23.1 Pay attention to all crane status lights Employees working in areas with overhead crane activity shall be trained to understand crane status lights, if the affected crane has the lights installed and are functional.

12 - Working at Overhead Locations

12.1 If you are required to work overhead, you must protect those below by displaying warning signs and blocking off the dangerous areas. If it is not possible to rope or block off the area, one or more safety Lookouts must be used to protect other people in the area.

12.2 Use approved ladders, scaffolding, or staging in good condition to reach overhead work. Report defects to your supervisor. Do not use improvised or makeshift arrangements. Loose materials, such as planks, scaffolding, pipe, bolts, nuts, tools, etc., must not be left overhead. Authorized personnel at the conclusion of the job must remove temporary scaffolding. Materials are not to be dropped or thrown to the ground but must be let down by hand lines or some other controlled method.

12.3 Overhead Work on Crane Runways

12.3.1 Crane movements may present special hazards.

12.3.2 Warning signs shall be posted on the floor below to alert others in the area of the work being performed overhead.

12.4 Working on Roofs.

12.4.1 All work on roofs shall apply 100% fall protection for both edge protection and fall through protection. This includes traveling to the location on the roof where the work will be done.

12.4.1.1 Exceptions to this rule will be:

1. Roofs that have a certification by Engineering that they are safe to walk on, and the work does not require edge protection.

2. Office building roofs that are designed with edge protection.

12.4.2 Roof access points such as ladders or stairways shall display signs stating, "Access to Roof is Prohibited without department authorization".

13 – Ladders, Scaffolding, & Staging

13.1 Ladders

13.1.1 Always inspect ladders before use. Defective ladders shall be tagged and immediately removed from service. Notify your supervisor for a replacement.

13.1.1.1 Portable metal ladders including aluminum shall not be used if there is any electrical hazard within 10 feet of any part of the ladder.

13.1.2 Never paint or use painted wooden ladders. Paint will hide cracks, knots, rot, or other defects.

13.1.3 Inspect the safety feet before using the ladder and be sure the safety feet are positioned on a firm level surface when positioning the ladder.

13.1.4 Straight portable ladders, extension ladders, or non-self-supporting portable ladders, shall extend at least three feet above the top access level and be placed so the distance from the base of the ladder to the wall or other supporting structure is about one-quarter the length of the ladder from the floor to the top support point. These ladders are to be tied in place or held by a coworker whenever someone is working on the ladder.

13.1.4.1 Both rails of the extension ladder must be tied off to a structure capable of stabilizing and supporting the ladder from falling.

13.1.4.2 When working from straight, extension, or non-self-supporting portable ladders and over 4 feet from the ground you must wear a full body harness fall arrest system and be tied-off to a proper anchor point unless the following conditions are met:

1. The worker can maintain a 3-point touch, 2 hands and one foot, two feet and one hand, or two feet and the midline of the body. Examples are:

A. Both feet and 1 hand - on the ladder, belt buckle or midline of the body must be between the rails of the ladder, and the shoulders below the top rail. Any stretching for position requires repositioning of the ladder.

B. Both legs and body leading against the ladder. The belt buckle/midline of the body must be between rails. Any stretching for position perpendicular to the ladder requires repositioning of the ladder. Feet must be firmly on the ladder and the belt buckle/midline of the body must be resting on the ladder. The shoulders must be below the top rung. Worker may use two hands for short duration work (changing light bulbs, opening hand valves, etc.).

2. The ladder must be tied off as described above, or ground person must be holding the ladder during climbing and working activities.

13.1.5 Safety stepladders need not be held by another person if they are used with all 4 legs on an even surface. The legs of stepladders shall be fully opened and locked. Never stand on top of a stepladder.

Work from a point at least two feet or two steps from the top. When working on a safety stepladder 6 feet or less, which is properly secured and stable and the worker is no higher than the 4th step, it is not necessary to use fall protection.

13.1.5.1 When working on a safety stepladder over 6 feet you must wear a full body harness fall arrest system and be tied off to a proper anchor point unless the following conditions are met.

1. The worker can maintain a 3-point touch, 2 hands and one foot, two feet and one hand, or two feet and the midline of the body. Examples are:

A. 2 legs are braced against the opposite side rails of the ladder, 1 hand holding onto the ladder, and belt buckle/shoulders must be between rails of the ladder. Any stretching for position perpendicular to the ladder requires repositioning of the ladder.

B. 2 legs are braced against the opposite side a rail of the ladder, and the belt buckle is in contact with the ladder. The belt buckle/shoulders must be between rails and the belt buckle must be below the top rail. Any stretching for positions perpendicular to the ladder requires repositioning of the ladder. Feet must be firmly on the ladder and the belt buckle must be resting on the ladder. Worker may use two hands for short duration work (changing light bulbs, opening hand valves, etc.).

13.1.6 When climbing any ladder (portable or stationary) hold on with both hands and always face the ladder. Use a hand line to raise or lower tools that you will need. Do not overreach. Move the portable ladder as work progresses or, if necessary, use another ladder to avoid overreaching. Never exceed the maximum intended load of the ladder.

13.1.7 Never place a ladder against equipment, which may move or rotate unexpectedly or in the path of equipment that may move unless such equipment is locked out.

13.1.8 Never extend an extension ladder full length. The overlap shall be at least four rungs.

13.1.9 Wherever practical, rope off the areas at the base of a ladder while in use.

13.1.10 Ladders shall not be placed in front of doors opening toward the ladder unless the door is blocked open, locked, or guarded.

13.1.11 Ladders shall not be placed on boxes, barrels or other unstable bases to obtain additional height.

13.1.12 When raising or lowering an extension ladder, take extreme care to keep your hands and fingers clear of pinch points.

13.2 Scaffolding & Staging.

13.2.1 Employees who perform work while on a scaffold shall be trained by a qualified person to recognize the hazards associated with the type of scaffold being used, the nature of any electrical hazards, fall hazards, and falling object hazards in the work area.

13.2.2 Scaffolds and their components shall be capable of supporting without failure at least four times the maximum intended load.

13.2.3 Any scaffold damaged or weakened from any cause shall be immediately repaired or replaced and shall not be used until repairs have been completed.

13.2.4 Scaffolds shall not be loaded in excess of the working load for which they are intended.

13.2.5 Tools, materials, and debris shall not be allowed to accumulate in quantities to cause a hazard when working on a scaffold.

13.2.6 All scaffold planking must be approved and identified as scaffold grade.

13.2.7 Access to a scaffold shall be by secured ladder, or an equivalent safe access shall be provided. Climbing the side of scaffolding is not permitted.

13.2.8 Scaffolding greater than six feet in height must be equipped with handrails, mid rails, toe boards, and be tightly planked.

13.2.9 Fall protection equipment including a body harness and shock absorbing lanyard deceleration device shall be worn and connected to an approved anchorage point or lifeline when working on any scaffold platform greater than six feet in height and not equipped with standard top rails and mid rails.

13.2.10 A scaffold tag signed by a competent person is required prior to allowing personnel to work on scaffolds. The tag certifies proper construction and that safety features are in place. The scaffold inspection checklist must be completed before accessing the scaffold.

14 – Fall Protection

14.1 Employees working at any elevation greater than 6 feet above the floor, deck, platform, or ground level, and not protected by standard top rails, mid rails, toe boards, and/or equivalent protection shall be required to use personal fall protection. Employees working in an aerial lift or on scaffolding not equipped with standard top rails, mid rails, and toe boards shall be required to use personal fall protection. All employees shall comply with the provisions of Fall Protection Program.

14.2 Personal Fall Protection is a system that is used to arrest an employee in a fall from a working level. The fall protection must consist of a body harness, a lanyard with a deceleration device, and an anchorage point or lifeline, with approved hooking devices as specified in

14.3 Travel Limiting is a system consisting of a body harness, lanyard, and anchorage that prevents a person from an exposure to a fall. The length of the lanyard must prevent the person from reaching the free fall hazard.

14.4 Work Positioning is a system consisting of a body harness, lanyards, and anchorage devices rigged to allow a person to be supported on an elevated vertical surface, such as a wall or fixed ladder, and work with both hands free.

14.5 All fall protection equipment shall be visually inspected for damage and defects prior to use.

14.6 Fall protection equipment shall be adjusted to minimize the drop in case of a fall. The potential free fall distances should never exceed 6 ft. The anchorage point for tie off should be at or above the D-ring level on the body harness whenever possible.

14.7 In considering the most desirable anchorage for tie-off, any sharp object that the lanyard may contact while at the work location or during a possible fall must be avoided. Lanyards must never be tied off to shafts or other parts of machinery, which are subject to movement or rotation.

14.8 Anchorage Points must be capable of supporting 5,000 lb. per employee attached. If there is any doubt about the strength of the anchorage point, do not tie off; notify your supervisor and find an alternative anchorage point.

14.9 Anchorage locations should; reduce possible free fall distance, prevent swing fall hazards, and provide clear space in the potential fall path to avoid striking an object.

14.10 Use caution while wearing a body harness and lanyard when you are not tied off. Wear the lanyard in such a manner that it will not get caught on or in equipment, structures, or moving machinery.

14.10.1 All adjustment straps of the body harness shall be kept snug against the body.

14.10.2 No part of the lanyard shall be allowed to dangle freely when not tied off. The lanyard shall be secured tightly against the user's body.

15 – Vehicles: Operations & Care

15.1 Only employees authorized by the company as being physically fit and thoroughly trained are permitted to operate trucks, tractors, forklifts, and other plant vehicles. If riding in or operating this type of equipment is not your job, stay off of the equipment.

15.2 At the beginning of each work shift, operators shall inspect and test their assigned vehicle to determine if it is in safe operating condition. A Mobile Equipment daily checklist shall be completed and signed by the operator and submitted to the responsible supervisor.

15.3 Authorized vehicle operators shall abide by all traffic regulations and be alert for pedestrians. Do not stay in the cab, or truck while loading or unloading with a crane. If you must leave your vehicle unattended, be sure to turn the engine off and set the brake or block the wheels to prevent unexpected movement.

15.4 Vehicle operators must not permit unauthorized riders on their vehicles. Employees are permitted on vehicles authorized to carry riders only when their duties require them to become riders. Riders are never permitted on vehicles for which a "no rider" ban applies. Riders are not permitted to ride in the back of pickup trucks or other vehicles that do not have specifically approved seats and seat belts.

15.5 If you are authorized to ride in a truck or other plant vehicle, do not allow any part of your body to hang over the edge. Do not jump off a moving vehicle. Do not ride in a truck with unsecured loads.

15.6 Pedestrians must be aware of plant vehicle movement when walking through buildings or yards. Do not walk beside equipment while it is in motion. Do not assume the vehicle operator can see you. Be prepared for sudden turns or the vehicle backing up.

15.7 Operators of plant vehicles are not to transport loads which are unstable or above the rated capacity of their vehicles.

15.8 Mobile cranes are not to be used to transport materials on the hook to and from the job site.

15.9 Never use a forklift or similar vehicle as a working platform or allow yourself to be hoisted from one level to another unless a specially designed platform is provided, and you have been authorized to use the vehicle in this way. The platform must be secured to the forklift, and the forklift operator must remain at the controls at all times while the platform is in use.

15.10 When a powered industrial truck is left unattended, the load-lifting device shall be fully lowered, controls neutralized, power shut off and brakes set. Wheels shall be blocked if the truck is parked on an incline.

15.11 When a vehicle is being refueled or serviced, the motor must be shut off. Gasoline refueling is also to take place out of doors at a location, which is well in the clear of ignition sources. The vehicle being refueled must be attended the entire time during the fueling process. The following sign must be attached to or next to the fuel pump.
WARNING: This is a designated "No Smoking" area.

15.12 Operators shall use access ladders and provided steps and/or ladders to get on or off the equipment. Do not jump from the vehicle to the ground. Alertness, firm footing, and firm grip on hand holds must be maintained when boarding and dismounting equipment. Hand holds and steps shall be part of the daily inspection to assure their integrity.

15.13 Be alert for other moving equipment, debris, obstructions, product, or uneven ground surfaces, which may be in the area when boarding or dismounting the vehicle.

15.14 Slow the vehicle down and give adequate warning by sounding the horn or audio warning alarm signal when entering or exiting buildings, or when approaching corners, blind spots, cross aisles, pedestrians, or where employees are working. Operate the vehicle with caution. Sounding of the horn or alarm does not give the operator of the equipment the right of way.

15.15 Vehicles shall not be parked closer than eight feet from the centerline of the nearest operating railroad track.

15.16 Operators shall always keep their vehicles under control and shall be required to look in the direction of, and keep a clear view of, the path of travel.

15.17 Stunt driving and horseplay shall not be permitted.

15.18 Vehicles shall not be placed in motion until the operator makes certain the vehicle movement will not endanger another person's safety or damage material or equipment. Loads will be secured in such a manner to permit shifting before the vehicle is placed in motion.

15.19 Operators shall be aware of overhead crane movements. Maintain a safe distance with your vehicle when crane movements are being made.

15.20 Operators shall not remove or make inoperative any safety device such as seat belts, running lights, warning alarm, strobe lights, revolving lights, guards, back-up alarm, speed governor, fire extinguisher, etc.

15.21 If a vehicle operator is involved in an accident with their equipment, such as injury to personnel or damage to a building, structure, machinery, equipment, products, materials, etc., the operator shall immediately report the occurrence to their supervisor or Safety Manager regardless of how minor the injury or property damage may appear.

15.22 When following behind large vehicles stay back far enough to allow you to see the mirrors of the equipment you are following at all times.

15.23 Seat belts must be worn by vehicle operators and passengers at all times on company property. If the seat belt is damaged or missing, report it to your supervisor immediately.

15.23.1 Vehicle operators and passengers driving off company property but on company business must wear seat belts at all times.
15.24.1 This policy does not include general passenger automobiles or light trucks used for individual

transportation.

15.25 Vehicles not equipped with air brakes can be left running and unattended in temperatures below 35° F. with the emergency brake set and chocks set behind and in front of a rear wheel. Air brakes must be set on vehicles that are equipped with them.

16 – Blank

17 – Piling, Storing, Loading, & Manual Material Handling

17.1 Always use good judgment when piling materials. A solid, level base is necessary. Observe all height requirements for your area and be sure all material is piled straight. If you must pile different sizes of lifts of flat steel, coils or other items, the wider material must be on the bottom.

17.2 Follow the safe practice in your department for blocking materials to prevent rolling or falling. Check blocking to make sure that removing material will not result in a spill or shifting in other parts of the pile.

17.3 Designated aisles, walkways or passageways shall not be blocked or obstructed by materials. Access to emergency devices, such as fire hydrants, extinguishers, stretchers, control valves, electrical switch boxes, shall be maintained at all times and shall not be obstructed by any materials.

17.4 When storing materials in bins or on shelves, put heavier items on the lower level. Avoid overloading shelves and overhead storage areas. Never store materials on shelves, roofs, or other flat structures unless they are rated, and load posted. Shelves, cabinets, lockers, toolboxes, etc. must be bolted to the wall or floor to prevent tip-over. Storage capacity must be marked on all shelving designed for industrial storage.

17.5 Employees are not permitted to climb on piled sheets, scrap, plates, coils, pipe, or other material except in the discharge of their regular duties under the direction of supervision.

17.6 When piling, do not throw materials onto the pile. Place your materials into position. Take care to avoid crushing fingers between materials and the top of the pile.

17.7 Loading & Unloading

17.7.1 Know the safe load limits and the approved methods of securing loads of piled materials. Never load any material handling equipment such as trailers, trucks, buggies, elevators, etc., beyond its safe limit. Tie or band material if necessary to prevent shifting.

17.7.2 Always check the condition of the floor of trucks and railroad cars for holes or weak spots. Report defective cars or trucks to your supervisor or Safety Manager before working in them.

17.7.3 Only properly trained and authorized personnel are permitted to load or unload tank cars and trucks containing flammable liquids. Open flames, spark producing devices and unprotected electrical devices must be removed from the area before proceeding with the loading or unloading of flammable liquids. Specific job procedures must be developed for each chemical, a current SDS must be available on site, and all required Personal Protective Equipment must be worn during the operation. If in doubt, check with your supervisor or Safety Manager.

17.7.4 Stay away from all tank cars or trucks if you are not trained and equipped to work with the potentially hazardous chemical that they might contain.

17.7.5 Special arrangements have been made with commercial trucking companies that deliver and pick up loads at the plant. If it is your job to assist in loading or unloading outside trucks, be sure you understand which jobs are to be performed by employees of the trucking company and which jobs are to be done by our employees. Specific job procedures must be developed for each chemical, a current SDS must be available on site, and all required Personal Protective Equipment must be worn during the operation. If in doubt, check with your supervisor or Safety Manager.

** 17.7.6 Employees, Contractors, or Vendor Truck Drivers shall not walk or work on the top of trucks, trailers, and railroad cars unless protected by an approved handrail system or a full body harness fall arrest system.

This rule applies to all tank or bulk material trucks and rail cars and any other truck or rail car of a similar height or configuration. This rule does not apply to flatbed or specialty coil trucks and rail cars typically used to ship and receive steel product, production machinery, or operating supplies.

** 17.7.7 Employees, Contractors, or Vendor Truck Drivers may climb and work from permanently affixed truck and rail car ladders, without the use of a full body harness fall arrest system, when the worker can maintain a 3-point touch (two hands and one foot or two feet and one hand) on the ladder at all times.

17.8 Manual Material Handling – Back Safety

17.8.1 Learn to lift the right way to avoid strains. To safely lift and/or manually transfer materials from one location to another:

17.8.1.1 Determine the weight of the object or material to be moved before lifting. Do not lift beyond your safe limits. If you suspect the load is too much to lift safely, GET HELP!

17.8.1.2 Position your feet before you lift to reduce twisting with the load and to maintain your balance while lifting.

17.8.1.3 Bend your knees and hips when lifting. Bring the material in as close to your body as possible and keep your back straight. Lift slowly with your leg and arm muscles - avoid jerking the load!

17.8.1.4 Don't twist or extend your torso while lifting or transferring material. After lifting vertically, move your feet in the direction of travel. If the load interferes with normal walking, GET HELP! Always have a clear vision over the load.

17.8.2 Before you lift, examine the material to be lifted. Check for nails, sharp edges, slivers or other objects, which might injure you. Look over the ground for obstacles and tripping hazards. Do not try to change positions or adjust your grip on the load while you are carrying it. Rest the load against something for support and then make the change. When you set your load down, be sure to allow for finger clearance. Bring the object to rest on its edge or place it on a block until you can get your fingers out from under.

17.8.3 When lifting or carrying materials with a co-worker, use good communications and coordinate your actions.

18 – Excavations, Floors, & Pit Openings

18.1 Unless authorized by your supervisor, do not start digging or excavating in any plant area and then, only after the completion of an excavation permit. Supervision must check with the Safety Manager for existence of pipes or conduits in the area to be excavated. Should the excavation come upon pipes, conduits, or red plastic tape, work must be stopped at once and supervision notified.

18.2 Employees making excavations, openings in floors or removing covers from sewers, manholes, valve pits, trenches, etc., are responsible for safeguarding them by erecting proper guards or barricades with signs. At night, warning lights shall be used to warn others of the danger. Deep trenches or excavations (over four feet) must be properly shored, sloped, or braced to guard against cave-in. All excavated material must be piled at least three feet back from the edge of the excavation.

18.3 Excavations, floor openings, and pits shall be protected by an attendant or shall be protected by a permanent or removable standard railing capable of withstanding 200 pounds of lateral force.

18.4 Never step, leap, or jump over excavations, trenches, manholes, etc. Observe all barricades. Never remove a barricade unless authorized to do so.

18.5 Report any unguarded excavation, trench, open manhole, shaft, etc. to your supervisor or Safety Manager immediately.

18.6 Piping trenches, valve pits, sewers, enclosed tanks, pipelines, etc., are confined spaces. Never enter a confined space without an entry procedure and specific written permission. Whenever possible, label all confined spaces as "Confined Space".

18.7 All soil at Mechanical Services & Design Inc. is considered to be Class C, (as defined in OSHA's Construction Standards) unless otherwise designated by the Excavation Permit issuer on the Excavation Permit.

19 - Fire Prevention & Firefighting

19.1 Prevent Fires

19.1.1 Follow fire prevention rules for your area and be alert to potential fire hazards throughout the plant. Be aware that the danger of fires is higher in certain areas of the job and special precautions must be taken. Know the proper way of responding to a fire and how to turn in an alarm in the area where you are working. Know the emergency escape routes and the designated assembly points should evacuation become necessary.

19.1.2 Always obey smoking regulations. Smoking is permitted in approved smoking areas only. Smoking is not permitted in motor control centers, computer rooms, electrical distribution areas, or within 50 feet of any flammable liquid or gas storage area.

19.1.3 Do not allow rubbish or flammable materials to accumulate. Oily waste, rags, gloves, etc., shall always be placed in receptacles provided for them.

19.1.4 Never pour gasoline, kerosene, oil, etc., or other flammable liquids down drains or sewers. Flammable liquids are to be kept in self-closing, properly labeled containers. Never use flammable liquids on materials around open flames.

19.1.5 Change your clothes immediately if they become soaked with oil, gasoline, kerosene, naphtha, or other flammable or combustible materials. Stay far away from salamanders, heating stoves, welding sparks, hot metal, and other sources of fire if your clothing has been exposed to flammable or combustible liquids.

19.1.6 Do not light oil or gas furnaces, stoves, salamanders, or other heating equipment unless you have been properly instructed and authorized. Never deviate from specific written procedures when lighting furnaces, stoves, salamanders, and heaters.

19.1.7 Flammable liquids (flash point under 100°F) may be used only where there are no open flames or other sources of ignition within any possible path of a vapor trail. Do not dispense a flammable liquid into another container unless the nozzle and container are properly grounded. Flammable liquids shall be disposed from approved safety cans only.

19.1.8 Flammable liquids must be stored in a building, cabinet, or area specifically designed for such storage and remote from general access or traffic. The storage area must be properly identified and have a fire extinguisher readily accessible.

19.2 Firefighting Equipment

19.2.1 Firefighting Equipment must not be used for any purpose except to put out fires. Using fire hose for such jobs as washing down floors, walls, etc. is prohibited unless specifically authorized by the Safety Manager. Do not obstruct aisles or block the paths to fire plugs, extinguishers, hose stands, and other firefighting equipment.

19.2.2 Learn the location of the nearest fire extinguisher or fire hose in the area where you work. Learn how to operate them and which type of fire extinguisher to use on different types of fires, in their incipient or early stages.

19.2.2.1 All Fire Extinguishers must have metal tops and be mounted with metal brackets.

19.2.3 Fire Classes

19.2.3.1 Class A fires involve ordinary combustibles like paper, wood, cloth. Water is recommended, but any extinguisher rated A B C can be used with reasonable success.

19.2.3.2 Class B fires involve grease, flammable liquids, and flammable gas. They require the use of a blanketing or smothering type of extinguisher such as foam, carbon dioxide (CO2), dry chemical, or water fog. Use any extinguisher rated B or multipurpose A-I B-I C.

Caution: never pour water from containers or use an ordinary water hose on these fires.

19.2.3.3 Class C fires involve electrical equipment. Use non-conductive extinguishers such as dry chemical or carbon dioxide (CO2). Use any extinguisher rated C or multipurpose A-I B-I C.

Caution: never use foam or water; they can be very dangerous and may cause electrocution. If possible, pull the main electrical control switch.

19.2.3.4 Class D fires involve combustible metals such as magnesium, titanium, certain suspended metal powders, or finely divided iron or steel dust. Use only extinguishers rated D. (Special Dry Compound extinguishing agents.)

19.2.3.5 The PASS method shall be used when using a fire extinguisher - Pull, Aim, Squeeze, and Sweep.

19.2. 4 If there are flammable liquids in containers, or pipelines supplying gas or oxygen in the area where a fire breaks out, make every effort within the bounds of safety to remove the containers and shut off the valve controlling the gas or oxygen supply to keep the fire from spreading or exploding.

19.2.5 If a fire extinguisher is used, take it to the fire extinguisher pick-up storage rack. Do not replace it on a hanger or in a cabinet. Notify your supervisor or Safety Manger, who will have the extinguisher checked and refilled.

19.2.6 Automatic sprinkler systems: If you are in an area protected by a sprinkler system, do not tamper with the equipment. Do not pile materials close to the sprinkler valves or heads.

19.2.7 In case of fire:

19.2.7.1 Only do what you can do safely to control or contain the fire. Call the fire emergency number (listed in back of book) immediately if there is any doubt about the situation. Notify your supervisor or Safety Manager as soon as possible and alert other personnel in the area of the situation.

19.2.7.2 Be sure to give the exact location, by building and door number, of the fire and the type of material that is burning. Speak clearly and answer any questions that may be asked. Do not hang up until the communication is complete and you are told to do so.

19.2.7.3 If possible, send someone to the roadway or door of a building to direct the firemen when they arrive. In a major fire event, go to a prearranged known safe area and report to your supervisor.

19.2.8 If your clothing should catch fire STOP, DROP and ROLL. If possible, smother the flame with a blanket, coat, or anything available.

20 – Gas Hazards / Carbon Monoxide

20.1 Some equipment and processes produce dangerous levels of hazardous gases, oxygen, or carbon monoxide. This includes operations or procedures when the potential exists for:

The release of toxic gas or vapors
An oxygen deficiency or enrichment atmosphere High
levels of carbon monoxide
Combustible or explosive gas/air mixtures
Gas Hazard Areas have been established and posted based on results of Industrial Hygiene studies, department measurements, past experience, or predictable potential for a gas incident.

20.2 Never enter a Gas Hazard Area without:

20.2.1 Receiving permission from supervision to enter the Gas Hazard Area.

20.2.2 Signing in and receiving specific Gas Hazard instructions.

20.2.3 Following all safety rules specific to the Gas Hazards in that area.

20.3 Do not enter or work in any location where a gas hazard may be present until proper gas tests have been made with the required instrumentation.

20.3.1 All tests shall be made by a qualified and authorized employee.

20.3.2 All gas tests shall be made with instrumentation that has a current calibration and has been "bump tested" as required.

20.4 When it is necessary to enter an area where hazardous gases (toxic, oxygen deficient, or enrichment, combustible/explosive and/or carbon monoxide) have accumulated, it is the responsibility of supervision to formulate a specific safe procedure and to direct the operation to assure the procedure is followed.

20.4.1 This procedure will require some or all of the following:

Gas Testing / continuous Monitoring
Additional Personal Protective Equipment
Breathing Air (SCBA or Air Line)
Body Harness and Tag Line Work
Location Ventilation Emergency
Escape Devices
Additional Fire Fighting Equipment
Emergency Rescue Team
Stand by Fire Truck or Foam Truck

20.4.2 Non sparking tools shall be used in areas where explosive or combustible gases have accumulated or have the potential to accumulate during the work.

20.5 Report promptly to your supervisor any indication of leaking gas, whether it be from tanks, pipes, or fittings of any kind.

20.6 Carbon Monoxide

20.6.1 All areas where either Industrial Hygiene studies or past experiences indicate that CO is likely to be present in significant concentrations, shall be identified. Access to these areas shall be posted designating them as CO Hazard Areas. No one is permitted in a CO Hazard Area.

21 – Blank

22 - Asbestos

22.1 Mechanical Services & Design Inc. employees shall not work with, remove, or disturb, materials containing or suspected of containing asbestos.

22.2 All suspect materials shall be considered asbestos until the material is tested for the presence of asbestos, or other documented information that shows asbestos is not present (e.g., Material Safety Data Sheet, Manufacture Statement).

22.3 Only authorized, trained contractors approved by the Safety Manager shall be permitted to perform work, (removal or encapsulated) involving asbestos.

22.4 All asbestos containing materials must be removed or encapsulated prior to any activity that may disturb it.

22.5 Contact the person responsible for asbestos testing and removal or the Safety and Manager immediately if you suspect a material to be asbestos. Report all damaged materials that may contain asbestos to your supervisor.

23 - Lead

23.1 Only authorized, trained employees shall be permitted to perform work, involving lead. This includes the removal of lead-based paint or performing any task that could disturb lead- based paint. As a preventive measure, each time you begin a task such as: cutting, grinding, welding, brazing, sanding, or urning on a painted surface, suspect that it contains lead unless tested otherwise.

23.2 No employee shall be permitted to burn, weld, or grind on lead-based paint due to the potentially high levels of lead fume that may be generated during these activities.

23.3 Lead can be absorbed into your body by inhalation (breathing) and ingestion (eating). When lead is scattered in the air as a dust, or fume or mist it can be inhaled and absorbed through your lungs. You can also ingest lead through your digestive system if lead gets into your mouth and is swallowed. If you handle lead,

never consume food, cigarettes, chewing tobacco, or use make-up, which have lead on them or handle them with hands contaminated with lead, this will contribute to ingestion.

23.4 Supervision or the Safety Manager shall make arrangements to test for lead before work begins. Do not burn, weld, grind, sand, or cut any material that may contain lead until the tests have been completed.

23.5 All paint at Mechanical Services & Design Inc. is considered to contain lead unless, all layers of the paint are tested negative for the presence of lead by an approved laboratory or other confirmed and documented information (x-ray fluorescence analysis, Material Safety Data Sheets, etc.).

23.6 Contact the person responsible for lead testing or the Safety and Manager immediately if you suspect a material to contain lead.

24 - Bloodborne Pathogens (BBP)

24.1 Employees who have the potential for occupational exposure to bloodborne pathogens, such as first aid responders, will be trained annually by a qualified trainer in accordance with the requirements of OSHA standard 29 CFR 1910.1030 – Bloodborne Pathogens.

24.1.1 Training shall include company policy; types and transmission of bloodborne pathogens; general safety rules; universal precautions; use of personal protective equipment (PPE); waste disposal procedures; post-exposure treatment; and HBV vaccinations.

24.2 Engineering controls, PPE and work practices will be used to prevent or minimize exposure to bloodborne pathogens in accordance with local jurisdiction.

24.3 BBP – General Work Procedures

24.3.1 The safety manager will ensure that employees who handle, store, use, process, or dispose of potentially infected blood and bodily fluids are trained in the proper work practices, universal precautions, the use of personal protective equipment, and proper cleanup and disposal techniques.

24.3.2 Engineering controls will be examined and maintained on a regular schedule to ensure their effectiveness.

24.3.3 MSD, Inc will provide resuscitation equipment to eliminate the need for direct mouth-to-mouth contact for employees whose jobs would require them to perform resuscitation.

24.3.4 Do not eat, drink, smoke, handle contact lenses or apply cosmetics in areas where exposure to BBP is possible.

24.3.5 Do not store food and drinks in refrigerator or cabinets where blood and other potentially infections materials are stored.

24.3.6 Only authorized, trained employees shall handle, clean up, or dispose of human blood or

other infectious materials. This includes the handling of regulated waste as defined by the OSHA Bloodborne Pathogen Standard.

24.3.7 Wear personal protective equipment (PPE) such as, latex or vinyl gloves, an apron, safety glasses, face shield and shoe coverings when handling blood, blood products, or bodily secretions.

24.3.8 Wash your hands after handling potentially infectious materials, and after removing protective clothing and equipment.

24.3.9 Remove all protective equipment when leaving the area and place any contaminated equipment in a proper storage container for washing, decontamination, or disposal.

24.3.10 Remove contaminated clothing before entering other areas of the building/site or leaving the building/site.

24.4 BBP – Infectious Waste

24.4.1 Separate all infectious waste from other waste at the point of origin, and place (except for sharp objects) in double, disposable red bags with "Biohazard" and "Infectious Waste" labels. Red bags are also acceptable to use.

24.4.2 Place all 'sharps,' such as needles, razor blades or broken glass, in puncture-proof, leak-proof, labeled, or color-coded containers for proper disposal.

24.4.3 Place all infectious waste in leakproof bins or barrels marked "Biohazard" and "Infectious Waste." These will be collected by an approved infectious-waste removal company.

24.4.4 Decontaminate reusable equipment, floors, and other surfaces with a 1:9 bleach solution (1 part bleach to 8 parts water).

24.5 BBP – Engineering Controls

Changes in technology that eliminate or reduce exposure to bloodborne pathogens will be incorporated when identified. Consideration and implementation of appropriate, commercially-available, effective and safer medical devices will be documented by the safety manager.

24.6 Hepatitis B (HBV) Vaccinations

MSD, Inc. will provide, at its own expense, hepatitis B vaccinations to employees covered under this program and who choose to be vaccinated. The company will document that it offered the vaccine, as well as the employees' decision to accept or decline and the date of vaccination.

24.7 BBP - Reporting

24.7.1 Any employee who has suffered a cut, needle stick or exposure to another person's bodily fluids, or who has been exposed to human blood and blood products, must report the incident immediately to the company safety manager.

24.7.2 An employee covered under this program, or an employee acting as a "Good Samaritan," who has been exposed on the job to Human Immunodeficiency Virus (HIV), Hepatitis B (HBV), or Hepatitis C (HCV) will be tested at the time of exposure to determine if the virus has been transmitted. The employee will be re-tested as a medical professional deems necessary. All testing will be performed at company expense.

24.7.3 The company will also contact the exposure source and request that person to be tested, at company expense. The testing for this person is not mandatory, however, a refusal will not affect his or her employment.

24.7.4 Test results will be provided to source and exposed employees within five business days of their receipt. Confidentiality will be maintained for both the exposed employee and the exposure source during all phases of the post-exposure program.

24.8 BBP Recordkeeping

The safety manager will maintain all exposure reports, training, and HBV vaccination records. OSHA requires that records be kept for the duration of employment, plus 30years, except training records which must be kept for 3 years. Hepatitis B or HIV contracted on the job will be recorded on the OSHA 300 log as an illness. Exposure to bloodborne pathogens from contact with 'sharps' will be recorded on the OSHA 300 log.

25 - Hearing Conservation

25.1 The purpose of the Hearing Conservation Program is to protect employees from occupationally related hearing loss and to meet federal and state health and safety standards.

25.2 All employees included in the Hearing Conservation Program must use approved hearing protection. The Safety Manager will utilize noise-monitoring results, to determine which employees shall be included in the Hearing Conservation Program.

25.3 All work areas that have sound levels above 85 dBA shall be posted with signs indicating "Hearing Protection Required." Everyone entering these areas must wear approved hearing protection, which can be obtained from your supervisor.

25.4 In addition to specific work areas, specific tasks or jobs, (like operating a pneumatic jackhammer), require the use of hearing protection. The hearing protection requirement is to be included in the SJP for the task or job.

25.5 All employees identified as being in the Hearing Conservation Program must have yearly audiometric exams. Those who do not report as scheduled to the plant medical department or designated testing facility for the audiometric exam, will not be scheduled to work.
25.6 Employees shall be allowed to choose hearing protection from the approved hearing protection equipment for the job or task.

25.7 The Safety Manager will furnish a list of the various types of hearing protection with suitable noise reduction for each level of noise exposure.

25.8 Employees are responsible for the maintenance of their hearing protection equipment.

25.9 Only hearing protection suitable for the job/task noise exposure shall be used.

25.10 If hearing protection is not required, individuals may choose to use hearing protection on an individual, voluntary basis. Employees who voluntarily wish to use hearing protection will be provided with suitable hearing protection equipment approved for use at Mechanical Services & Design Inc.

25.11 For a full explanation of the Hearing conservation Program, contact the Safety Manager.

26 - Batteries

26.1 Lead-Acid batteries typically used in autos, trucks, mobile equipment, and backup power sources, contain sulfuric acid and generate hydrogen an explosive gas. Keep sparks, flames, burning cigarettes, or other ignition sources away from batteries at all times. Wear a face shield when testing or charging batteries or jump-starting an engine.

26.2 Only authorized and trained personnel shall work near lead-acid batteries, either in a vehicle, on a bench, or as part of an electric power source. The manufactures instructions and all applicable SJP's must be followed when using any equipment on or around batteries such as battery chargers or testers.

26.3 Refer to the Plant Rules for how to properly dispose of used batteries.

27 - Accident, Illness, & Incident Reporting

27.1 Report all injuries, illnesses, near miss accidents, and incidents to your supervisor or Safety Manager immediately. Your Supervisor or Safety Manager is responsible for investigating every accident, incident, or exposure that occurs in the shop, even though the accident/incident/exposure may not result in personal injury, illness, or property damage. This is to determine what caused the accident/incident/exposure and prevent a recurrence that could cause serious injury, illness, or property damage. Cooperate with your Supervisor and Safety Manager, and other people investigating accidents, incidents, and exposures. When asked about an accident/incident/exposure, tell all you know just as you saw it. Do not disturb or remove evidence at the scene of the accident, incident, or exposure until it has been investigated. Do not leave the area until your supervisor, or the Safety Manager permits you to.

27.2 Emergency Reporting Procedures and Emergency Action Plan must be followed without deviation to prevent unnecessary and possible life-threatening delays.

27.2.1 Ambulance Emergency Actions----------911

Call the Emergency Injury Number. Give
the exact location of the injured. Give the
specific location.
Give the nature of the emergency.
Stay on the phone! Do not hang up until told to do so by the person taking the call. Send someone to the road to meet and direct the emergency vehicles.

27.2.2 Fire Emergency Actions---------- 911

Call from a safe location that is not threatened by the fire or explosion. Call the
Emergency Fire Number.
Give the Door Number. Give
the specific location.
Stay on the phone! Do not hang up until told to do so by the person taking the call. Send someone to the road to meet and direct the emergency vehicles.
Go to the designated emergency assembly area.

28 - Start Up of Equipment

A thorough inspection must be conducted to assure all persons who may be affected by the startup of the equipment are made aware that the equipment is to be started. Written procedures (SJP) shall be in place to assure all employees are in a safe position before equipment is started. The written Start Up Procedures shall also specify any other necessary steps, which must be taken before equipment is started.

28.1 DOCUMENTATION

Lock Out Procedure Training
Specific Lock Out Contacts
Observations of Lock Out Work Tasks Violations
of Lock Out Procedures
The Safety Manager will maintain a copy of the training records in his/her files.

28.2 UNIQUE SAFETY LOCK, LOCK IDENTIFICATION

28.3 The designated locks shall be used only to secure hazardous energy sources and shall not be used for any other purpose.

28.4 Second or duplicate keys for designated locks shall be destroyed.

28.5 One key shall not open more than one designated lock.

28.6 Individually owned locks shall be further identified by permanently marking with at least the employees name and one other form of identification.

28.7 The only exceptions that may exist to the safety lock and lock identification rule are

specifically designed locking systems. The Safety Manager must approve all exceptions.

28.8 Green locks may be used only as equipment control for idled equipment and where no work is being performed.

28.9 Idled equipment is defined as equipment that is no longer in use or that will be out of service for a lengthy period of time.

28.10 OUTSIDE PERSONNEL (CONTRACTORS)

When outside contractors are working within the facility, they will be required to have and present to a written lockout/tryout program. If no plan exists, the Contractor will conform to Mechanical Services & Design Inc. Lockout/Tryout Procedure. The unique safety lock and lock identification, as defined above, applies to all non- personnel performing work on the premises.

28.12 RESPONSIBILITY FOR HAZARDOUS ENERGY CONTROL

Although it is the responsibility of the company to provide a written LOTO procedure and comply with the various provisions of federal, state, and local rules and regulations, the ultimate responsibility to recognize, secure, test, and verify all hazardous energy sources lies within each person who might be required to apply or abide by the provisions of this program.

28.12.1 When a Locked Key Box System of LOTO is used it is the employee's responsibility to assure that he or she places their lock on the correct Lock Box.

28.13 LOTO PIPING SYSTEMS

Before any piping system is opened, procedures must be established to safely reduce to a zero- energy state, and verify that this has been done, for the section to be worked on.

28.13.1 System shut down to zero energy state is always preferred. If the work to be done will affect the integrity of system valves, blanks, blinds, or other controls, the system must be at zero energy.

28.13.2 Blank, blind, or bolted slip blind acceptable if there has been no previous failure under same or like conditions.

28.13.3 Double Block and Bleed (aka. Double Block and Vent).

28.13.3.1 Conditions for use of double block and bleed:

1. The bleed or vent has been confirmed to be open visually, mechanically (rod), or by flow.

2. Release from bleed or vent will create no hazard.

3. System pressure will not exceed rating. Piping system rated by pressure and temperature (most

significant for steam).

4. The bleed off vent is large enough to release pressure.

28.13.3.2 Conditions under which use of double block and bleed is not permitted:

1. There has been a previous failure under the same or like conditions.

2. System pressure not known.

3. Piping rating not known.

4. The piping system is not rated.

5. System is susceptible to hammering or other uncontrolled pressure surges.

6. IF during start-up, there is no procedure for bringing a system up to pressure.

7. There have been changes, which could affect the flow of material, made to the system since it was last in operation.

28.13.4 Single Valve

28.13.4.1 Conditions for use of a single valve:

1. System pressure will not exceed 75% of rating. Piping system rated by pressure and temperature (most significant for steam).

2. No defects or problems are detected by careful inspection of the valve.

3. Stored energy and energy potential is extremely low/minimal & the maximum system high pressure does not exceed rating. Piping system rated by pressure and temperature (most significant for steam).

4. The material being valved off creates no significant hazard.

28.13.4.2 Conditions under which use of a single valve is not permitted:

1. Has been a previous failure under same or like conditions.

2. System pressure not known.

3. Valve rating not known, or the valve is not rated.

4. System is susceptible to hammering or other uncontrolled pressure surges.

5. If during start up, there is no procedure for bringing a system up to pressure.

6. There have been significant changes made to the system since it was last in operation.

7. When the system contains acid, caustic, or poisonous material of such strength or concentration that contact is capable of causing injury.

29 - Persons Working on Overhead Cranes, Crane Runways, and Buildings

29.1 SCOPE

Mechanical Services & Design Inc. Crane Policy has been authorized and approved to provide protection and warning to personnel working on overhead cranes and like equipment, crane runways, and in building areas or other locations where there is a need for special precaution from the hazard of moving cranes.

29.2 DEFINITIONS

29.2.1 **Work Group Supervisor or Leader** - is the individual in charge of the work that is to be performed. In most cases this is not the operations supervisor but the repair group supervisor doing the work activity.

29.2.2 **Flashing Warning Beacons** - rotating or blinking warning lights visible to the crane operators shall be used to draw attention to a planned work zone. The color of the light shall be consistent for the shop.

29.2.3 **Look Out** - a person whose sole responsibility is to look out for the crew or crews being protected and to prohibit the crane operator from operating the crane too close to the personnel being protected. The Look Out is assigned to the group doing the repair or maintenance activity. This person reports to and is relieved with the work group.

29.2.4 **Competent** - One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

29.2.5 **Hot Rail** - Electrical conductors (runway conductors) located along a crane runway to provide power to the crane.

29.3 RESPONSIBILITY

The Supervisor, Safety Manager or Shop Leader shall be responsible to determine the means of protection that will be used, and the implementation of the protection before the work begins. This will include an understanding by all crane operators, lockouts, and affected employees of the level of protection to be implemented and the communications to be used during the work.

29.4 PROTECTION PROCEDURES

The means of protection shall be implemented in the following order of effectiveness to eliminate the hazards of crane movement. The Supervisor, Safety Manager, will determine the level of protection selected or leader, based on the operating conditions at the time the work begins.

29.4.1 Lock Out of Cranes

29.4.1.1 Lock out of cranes that may interfere with a work activity is the most effective way of protecting the work area, when operations or maintenance activities permit.

29.4.1.2 Lock out shall be completed for cranes on the same runway, and when a hazard from adjacent cranes exists.

29.4.2. Lockout or rail stops are required when work activity involves rail breaks, rail replacement, or work on rails where there is no safe clearance for cranes to pass.

29.4.2.1 When lockout has been shown not to be feasible, a safety lookout shall be used.

29.4.2 Planned Work Zones with Safety Look Out Control

29.4.3. The work group supervisor or leader shall conduct a meeting with the crane operator(s) to determine the location of the lookouts(s).

29.4.3.1 The work group leader or supervisor shall then hold a meeting with the lookout to instruct them and position them as required.

29.4.3.2 When a job continues into the next turn, relief personnel shall have the same specific meeting to be advised of the details of the areas being protected.

29.4.3.3 Planned work zones, safety lookout control provides 2 levels of control:

a. First the crane operator is responsible for the safe operation of the crane. b. The operator shall perform the regular inspection of the crane at the beginning of the turn to assure proper functioning.
c. Second, a safety lookout positioned by the crew, and working under the crew supervisor or leaders' direction shall constantly monitor crane activity for protection of the work crew.

29.4.3.4 There shall be voice or radio communication between the safety lookout and the crane operator(s) prior to the beginning of the work and at all times.

29.4.3.5 The safety lookouts' sole duty shall be to keep a sharp lookout of crane activities for the crew being protected.

29.4.3.6 The safety lookout shall wear an orange safety vest, or a dedicated color which management has approved.

29.4.3.7 When this method is used there shall be written communications initiated by the supervisor or leader and a signed understanding, by the crane operator, the safety lookout and the work group supervisor or leader as to the location and protection of the work area. This can be accomplished in the form of a (SJP)

29.4.3.8 The lookout will hold the written communications (SJP) sheet until the job has been completed and the crew being protected relieves the lookout.

29.4.3.9 It is the responsibility of the work crew supervisor, leader, or Safety Manager to be sure this written communication is understood.

29.4.3.10 In all cases involving the safety of the work crew the crane operator shall follow the directives of the crew being protected or the crew's safety lookout person.

29.4.3.11 Safety lookouts shall be trained in the following:

a. The location and boundaries of the work area.

b. Specific responsibilities, duties, and obligations to the work crew.

c. The signs and signals of the job.

d. Responsibility of not leaving the job until relieved by the work crew supervisor or leader.

29.4.3.12 During the course of work, it may be necessary for crane(s) to pass into or through a work zone, this may be done only as follows:

a. The crane operator notifies the safety lookout of the need to pass into or through the work zone the safety lookout clears the area and assures that the employees and equipment are in a safe position

29.4.4 Jobs involving minor repair or adjustments - In some instances, hazards associated with the placement of rail stops and flashing warning beacons may exceed those of minor adjustments or repairs. In these cases, the following shall be in place:

29.4.4.1 Specific written crane and work procedure instruction(s) shall be established and reviewed with the personnel doing the work.

29.4.4.2 At a minimum the instructions shall include specific LOTO requirements, communications with other cranes, and consideration of specific job hazards such as fall protection or hazards specific to the repair or adjustment.

29.4.4.3 Other cranes shall keep a specified distance from the area being worked in. The Supervisor or Safety Manager will determine the distance.

29.4.5 Persons required to check the performance of the crane while it is in operation shall have:

29.4.5.1 A clear understanding and communication with the crane operator of the position(s) of the service people

29.4.5.2 All other motions other than the one being checked shall be locked out, or the crane operator in the cab in communication with the repair person and instructed by the repair person.

30 - Machine Guarding Checklist

Answering the following questions will help determine whether Mechanical Services & Design Inc. is providing adequate machine guarding protection for new and existing equipment. This checklist will help highlight hazardous conditions or practices that require correction.

Inspecting Equipment

Mechanical Services & Design Inc. shall inspect new equipment before putting it to use. Supervisors should answer at least the following questions:

- Does the guarding conform to the company's requirements for machine guarding?
- Does the guarding meet all requirements in OSHA's standard (29 CFR §1910, Subpart O)?
- Does the manufacturer provide adequate documentation on machine guards?
- Does the guarding allow the worker to comfortably perform the necessary task?
- Does existing equipment comply with all safeguarding requirements?

Using Machinery with Guards

Employees who operate machinery with guards must be properly trained. Employees should be able to answer at least the following questions:

- What are the hazards of the machine?
- Does OSHA require special training to operate and work with the guards on this machine?
- Are the required guards in place?
- Do you know why the safeguards are in place?
- Do you know how to perform the job with the safeguards in place?

- Who can remove the safeguards and under what circumstances?

If a safeguard is damaged, missing, or unable to provide adequate protection, employees should contact their supervisor or the Safety Department.

Requirements for All Machine Safeguards

- Do safeguards prevent the operator's hands, arms, and other body parts from making contact with dangerous moving parts?
- Have the following areas been properly safeguarded:
- gears, sprockets, pulleys, flywheels,
- rotating drums;
- belts and chain drivers; and
- exposed set screws, keyways, and collars?
- Are safeguards provided for all hazardous moving parts of the machine, including auxiliary parts?
- Are safeguards firmly secured and not easily removable?
- Do safeguards prevent objects from falling into the moving parts?
- Do safeguards permit safe and comfortable operation of the machine without interfering with the operation?
- Can the machine be lubricated without removing the safeguards?
- Can the safeguards be improved? Employees should work with their supervisors and the Safety Department to make sure that machines are both adequately safeguarded and useable.
- Are the starting and stopping controls within easy reach of the operator?
- If there is more than one operator, are separate controls provided?
- Is there a system for shutting down the machinery and locking/tagging out before safeguards are removed?

Requirements for Mechanical Hazards

- Is a point-of-operation safeguard provided for the machine? The point of operation is the point at which cutting, shaping, boring, or forming is accomplished on the material.
- Do the point-of-operation safeguards keep the operator's hands, fingers, and body out of the danger area?

- Is there evidence that the safeguards have been tampered with or removed?
- Can the point-of-operation safeguard be improved? Can changes be made on the machine to eliminate the point-of-operation hazard entirely? Employees should work with their supervisors and the Safety Department to make sure that machines are both adequately safeguarded and useable.

Power Transmission Apparatus

- Are there any unguarded gears, sprockets, pulleys, or flywheels on the apparatus?
- Are there any exposed belts or chain drives?
- Are there any exposed set screws, keyways, collars, etc.?
- Are starting and stopping controls within easy reach of the operator?
- If there is more than one operator, are separate controls provided?

Other Moving Parts

- Are safeguards provided for all hazardous moving parts of the machine, including auxiliary parts?

Non-mechanical Hazards

- Have appropriate measures been taken to safeguard workers against noise hazards?
- Have special guards, enclosures, or personal protective equipment been provided, where necessary, to protect workers from exposure to harmful substances used in machine operation?

Electrical Hazards

- Is the machine installed in accordance with National Fire Protection Association and National Electrical Code requirements?
- Are there loose conduit fittings?
- Is the machine properly grounded?
- Is the power supply correctly fused and protected?
- Do workers occasionally receive minor shocks while operating any of the machines?

31 - Contractors – Confined Space

All contractors that participate in any aspect of confined space entry operations must, at a minimum, follow Mechanical Services & Design Inc. Confined Space Entry Procedures.

Contractors must comply with all Mechanical Services & Design Inc. documentation requirements involving Confined Space Entry Procedures.

31.1 The person responsible for bringing the contractor on site must notify the contractor about hazards of the confined space, monitoring requirements, and Confined Space Entry Procedures. This notification must be documented.

31.2 The person responsible for bringing the contractor on site must assure that the required debriefing is completed at the conclusion of the confined space entry.

31.3 Contractors shall furnish their own monitors with proper calibration and a current bump test prior to the issue of a confined space permit.

31.4 AUDITS: The Confined Space Entry Program and entry procedures are subject to annual review and periodic audit to ensure proper program direction and execution.

Appendix 1: Hot Work Permit

CORPORATION

_____ Works

Burning, Welding, Grinding or Hot Work Permit To:
All, Contractor, and Subcontractor employees.
This permit is good only for this location, this crew, and the time shown.
Do not leave any item blank, if not applicable, mark N/A.

Department or contractor Name_____Craft_____

Date____/___/___Turn _____Time: Start_____End _____

Building No., Door No., or Location_____Grid No. _____

Building Column Line _____

Nature of Job: Weld Burn Grinding Other _____

Person(s) in Charge of Job _____

Job Requester _____

If any of the following conditions exist and cannot be removed or eliminated from the work area, then at least one Fire Watcher shall be used.

Combustible material in building construction or contents is closer than 35 ft. to the point of operation.
YES NO

Combustibles are more than 35 ft. away but are easily ignited by sparks. YES NO

Wall or floor openings within a 35 ft. radius exposed combustible material in adjacent areas, including concealed spaces in walls or floors.
YES NO

Work to be performed near sensitive or vital equipment.
YES NO

If more than a minor fire might develop, and YES has been marked for one or more of the above, a Fire Watch shall be required.

Name of Assigned Fire Watch _____

APPENDIX 1: Hot Work Permit (continued)

Fire Hazards

Fire Hazards are not necessarily the same as the conditions listed on the front left side of this permit. Fire Hazards are conditions, which make it dangerous to do hot work regardless of whether or not a fire watch is used. If fire hazards exist and cannot be eliminated, hot work cannot be performed.

Fire Watch

Keep in mind that the fire conditions listed on the front left side of this permit help to determine if a fire watch is needed, however the conditions only apply in situations where more than a minor fire might develop. Also, whenever possible the fire condition shall be eliminated or removed so that a fire watch is not needed.

Signature of Employee

Depending on the amount of welding done in the shop, there shall be assigned person(s) who inspect the area where welding or other hot work is going to be done. This permit is designed to help with inspection of the hot work area. Areas designed and designated as hot work allowed areas do not need to be inspected every time hot work is performed. However, these hot work allowed areas, shall be inspected frequently to assure that they are free of fire hazards and fire conditions.

Air Quality Test

It is also important to remember that Air Quality Tests must be made if there is a chance of an explosive atmosphere. When testing it is important to test the oxygen level first. There must be between 19.5% - 23.5% oxygen in order to properly test the Lower Explosive Limit (LEL). After testing for oxygen if the LEL is at or above 5% the area must be investigated in order to determine if the source can be eliminated. If the LEL is above 10% hot work is not permitted.

Person in Charge of Job

The person in charge of the job shall be the crew leader or the person actually directing the work activity.

Appendix 2: Scaffold Tag & Scaffold Inspection Checklist

SCAFFOLD SAFETY TAGS - WHAT THEY MEAN TO YOU

A. **RED** indicates "**WARNING, DOT NOT USE**". This scaffold is incomplete. It is either under construction or found defective/damaged during inspection. "**You DO NOT get on any scaffold with a red tag attached to it.**"

Also, "**NO TAG**" is the same as a red tag.

B. **GREEN** indicates "**OK TO USE**". The competent person that built it or last inspected the scaffold attaches the green tag.

Attention users: "You must inspect the scaffold before you use it and report any defects to your supervisor or Safety Manager for corrections to be made prior to use".

C. **YELLOW** indicates, "**FALL PROTECTION REQUIRED**" This means that because of structural conditions or obstructions the scaffold may have an opening or parts of the handrail, mid rail or toe board may be missing.

Special Note: Make sure you follow the yellow tag instructions because it will be attached to the scaffold alongside the green tag, which means that the scaffold is OK, but you must be (100%) one hundred percent tied off. No person shall use the scaffold for fall arrest unless, a qualified person has evaluated it, and the proper signatures indicating the appropriate anchor points are affixed to the scaffold permit.

DO NOT REMOVE or ALTER SCAFFOLD TAGS

Appendix 3: Scaffold Tag & Scaffold Inspection Checklist

Checklist No. _____

Corporation

_____ **Works**

Scaffolding Inspection Checklist

To: All Employees. **This checklist is good only for the crew, the location, and the time listed below. A new checklist shall be completed and posted on site before each shift.** *A Competent person who erected the scaffolding shall be contacted to correct any deficiencies found in the scaffolding.*

Name _____

Craft _____

Date____/___/___Shift _____

Description of work to be performed.

_____

_____

_____

YES, NO, N/A

1. Is the scaffolding tagged? (Circle which tag(s) are in place.) Red, Green, Yellow
2. Does the scaffolding have permanent safe access?
3. Is the scaffolding built on an even solid surface?
4. Does the scaffolding have adequate mud seals?
5. Is the scaffolding secure from any energy source (LOTO) which might cause a hazard?
6. Is the platform fully decked?
7. Are scaffold planks secured or overlapped by not less than 12 inches?
8. Are scaffold planks secured or extended 6 to 12 inches over the edge of the scaffold?
9. Was scaffold grade planking used and is it in acceptable condition?

10. Are aluminum picks in acceptable condition, if used?

11. Does the scaffolding have Toe Boards?

12. Does the scaffolding have appropriate Guardrails? (Top and mid rail)

13. Was the area below the scaffolding properly demarcated and secured?

14. All pins are in the scaffolding uprights?

15. The scaffolding has not been moved or subjected to any conditions, which might weaken it.

16. Has housekeeping been addressed around and on the scaffolding?

17. Is scaffolding secured from tipping for every 26 feet in width and every 30 feet in height?

18. Are cables and other components in acceptable condition on suspended scaffolding?

19. Are anchorage points acceptable for suspended scaffolding?

20. Are wheels locked on Mobile Scaffold?

21. Have all other potentially hazardous conditions been dealt with appropriately?

A. If the NO was marked for any of the above, write a description of corrective actions to be taken specific to this scaffolding. Write on back of checklist when needed.

_____

_____

_____

_____

Section B.

Signature, Date, Printed Name, Phone No.

_____ ____/___/____ _____ _____

Person who completed inspection_____

KEEP HARD COPY ON SITE AND FILE ANOTHER COPY IN THE SAFETY MANAGERS OFFICE FOR NOT LESS THAN ONE WEEK

APPENDIX 3: Scaffold Tag & Scaffold Inspection Checklist

COMPETENT PERSON: One who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. A competent person shall be able to erect and dismantle scaffolding while meeting all safety requirements and be able to train employees in erecting and dismantling scaffolding.

SCAFFOLD TAGGING: A *Red Tag* indicates the scaffolding is not permitted to be in use. A *Green Tag* indicates that the scaffolding is acceptable for use. All scaffolding shall have a green tag before being used. A *Yellow Tag* indicates fall protection is required. A green tag must accompany all yellow tags. All tags shall be hung at the access point. *No Tag* is the same as a red tag.

LOTO: Lockout/Tryout. All sources of energy, which create a hazard to the scaffold user, shall be isolated, or locked out. Work on scaffolding (Especially Mobile Scaffold) shall not be permitted within ten feet of electric lines unless the lines have been locked out or protected.
Mobile equipment shall be routed away from the scaffolding.

MOBILE SCAFFOLD: See LOTO. Employees are not permitted to ride scaffolding while it is being moved. When scaffold is moved an observer shall be present to watch for overhead hazards, such as electric lines.

SECURING PLANKS: bolting, nailing, wiring down or overlapping each other by not less than 12 inches shall secure all planks. If planks are not secured properly, they shall extend over the edge of the scaffolding by 6 to 12 inches.

TOE BOARDS: A four-inch barrier shall be secured along the long side and ends of all work platforms above four feet to guard against the falling of loose tools, materials, and other objects.

GUARDRAILS: A top rail and a mid rail shall be secured to uprights and erected along the exposed sides and ends of the platform. Both the top rail and the mid rail shall be able to support 200 hundred pounds of force.

AREA BELOW SCAFFOLDING: The area below the scaffolding shall, at a minimum, be roped off with red or yellow tape and have signs posted that warn of overhead work. Safety lookouts may be required.

CONDITIONS WHICH WEAKEN SCAFFOLDING: If any part of the scaffold is cut, bent, burned, missing, or subjected to unusual strain.

Appendix 4: Carbon Monoxide Hazard Procedures
CARBON MONOXIDE HAZARD PROCEDURES

PURPOSE

This procedure establishes the general requirements to enter known Carbon Monoxide areas. Carbon Monoxide is an odorless, colorless, tasteless gas, generated in some of our operations, which can be fatal in sufficient concentration.

SCOPE

These requirements apply to Mechanical Services & Design Inc. employees whose job duties may require them to enter known Carbon Monoxide Hazard Areas.

EXPOSURE ALTERNATIVES

Whenever feasible, design, process, or work practice changes will be developed to eliminate Carbon Monoxide hazards or the need to enter Carbon Monoxide Hazard Areas.

DEFINITION

All areas shall be identified where Safety Manager studies indicate that Carbon Monoxide (CO) is likely to be present in concentrations of 50ppm (TWA) Time Waited Average, and higher.

POSTING

Access to these areas shall be clearly posted, designating them as CO Hazard Areas. When feasible, this posting will include a physical barrier such as a removable cable, entryway, fence, or other impediment to prevent people from accidentally entering a CO Hazard Area.

ENTRY PROCEDURES

1. No one will be permitted in a CO Hazard Area without Supervisory or the Safety Managers permission.

2. A) Any person who enters a CO hazard area must contain at least one person, or be accompanied by someone, who is, experienced and familiar with the CO gas hazard area and the dangers of Carbon Monoxide.

B) Each person or group will not enter a CO Hazard Area without a properly functioning CO meter.

3. Any area designated as a Carbon Monoxide Hazard Area, shall have the appropriate signage and a written plan. This plan must include the following elements:

A) Prior to entering, at least one designated responsible individual will be notified of the area to be entered. This must be documented so it can be determined who is in the CO Hazard Areas at any given

time. Sign-in/sign-out sheets, a system of tokens, may do this electronically, or by any other means that positively identifies each individual and their location.

B) Mechanical Services & Design Inc. will develop a method to monitor the wellbeing of each person or group.

Above 200ppm but below 1200ppm

No one is permitted in the area without appropriate respiratory protection. Appropriate protection is full face-piece Self-contained breathing apparatus, or a full face-piece supplied air respirator (with or without escape provision), operated in the pressure demand mode.

100 - 200ppm

Work no more than 2 hours for any person without appropriate respiratory protection. No additional exposure for the rest of the day. Appropriate protection is a full face-piece Self- contained breathing apparatus, or a full face-piece supplied air respirator (with or without escape provision), operated in the pressure demand mode.

50 - 99ppm

Work no more than 4 hours for any person without appropriate respiratory protection. No additional exposure for the rest of the day. Appropriate protection is a full face-piece Self- contained breathing apparatus, or a full face-piece supplied air respirator (with or without escape provision), operated in the pressure demand mode.

Below 50ppm

Employees may work in the area without time limit.

4. Controlling exposure by use of a Time-Weighted Averaging meter:

A) Employee 8 Hour Time-Weighted Averages to Carbon Monoxide may not exceed 50ppm. Once a TWA of 50ppm is reached the employee is allowed zero additional exposure to CO.

B) If the concentration in an area is less than 200 ppm, employee work time may be controlled by use of an 8-Hour TWA Meter instead of the timed work shifts listed above.

C) If this method is selected; the meter must be assigned to a single individual and monitoring started at the beginning of a shift or before any possible CO exposure.

D) All readings will be assumed to be without regard to respiratory protection. In other words, if TWA control is used it cannot be ignored or circumvented by using appropriate respiratory protection intermittently and adjusting the TWA value.

5. Anyone who has a Carboxyhemoglobin level (blood poisoned by CO), which has been raised above baseline by 10% or more, may not return to Carbon Monoxide Hazard areas without Medical approval.

Appendix 5: General Company Conduct Rules & Regulations

RULES & REGULATIONS

Section 1: Automatic Suspension - Subject to Discharge

Under the Influence - entering or being found within the plant while under the influence of, or in the possession of, intoxicating liquor or controlled substances.

Stealing - unauthorized removal, attempted removal or possession of property belonging to someone else or to Mechanical Services & Design Inc.

Fighting - on company property

Dangerous Weapons - in possession of guns or dangerous weapons while on property,

Property Damage - Willful damage to equipment, buildings, or other plant property.

Section 2: Automatic Discipline

Sleeping - during working hours

Horseplay - scuffling, pranks, wrestling or throwing material at others.

Insubordination - refusal to perform a safe work assignment given by a supervisor.

Infectious Disease - knowingly harboring a disease that can be transmitted through workplace contact.

Visiting Other Operations - do not visit other operations if work does not require you to do so.

Housekeeping - willful littering, writing, defacing or other poor housekeeping actions to equipment, buildings, locker room/toilet facilities, or other plant property.

Unsafe acts - actions, which place yourself or co-workers in an unsafe working environment or situation.

Unauthorized absence from job.

Threatening other employees by profane and abusive language.

Appendix 6: Emergency

IN CASE OF FIRE:

Phone: Give Building/Door/ Number

Use Cell Phone/ Visual

Fight Fire - Use proper extinguisher

Report Fire - Notify your supervisor or Safety Manager about the fire as soon as possible.

SERIOUS INJURY - Call for Ambulance (911)

Phone: Give Bldg./Door/ Number _____

Report Injury - Notify your Supervisor or Safety Manager promptly.

Do Not Move Injured - Unless absolutely necessary to prevent further injury or death.

Do Not Treat Injured - EMT or Trained Personnel may respond to:

Severe bleeding - apply pressure.
Stoppage of breathing - use artificial respiration.
Chemical burns - use plenty of water.

Send someone to the roadway or a door to direct emergency vehicles to the scene.
Know the location of the safety station in your work area.

31. BENZENE PROTECTION PROGRAM

Applicable OSHA Standards: 29 CFR 1910.1028, 1926.1128

1. PURPOSE

a) The following written *Benzene Protection Program* has been established for all employees of Mechanical Services & Design Inc. who, in the course and scope of their work, have a potential for exposure to benzene. Such exposure may be associated with specific work, or as the result of an accidental release.

b) A number of chemicals are regulated by the Occupational Safety and Health Administration (OSHA) under 29 CFR 1910. The standard for benzene (CAS# 71-43-2) is listed under 29 CFR 1910.1028. It applies to persons working with gaseous or liquefied benzene at concentrations greater than 0.1% by volume. When any such exposure is over the OSHA PEL, this *Benzene Protection Program* shall be implemented and followed to reduce employee exposure to or below the PEL primarily by means of engineering and work practice controls in accordance with requirements of 1910.1028.

c) A specific benzene safety program based upon requirements of 29 CFR 1910.1028 and 1926.1128 and this *Benzene Protection Program* shall be written for each project that presents an exposure to benzene. Company site Supervisors will ask and coordinate with host employers regarding if and where benzene is used in a work location. Host employer safety rules and emergency response plans regarding benzene also will be reviewed by the site Supervisor. All such plans will be reviewed and revised as appropriate based on the work involved and most recent exposure monitoring data for the project or work location.

d) Written compliance programs shall be furnished upon request for examination and copying to the Assistant Secretary of the U.S. Department of Labor; the Director of the National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee; affected employees and designated employee representatives.

2. SCOPE

The written *Benzene Protection Program* shall apply to all Mechanical Services & Design Inc. employees and employees of subcontractors. This program shall be considered the minimum requirements and if conflicts arise between customer/client programs or applicable regulatory requirements, the most stringent shall apply.

3. RESPONSIBILITY

a) The Safety Manager shall be responsible for disciplinary action resulting from failure to follow the guidelines as set forth in this program.

b) The Safety Coordinator or designee shall be responsible for the monitoring and guidance for the implementation of this program.

c) The Site Supervisor shall be responsible for the implementation and training of the benzene program.

4. DEFINITIONS

- "Action level" means an airborne concentration of benzene of 0.5 ppm calculated as an 8-hour time-weighted average.
- "Authorized person" means any person specifically authorized by the employer whose duties require the person to enter a regulated area, or any person entering such an area as a designated representative of employees for the purpose of exercising the right to observe monitoring and measuring procedures under paragraph (l) of this section, or any other person authorized by the Act or regulations issued under the Act.
- "Benzene" (C(6)H(6)) (CAS Registry No. 71-43-2) means liquefied or gaseous benzene. It includes benzene contained in liquid mixtures and the benzene vapors released by these liquids. It does not include trace amounts of unreacted benzene contained in solid materials.
- "Bulk wholesale storage facility" means a bulk terminal or bulk plant where fuel is stored prior to its delivery to wholesale customers.
- "Container" means any barrel, bottle, can, cylinder, drum, reaction vessel, storage tank, or the like, but does not include piping systems.
- "Day" means any part of a calendar day.
- "Emergency" means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which may or does result in an unexpected significant release of benzene.
- "Employee exposure" means exposure to airborne benzene which would occur if the employee were not using respiratory protective equipment.
- "Regulated area" means any area where airborne concentrations of benzene exceed or can reasonably be expected to exceed, the permissible exposure limits, either the 8-hour time weighted average exposure of 1 ppm or the short-term exposure limit of 5 ppm for 15 minutes.

5. POTENTIAL BENZENE EXPOSURE LOCATIONS

Locations and work assignment that relate to potential benzene exposures include pipeline and refining operations; tank operations (including gauging tanks) inside petroleum refineries and at pipelines; and field maintenance operations.

6. CHEMICAL CHARACTERISTICS

a) Toxicity – blood toxin and carcinogen; absorbed through the skin; affects central nervous system; harmful or fatal if swallowed; aspiration hazard; *see health hazards next heading*

b) Color – clear, water-like liquid

c) Odor – sweet, aromatic with an odor threshold of 4.7 ppm

d) Solubility – Insoluble to slightly soluble in water

e) Flammability – OSHA/NFPA Class 1B flammable liquid

f) Toxic byproducts – hazardous decomposition can produce carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitro cresols that can decompose violently.

7. HAZARDS

a) *Health Hazards*

i) Acute exposure

(1) Acute exposure to benzene may act as a central nervous system depressant with headaches, dizziness, euphoria or even convulsions depending on the exposure level.

(2) It is also a skin and respiratory irritant. Benzene removes natural oils in the skin upon dermal absorption. The degree of irritation depends on the individual, the concentration, and exposure duration. Breathlessness may be a symptom of exposure.

ii) Chronic exposure

(1) Chronic exposure to benzene may lead to hematopoietic toxicity including, but not limited to, aplastic anemia or acute myelogenous leukemia. Benzene is metabolized in the body to a number of metabolites including phenol, catechol, hydroquinone, benzo-quinone, and muconaldehyde. These metabolites are toxic to the bone marrow. As a result of genetic damage to the DNA of developing stem cells in bone marrow, an increased growth of myeloblasts (white blood cell precursor) develop with low counts of red blood cells and platelets. This condition can lead to acute myelogenous leukemia.

.

(2) Aplastic anemia refers to a decrease in red blood cells, white blood cells, and platelets in the blood (pancytopenia) and a decrease in stem cells in the bone marrow (hypoplastic bone marrow).

(3) Benzene is also a known reproductive hazard. It reduces fertility in men and women and has reportedly been associated with menstrual disorders and impotence. It is also a teratogen affecting fetus development.

b) *Physical Hazards*

i) Benzene is a Class IB flammable liquid with a flash point of 12° F.

ii) Benzene is a moderate explosion hazard. Vapor/air mixtures are explosive.

6. EXPOSURE LIMITS

a) The permissible exposure limit (PEL) is 1 ppm, and the short-term exposure limit (STEL) is 5 ppm. No employee may be exposed to time-weighted average concentrations above 1ppm for an eight-hour time period and above 5 ppm for a 15-minute time period.

b) The action level (AL) is 0.5 ppm and is also a time-weighted average concentration for an eight-hour time period. Monitoring requirements become effective if the PEL, STEL, or AL are exceeded in a work area.

7. EXPOSURE MONITORING

a) Air monitoring will be conducted as required by the work assignment.

b) To assess airborne exposure to benzene, personal air samples will be collected representative of each potentially exposed work group in each work area. Future monitoring will not be necessary if the results are less than the exposure limits; however, additional monitoring may be required if there are complaints or a change in workplace operations or situations concerning benzene.

c) Safety and health determinations will be made based on employee exposure monitoring with air samples taken from the breathing zone. Air samples will be representative of each employee's average exposure to airborne benzene.

d) If 8-hr sample results are greater than the AL but less than the PEL, annual monitoring is conducted.

e) If 8-hr. sample results are greater than the PEL and 15-min sample results are greater than the STEL, monitoring will be conducted every six months.

f) Monitoring may be discontinued if two consecutive sample results collected at least seven days apart are less than the AL.

g) Employees must be notified within 15 working days by the Company if the personal sampling results exceed the exposure limits. The notification must also include corrective actions to minimize employee exposure.

8. REGULATED AREAS

a) OSHA defines a regulated area as "any area where airborne concentrations of benzene
exceed or can reasonably be expected to exceed, the permissible exposure limits..."

b) Access to work areas determined to be regulated areas will be restricted to designated personnel so the number of people exposed to benzene is minimized.

9. WORK PRACTICES & CONTROL METHODS

a) Because benzene is highly flammable vapors in the air can create an explosive atmosphere. Smoking, open flames and ignition sources are prohibited in areas where benzene is used or in a release area. Fire extinguishers will be readily available for use by trained personnel.

b) Exposure to benzene in work areas will be avoided to prevent adverse health effects, especially exposure via inhalation and dermal absorption. Established engineering controls, personal protective equipment, and work practices used to reduce benzene exposure will be included in site-specific plans for preventing exposure to benzene. These plans will be reviewed and revised at least annually to reflect the most current data.

c) Engineering controls

i) Engineering controls must be established first to reduce benzene exposure to the lowest possible level; then, if still warranted personal protective equipment (PPE) must be used. The necessary types of engineering controls and PPE are site-specific and must be included in the site-specific plan for preventing exposure to benzene.

d) Personal protective equipment (PPE) to prevent benzene exposure

i) Skin Protection -- Wear appropriate personal protective clothing to prevent skin contact, including gloves, aprons, boots.

ii) Eye Protection -- Wear appropriate eye protection to prevent eye contact, to be determined by hazard assessment; generally, splash goggles.

iii) Skin Clean-up -- The worker should immediately wash the skin when it becomes contaminated.

iv) Respiratory Protection – Appropriate respirators will be utilized as required by personnel who are trained and qualified for respirator use. This will be done in

accordance with the Company's written Respiratory Protection Program. Selection of respirator and cartridge will be based on written hazard assessment and airborne concentrations of benzene.

v) Clothing/PPE Removal -- Work clothing that becomes wet should be immediately removed due to its flammability hazard (i.e., for liquids with a flash point <100 deg F).

vi) Clothing/PPE Change -- No recommendation is made specifying the need for the worker to change clothing after the work shift.

vii) PPE Facilities -- Eyewash fountains should be provided in areas where there is any possibility that workers could be exposed to the substances. This is irrespective of the recommendation involving the wearing of eye protection. Facilities for quickly drenching the body should be provided within the immediate work area for emergency use where there is a possibility of exposure.

viii) PPE must be provided by the employer to the employee at no cost.

10. LABELS AND SIGNS

a) The Hazard Communication Standard requires chemical containers to be labeled with the chemical identity, hazard warnings, and manufacturer. The following are additional labeling requirements for benzene under 29 CFR 1910.1028. These labels can be obtained from DOES free of charge.

b) Containers labels

DANGER

CONTAINS BENZENE CANCER HAZARD

c) Signs to entrances of regulated areas

DANGER BENZENE CANCER HAZARD
FLAMMABLE – NO SMOKING
AUTHORIZED PERSONNEL ONLY
RESPIRATOR REQUIRED

11. POLICY/REQUIREMENTS

a) Respiratory Protection

i) Mechanical Services & Design Inc. will supply approved respirators and filters for all benzene hazards which an employee would encounter at the job-site at no cost to the employee. All Respirators shall be NIOSH approved.

ii) Mechanical Services & Design Inc. will train all employees operating under the *Benzene Protection Program* in the proper use, maintenance, and limitation of the respirator they will be using.

iii) Mechanical Services & Design Inc. will provide medical physical examination and fit testing for all employees required to wear a respirator (refer to the Company's *Respiratory Protection Program)*.

b) Medical Surveillance

Medical surveillance shall be performed for all Mechanical Services & Design Inc. employees who may be exposed to benzene, at or above the action level 30 or more days per year, or employees who are or may be exposed to benzene at or above the permissible exposure limits for 10 or more days per year, or for employees who have been exposed to more than 10 ppm of benzene for 30 days or more in a year prior to the effective date of the standard when employed by their current employer.

i) All medical examinations and procedures shall be performed by or under the supervision of a licensed physician.

ii) An accredited laboratory shall conduct all laboratory tests.

iii) All cost for physicals and laboratory work, etc. will be paid by Mechanical Services & Design Inc.

c) Initial Exam

i) Mechanical Services & Design Inc. shall provide employees who work in an area where he/she could be exposed to benzene, a medical examination to include the following:

ii) Detailed occupational history which includes:

(1) Post work exposure to benzene or other hematological toxins.

(2) A family history of blood diseases includes hematological neoplasm.

(3) A history of blood diseases including genetic hemoglobin abnormalities, bleeding abnormalities, abnormal function of formed blood elements.

(4) A history of renal or kidney dysfunction.

(5) A history of medical drugs routinely taken

(6) A history of previous exposure to ionization.

(7) Exposure to marrow toxins outside of the current work situation.

(iii) Complete Physical Examination

(1) Laboratory Test

(a) Complete blood count, including a leukocyte counts with differential.

(b) Quantitative thrombocyte counts.

(c) Hematocrit

(d) Hemoglobin

(e) Erythrocyte counts

(f) The results of the above laboratory tests will be reviewed by the examining physician.

d) **Periodic Examinations**

(1) Mechanical Services & Design Inc. will provide each employee a medical examination annually. This examination will include the following.

(a) A brief history regarding any new exposure.

(b) Changes in medical drugs used.

(c) Appearance of physical signs relating to blood disorders.

(2) A complete blood count including:

(a) Leukocyte counts with differential

(b) Quantitative thrombocyte counts

(c) Hemoglobin

(d) Hematocrit

(e) Erythrocyte counts

(f) Erythrocyte indicates (MCV, MCH, MCHC)

(g) If an employee develops signs or symptoms commonly associated with toxic exposure to benzene, Mechanical Services & Design Inc. shall provide the employee with an additional examination, which shall include those elements considered appropriate by the examining physician.

e) **Post-Employment Examination**

i) At the conclusion of a job that required benzene physicals each employee shall have a

complete physical examination before the employee is ROF or transferred to another job- site that has no benzene hazard. This physical will include:

(1) Complete blood count, including a leukocyte counts with differential.

(2) Quantitative thrombocyte counts.

(3) Hematocrit

(4) Hemoglobin

(5) Erythrocyte counts

f) **Emergency Examinations**

i) In addition to the surveillance required, if an employee is exposed to benzene in an emergency situation Mechanical Services & Design Inc. shall have the employee provide a urine sample and have a Phenol Test performed on the sample. The urine specific gravity shall be corrected to 1.024.

ii) If the result of the urinary phenol test is below 75mg Phenol level of urine, no further testing is required.

iii) If the result of the urinary phenol test is equal to or greater than 75mg Mechanical Services & Design Inc. shall provide the employee with a complete blood count, leukocyte count, with differential and thrombocyte count at monthly intervals for duration of three months.

iv) If conditions warrant after three months and a physician deems necessary Mechanical Services & Design Inc. will provide its employee with additional physicals per physician's direction.

g) **Additional Examinations and Referrals**

i) Where the results of the complete blood count required for the initial and periodic examinations indicate any of the following abnormal conditions exist, then the blood count shall be repeated within 2 weeks.

ii) The hemoglobin level or the Hematocrit falls below the normal limit [outside the 95% confidence interval (C.I.)] as determined by the laboratory for the particular geographic area and/or these indices show a persistent downward trend from the individual's pre-exposure norms; provided these findings cannot be explained by other medical reasons.

iii) The thrombocyte (platelet) count varies more than 20% below the employee's most recent values or falls outside the normal limit (95% C.I.) as determined by the laboratory.

iv) The leukocyte count is below 4,000 per mm 3 or there is an abnormal differential count.

(1) If the abnormality persists, the examining physician shall refer the employee to a hematologist or an internist for further evaluation unless the physician has good reason to believe such referral is unnecessary.

(2) The employer shall provide the hematologist or internist with the information required to be provided to the physician.

(3) The hematologist's or internist's evaluation shall include a determination as to the need for additional tests, and the employer shall assure that these tests are provided.

h) **Information provided to the Physician**

i) The employer shall provide the following information to the examining physician.

(1) A copy of this regulation and its appendices.

(2) A description of the affected employee's duties as they relate to the employee's exposure.

(3) The employee's actual or representative exposure level.

(4) A description of any personal protective equipment used or to be used.

(5) Information from previous employment related medical examinations of the affected employee, which is not otherwise available to the examining physician.

i) Physician's Written Opinions

For each examination under this section, Mechanical Services & Design Inc. shall obtain and provide the employee with a copy of the examining physician's written opinion within 15 days of the examination.

The written opinion shall be limited to the following information:

i) The occupationally pertinent results of the medical examination and tests.

ii) The physician's opinion concerns whether the employee has any detected medical conditions, which would place the employee's health at greater than normal risk of material impairment from exposure to benzene.

iii) The physician's recommended limitations upon the employee's exposure to benzene or upon the employee's use of protective clothing or equipment and respirators.

iv) A statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions resulting from benzene exposure which require further explanation or treatment.

v) The written opinion obtained by the employer shall not reveal specific records, findings and diagnosis that have no bearing on the employee's ability to work in a benzene-exposed workplace.

j) Medical Removal Plan

i) When a physician makes a referral to a hematologist/internist as required under this section, the employee shall be removed from areas where exposures may exceed the action level until such time as the physician makes a determination.

ii) Following the examination and evaluation by the hematologist/internist, a decision to remove an employee from areas where benzene exposure is above the action level or to allow the employee to return to areas where benzene exposure is above the action level shall be made by the physician in consultation with the hematologist/internist. This decision shall be communicated in writing to the employer and employee. In the case of removal, the physician shall state the required probable duration of removal from occupational exposure to benzene above the action level and the requirements for future medical examinations to review the decision.

iii) For any employee who is removed pursuant to this section, Mechanical Services & Design Inc. shall provide a follow-up examination. The physician, in consultation with the hematologist/internist, shall make a decision within 6 months of the date the employee was removed as to whether the employee shall be returned to the usual job or whether the employee should be removed permanently.

iv) Whenever an employee is temporarily removed from benzene exposure pursuant to this section, Mechanical Services & Design Inc. shall transfer the employee to a comparable job

for which the employee is qualified (or can be trained for in a short period) and where benzene exposures are as low as possible, but in no event higher than the action level. Mechanical Services & Design Inc. shall maintain the employee's current wage rate, seniority, and other benefits. If there is no such job available, Mechanical Services & Design Inc. will provide medical removal protection benefits until such a job becomes available or for 6 months, whichever comes first.

v) Whenever an employee is removed permanently from benzene exposure based on a physician's recommendation pursuant to this section, the employee shall be given the opportunity to transfer to another position which is available, or later becomes available, for which the employee is qualified (or can be trained for in a short period) and where benzene exposures are as low as possible but in no event higher than the action level. The employer shall assure that such employee suffers no reduction in current wage rate, seniority, or other benefits as a result of the transfer.

k) Medical Removal Protection Benefits

i) Mechanical Services & Design Inc. shall provide to an employee 6 months of medical removal benefits immediately following each occasion an employee is removed (from exposure to benzene because of hematological findings from exposure to benzene) unless the employee has been transferred to a comparable job where benzene exposures are below the action level.

ii) Regarding medical removal of an employee, the Company will maintain the current wage rate, seniority, and other benefits for the employee as though he or she had not been removed.

iii) The Company's obligation to provide medical removal protection benefits to a removed employee will be reduced to the extent that the Company receives compensation for earnings lost during the period of removal either from a publicly or employer funded compensation program, or from employment with another employer made possible by virtue of the employee's removal.

12. RECORDKEEPING FOR HEALTH HAZARD COMPLIANCE PROGRAM

a) GENERAL

i) The Company is required to keep all records of an employee's exposure to benzene and medical surveillance for a period of duration of employment plus (+) thirty (30) years, or, forty (40) years whichever is the longer.

ii) Specific records to be kept include:

(1) All records associated with monitoring, the results of individual monitoring and acknowledgment that the employee was informed of the results of the monitoring.

(2) All records pertaining to medical surveillance and the acknowledged results of all examinations.

b) STORAGE

i) All records subject to these provisions will be stored in the affected employee's personnel jacket/folder maintained at the Corporate Office(s).

ii) This is necessary since our projects do not normally have safe and secure storage facilities onsite.

iii) Any records can be made available to proper authorities from this office.

c) COPIES

i) Copies of pertinent records will be made available only to the individual, a duly authorized representative of the individual, or the individual's personal physician (in case of medical records) and then by written request to the Corporate Office only.

13. USE OF RESPIRATORS

When employees use respirators as required by this program, the Company shall provide respirators that are NIOSH approved and that comply with the requirements of 1910.1028(g)(1). Respirators must be used during:

a) Periods necessary to install or implement feasible engineering and work-practice controls.

b) Work operations for which the Company establishes that compliance with either the TWA or STEL through the use of engineering and work-practice controls is not feasible. (For example, some maintenance and repair activities, vessel cleaning, or other operations for which engineering, and work-practice controls are infeasible because exposures are intermittent and limited in duration).

c) Work operations for which feasible engineering and work-practice controls are not yet sufficient or are not required by OSHA standards to reduce employee exposure to or below the PELs.

d) In emergency situations.

14. RESPIRATORY PROTECTION PROGRAM

a) The Company has established and implemented a written *Respiratory Protection Program* in accordance with 29 CFR 1910.134. Any use of respirators relating to benzene exposure shall be done in compliance with the Company's *Respiratory Protection Program*.

b) For air-purifying respirators, the Company shall replace the air-purifying element at the expiration of its service life or at the beginning of each shift in which such elements are used, whichever comes first. Negative pressure respirators shall be used for escape only.

c) If NIOSH approves an air-purifying element with an end-of-service-life indicator for benzene, such an element may be used until the indicator shows no further useful life.

15. RESPIRATOR SELECTION

a) The Company supervisor in charge of a project where respirators will be used due to benzene exposure shall select the appropriate respirator from Table 1 of section 1910.1028 (g)(3) .

b) Respirators for working situations where required shall be either SCBA or SAR, positive pressure used in a pressure demand mode.

16. PROTECTIVE CLOTHING AND EQUIPMENT

a) Personal protective clothing and equipment shall be worn where appropriate to prevent eye contact and limit dermal exposure to liquid benzene.

b) Protective clothing and equipment shall be provided by the Company at no cost to the employee and the Company, through its supervisors, shall assure proper use of protective clothing and equipment where appropriate.

c) Eye and face protection shall meet the requirements of 29 CFR 1910.133.

17. NOTES TO EXPOSURE MODEL

a) *Less than 0.5 ppm*

i) Upon implementation of this *Benzene Compliance Program* and annually thereafter, project evaluations will be made to determine the presence of benzene on this project.

ii) All employees will be presented the Company's *Benzene Training Program* including respiratory protection and placed on the *Authorized Persons Listing*.

iii) If benzene is present on a project, initial monitoring shall be conducted to determine the degree of exposure of our people to benzene.

iv) The initial medical surveillance shall be performed on all employees who have the possibility of benzene exposure.

v) This medical surveillance shall be repeated if the employee during the previous year has had any opportunity to be exposed to benzene.

vi) In addition, annual monitoring shall be conducted to determine if the project in general is exposing our people to less than 0.5 PPM over an eight-hour time weighted average.

b) *Equal to or Greater than 0.5 PPM, but less than 1.0 ppm*

i) All exposed employees shall be placed in our initial medical surveillance program.

ii) All employees will be presented our *Benzene Training Program* including respiratory protection and placed upon *Authorized Persons Listing*.

iii) Medical surveillance shall be repeated on a semi-annual basis.

iv) Monitoring shall be completed on a quarterly basis until such time that two consecutive personnel monitoring programs show that the employee has been exposed to less than 0.5 PPM.

v) If quarterly monitoring results indicate that exposure levels are below 0.5 ppm, the project will then only be required to repeat the monitoring and medical surveillance on an annual basis.

vi) Any change in the project that could cause exposures to increase over the 0.5 ppm, the requirements for 0.5 ppm or greater shall be followed.

c) *Equal to, or, Greater than 1.0 ppm-to Equal to 10.0 ppm*

i) Employees working in areas where benzene exposure is greater than 1.0 ppm (up to 10.0 ppm) shall be equipped with a chemical cartridge respirator with an organic vapor cartridge and half mask or any type of supplied air respirator with half mask. They shall not be allowed to work in any area containing more than 1.0 ppm benzene without proper respiratory equipment.

ii) All employees will be presented our *Benzene Training Program* including respiratory protection and placed upon *Authorized Persons Listing*.

iii) Respiratory protective program shall be presented, and a follow-up made to be certain that our employees are complying with such program.

iv) Medical surveillance shall be completed within thirty days of implementation of this program or the discovery of benzene environments greater than 1.0 ppm.

v) All medical surveillance shall be repeated semi-annually.

vi) Monitoring program shall be repeated on a monthly basis until such time that two consecutive months show that the exposure level is less than 1.0 ppm.

vii) In addition, all other parts of compliance of this program shall be followed including authorized persons list and sign in and sign out of the area.

d) *Greater than 10.0 ppm, but less than or equal to 50 ppm*

i) When exposure levels have been found to be this high, immediate steps should be taken to withdraw Company employees from the area except those necessary to establish engineering and work practice controls to reduce the exposure levels to below 10.0 ppm and preferably below 1.0 ppm.

ii) While working in areas performing engineering and work practice controls, our employees shall be equipped and required to wear chemical cartridge respirators with organic vapor cartridge and full-face piece, or any supplied air with full-face piece or any organic gas mask, or any self-contained breathing apparatus with full-face piece.

iii) Prior to admittance to the area, these employees shall have completed all training programs, medical surveillance programs, and respiratory protection program, and shall be placed on authorized persons list and shall be required to sign in and out of the restricted area.

e) *Benzene Exposure greater than 50.0 ppm but equal to or less than 1000 ppm*

i) Mechanical Services & Design Inc. employees shall be allowed in this area only for the purpose of establishing engineering and work practice controls.

ii) They shall be equipped with supplied air respirator with half mask and positive pressure mode.

iii) Prior to admittance into the area, all employees shall be instructed in our training respiratory protective programs and have completed all medical surveillance and been placed on our authorized persons list. In addition, they shall sign in and out while in the area to perform engineering controls.

f) *Benzene Exposure greater than 1000 ppm but equal to or less than 2000 ppm*

i) Company employees shall be equipped with supplied air respirators with full-face piece, helmet or hood and positive pressure mode. All requirements as established above shall be followed.

g) *Greater than 2000 ppm but equal to or less than 10,000 ppm*

i) Company employees, if allowed in this area, shall be allowed only to shut off valves and to perform emergency operations. They shall be equipped with a supplied air respirator and auxiliary self-contained breathing apparatus with full-face piece and positive pressure mode.

ii) In addition, all requirements as outlined above shall be followed

18. ESCAPE

a) Since benzene can be fatal in only a very short period of time at concentrations greater than 10,000 ppm, anyone exposed to areas of such high concentration shall use any organic vapor gas mask or self-contained breathing apparatus with full face piece for purposes of escape from the area.

b) This escape shall be undertaken immediately upon the sensing of vapors or an alarm of vapors being this high.

c) EMERGENCY SITUATION: Equal to, or greater than 100 ppm

i) Where an employee is exposed to a massive release of benzene (100 ppm) due to some type of failure, the employee will be required to participate in special medical tests program.

ii) Special tests will be provided by the end of the employee's work shift.

iii) If the results of the tests are positive, additional tests will be provided as soon as practicable and repeated one month later.

32. HYDROGEN SULFIDE / H2S

Protection from H2S

1. It is important that first we identify those potential areas where exposure to Hydrogen Sulfide can be found:

a. Drilling operations- Recycled drilling mud, Water from sour crude wells, Blowouts

b. Tank Gauging (tanks at producing, pipeline &refining operations).

c. Field maintenance- Tank batteries and wells, etc.

2. Before entering an area where H2S gas can accumulate, the air should be tested, either through air monitoring and or personnel sampling. If H2S is detected, the space should be ventilated to remove the gas or lower the concentration to a safe level. If the space cannot be adequately ventilated, properly trained individuals can work in the space if they follow OSHA rules for hazardous atmospheres in confined spaces. When the air monitors alarm sounds, vacate the area and do not re-enter without, considering the source, trying to eliminate the source, use Engineering Controls to reduce exposure and as a last resort, use proper respiratory protection. Make sure there is a Site Specific or Owners contingency plan for emergencies concerning Benzene exposure. Employees are to be made aware of such plans and adequately trained/drilled according to these plans.

3. Working in H2S Atmospheres-

The PEL of Hydrogen sulfide is 20 PPM. We have set an Action Level at the NIOSH REL at 10PPM. H2S is listed as a human carcinogen. If a worker most work in an atmosphere contaminated with H2S gas, he must use a full-face respirator or a half-face respirator and tight- fitting goggles to protect both the eyes and the lungs from exposure. If the concentration of the gas is less than 100 parts per million, an air purifying respirator can be used. If the concentration of the gas is higher, a self-contained air supply, either SCBA or SAR with escape must be used. Rescuers cannot enter the contaminated space without appropriate protective equipment, so additional respirators should be kept on hand. The IDLH level for H2S is 100PPM. All respirators must be NIOSH certified. Study and be prepared to utilize the site-specific evacuation plan in case of an emergency.

4. For Confined Space work see Section 21 of this plan. Employees shall be trained under 29 CFR 1910.146(g).

A. Toxicology

H2S is classed as a ***chemical asphyxiant***, similar to carbon monoxide and cyanide gases. It inhibits cellular respiration and uptake of oxygen, causing biochemical suffocation. Typical exposure symptoms include:

LOW	0 - 10 ppm	Irritation of the eyes, nose, and throat
MOD	10 - 50 ppm	Headache Dizziness Nausea and vomiting Coughing and breathing difficulty
HIGH	50 - 200 ppm	Severe respiratory tract irritation Eye irritation / acute conjunctivitis Shock Convulsions Coma Death in severe cases

CAS # 7783-06-4 , OSHA PEL- C 20PPM , NIOSH REL-C 10PPM, IDLH-100PPM

H2S, is a colorless gas with a strong odor of rotten eggs. Sense of smell can become rapidly fatigued and cannot be relied upon to warn of the continuous presence of H2S. It is shipped as a liquefied compressed gas.

Solubility in water is o.4 percent. Flash point is NA but does have an LEL of 4.0% and a UEL of 44.0%.

Vapor pressure is 17.7 ATM and the RgasD is 1.19. Target organs –Eyes, respiratory system, central nervous system

33. SANDBLASTING

I. SCOPE AND PURPOSE

A. The purpose of this policy is to provide safe guidelines for the operation and maintenance of abrasive blasting equipment and their related components.

B. This policy applies to personnel involved in abrasive blasting jobs performed by the Company.

II. RELATED PROCEDURES AND RESOURCES

A. Personal Protective Equipment

B. Fall Hazard Management

C. Abrasive Blasting Checklist

D. Personal Protective Equipment Field Training Module

E. Respiratory Protection Field Training Module

F. Asbestos and Lead Awareness Field Training Module

III. PERSONNEL RESPONSIBILITY

A. Responsibility

1. Supervisor

a. Must be aware of potentially hazardous conditions that may arise during the blasting process, such as silica, lead, and other heavy metals, asbestos, and flammable atmospheres, prior to starting any blasting job, and must, take measures to protect employees preforming sandblasting and those employees affected by sandblasting activities.

b. Strive to "engineer out' heavy exposures by using alternate blasting media, ventilation, containment, such as cabinets, blasting rooms or other portable equipment. The only way exposures can be determined is through the use of air monitoring. Air monitoring should be performed to measure airborne crystalline silica and other hazardous materials and to provide a basis for selecting engineering controls

c. Supervisors must ensure that all employees are trained on related safety topics.

d. Must understand the importance of regularly scheduled maintenance for continued safe operation of blast equipment.

e. Must ensure that all employees comply with this policy and all other related policies.

f. Must complete Abrasive Blasting Checklist on at least daily.

g. Signs should be posted to warn workers about the hazard and specify any protective equipment required

2. Employee

a. Blasters must be familiar with the safe operating functions of blasting equipment to be used on a job.

b. Blast operators must comply with all company procedures.

c. Employees must have knowledge of hazards associated with respirable silica.

d. Employees are to exercise good personal hygiene habits. All sandblasters should wash their hands & faces before eating, drinking or smoking. No eating, drinking or tobacco products in the blasting area. Employees should shower before leaving the worksite. Vehicles should not be parked in any contaminated area.

IV. EQUIPMENT SAFETY

A. Equipment Handling

1. Follow these guidelines when moving blasting equipment to prevent back strains and crushing injuries:

    a. Use a forklift, crane, or other type of lifting device for transporting a blast machine; always use a lifting device when the machine contains abrasive.

    b. Never manually move a blast machine where abrasive has been spilled on hard surfaces or on a wet or slippery surface.

    c. Never attempt to manually move a blast machine containing abrasive.

    d. Always disconnect hoses from machines to avoid interference during movement.

    e. When an empty two-wheeled machine must be manually moved, use two physically capable workers, and ensure that the surface is smooth, level and uncluttered by hose, debris or other obstacles that prevent smooth rolling.

    f. On job sites requiring continual manual machine handling, use a four-wheeled blast machine or towing attachment on a two-wheeled machine.

B. Air Compressors

1. Air compressors must be located in a well-ventilated area. It must be able to obtain large volumes of clean, toxicant-free air. This means the compressor must be placed "upwind from the blasting" operation and out of the range of dust and flying abrasives.

2. Due to the high pressure that air compressors create, precautions must be taken to prevent unleashing of strong forces that can cause serious bodily injury.

3. Air compressors must be inspected daily, prior to use, by a competent person. Inspection must include, but are not limited to the following:

    a. Look for broken airlines.

b. Look for damaged air fittings.

c. Ensure the filters are clean.

4. Never adjust the pressure setting on a compressor above the blast equipment maximum working pressure rating. The maximum working pressure rating is indicated on the manufacturer's metal identification plate.

C. Blast Pot

1. Position blast pots and/or compressors on level ground. Machines operate best when they sit on level surfaces. Oils and other lubricants work more effectively when the parts are not sitting at an unnatural tilt.

   a. If a level site is impossible, the operator should use wheel blocks or construct a temporary base for the equipment.

2. For communication purposes place blast pot between the compressor and the surface to be blasted. This will enable the "pot tender" and operator to make visual contact.

3. All couplings and pipefitting on the blast pot, compressor, and hoses must be airtight.

4. Blast Pots must be inspected daily, prior to use, by a competent person.

D. Hoses and Connectors

1. Wooden ramps must be placed over blasting hoses to protect hoses that stretch across roadways.

2. Couplings must have safety wires in place and be secure as required by federal safety regulations. The operator shall be responsible to ensure that each coupling has safety wires (tie wire) in place. Outside couplings, such as quarter-turn and "crow's foot" type couplings, can be accidentally disconnected when hoses are dragged over rough ground.

3. Whip checks must be installed at bull hose connections.

4. Pot attendant must carefully check for leaks immediately after the hoses have been pressurized and immediately correct them. The pot attendant shall also replace rubber gaskets in hose couplings and

tighten pipe fittings. In addition, the pot attendant shall ensure there is an ample supply of gaskets available on each jobsite.

5. The operator should hold onto the blast hose until the air pressure from the nozzle drops off to zero.

6. Do not use hose with soft spots. Soft spots pose danger of

   unexpected blowouts that may cause serious injury if struck by high-velocity abrasive. Cutting out the, worn section and installing

   couplings to join the good pieces together may repair hoses with one or two soft spots. When repairing hose, ensure that the ends are cut square and smooth, and fit firmly against the coupling shoulders.

7. Never use tape to repair a blown-out hose.

8. Immediately replace a hose if a blowout or leak occurs.

9. Hose ends must come into contact with coupling gaskets to prevent leaks and to maintain static electricity conductivity.

10. When all air is exhausted, the hose shou1d be carefully laid down. Hoses should never be dropped or thrown down because such actions may damage nozzles and the remote-control handle assemblies.

E. Nozzles and Remote Controls

1. All blast machines must be equipped with remote control systems to start and stop the blasting process. Remote controls consist of either an Electric Remote-Control Switch or an Air Actuated Remote Lever. On the Electric Remote Control, the trigger mechanisms are encased to prevent accidental start-up of blasting.

2. Never tape, strap, or tie down an air actuated remote-control lever or choke electric remote-control switch. If the lever cannot freely open, the safety feature of remote controls is completely circumvented. Without remote controls, when an operator loses control of a pressurized blast hose, it will wildly whip around blowing high-velocity abrasive in every direction. Emergency depressurization of the hose is vital.

3. If there is the slightest delay in reaction time of the handle lever or lever lock to open, check for, dust and dirt build-up around pivot

pins before resuming blasting. Also, test the tension on the lever springs, and replace them immediately if they do not respond rapidly.

4. Remote control systems must be well maintained by only designated personnel. Dirty, worn-out parts may interfere with the controls ability to shut-off, culminating in potentially serious injuries to blast operators and bystanders.

5. Increasing depressurization time signals the need to replace the muffler filter element.

6. Substituting component pieces with other manufacturer's parts is not allowed.

7. Inspect blast nozzles for wear and cracks on the inner liner. When a nozzle orifice is worn 1/16" larger than its original size, it should be replaced. Continuing to use a nozzle, beyond the maximum wear point may result in eroding away the liner to the point where abrasive will blow-out through the side of the nozzle.

8. Check nozzles and nozzle holders for deterioration of thread form. Threads on nozzles and their companion holders must not be cross-threaded, worn, or distorted.

9. Hoses that are being tied and lifted to blasting operations being conducted above grade, i.e., scaffolds, shall be depressurized to prevent accidental start-up.

F. Operator Signals

1. On the job site, voice communication is often impossible. Even shouts cannot be heard over the noise of compressors and blasting. In addition, the operator's head will be enclosed in the helmet, which blocks out sound and limits vision. For these reasons, an industry wide standard set of hand and sound signals has been developed.

2. Signals may be visual hand movements, flashing light, pulls on a rope or sounds made by banging a hammer or using a horn or electric buzzer.

3. Every operator should become familiar with the signals to be used on the jobsite.

V. ENVIRONMENTALCONTROLS

A. Electrical Safety

1. The work area must be inspected for exterior electrical power lines that may endanger operators.

2. Blasters should use care to avoid directly blasting power lines and insulators.

3. Indoor work areas should be inspected for electrical wiring, which should be protected from blasting.

    a. Electrical power should be shut off and not restored until the wiring is inspected for damage and determined to be safe.

4. Electrical wiring used for equipment on the job site should be constructed of heavy-duty casings and equipped with dust-tight, moisture-resistant connectors.

5. Inspect wiring to ensure that it is in good condition and properly grounded.

6. Electrical control panels and terminal boxes should be UL-approved, dust tight and moisture-free enclosures.

7. Use Dust-tight, moisture-free connectors on all electrical fittings.

8. Keep electrical cords and fittings away from water and other liquids.

9. For prevention of electrical shock with electrically operated remote controls, transformers must e used to reduce incoming high voltage to no more than 12 to 24 volts at the operator's control handle.

B. Fire Protection

1. Always consult with client safety representative for specific instructions when the work environment may be flammable.

2. If possible do not blast in atmospheres that contain flammable fumes.

3. On applications where flammable gas is present and cannot be avoided, install additional grounding wires on blast machines and nozzles, and use ventilation systems to reduce the fume concentrations to an acceptable level.

C. Walking and Working Surfaces

1. Take precautions at the work site to eliminate hazardous surface obstacles that may interfere with worker mobility.

2. Prior to working from scaffolds ensure that a competent person has inspected them.

3. Check means of access to areas where blasting will occur. Ladders must extend three feet beyond working surface. Portal must be large enough for workers and hoses to pass so not to cause hazards.

4. Surfaces where platforms, scaffolding, scissor lifts or personnel lifts are used must be level, dry, free of obstructions and holes and in compliance with other conditions recommended by manufacturers and safety specialists.

5. Spent abrasive and debris must be removed from walking and working surfaces as soon as possible and not allowed accumulate.

6. Spent abrasive and debris removed from surfaces must be disposed of in accordance with the Federal and State regulations on solid and hazardous waste.

D. Enclosures and Containment

1. Adequate ventilation must be provided for employees working within enclosures. Referred to as "engineering controls" the ventilation equipment needed for job site containment of abrasive blasting must comply with OSHA regulations. These regulations are the same for field-installed enclosures as for stationary blast room facilities (refer to29 CFR 1910.94).

2. Consult with client representative and safety personnel prior to job startup to plan for ventilation while working in enclosures.

3. Use Silica Free/alternative blasting media when possible.

E. Temperature Extremes

1. Never operate compressor if hoses are frozen. When winter temperatures drop below freezing, check them for ice prior to pressurizing hoses. The moisture within the hoses may have frozen overnight, resulting in loss of control over the guillotine.

2. Provide adequate drinking water, especially during summer.

VI. PERSONAL PROTECTION EQUIPMENT

A. Fall Protection

1. Secure blast hoses by tying them to scaffolding or personnel

   platforms, when working from elevations, to prevent injury from hoses falling on other personnel working below or near blasting area.

2. Workers must be certified to operate lift equipment if blasting is to be performed from aerial work platforms.

3. Harnesses and lanyards must be worn when required

B. Respiratory Protection

1. Inhaling dust in a blasting operation is dangerous and can result in severe lung diseases or death.

2. Before using any blasting abrasive, check the Safety Data Sheets (SDS) to find out the chemical composition of the abrasive material.

3. Investigate the chemical and physical composition of the materials that are to be removed from the surface. Some protective coatings consist of lead, cadmium, chromium, titanium, or other metals which when pulverized to respirable dust particles can cause harm to respiratory system.

4. All personnel within an abrasive blasting zone must wear goggles and proper respiratory protection. The blasting zone is an area where any personnel may be subjected to unacceptable levels of respirable dust. The type of protection is dependent on the hazardous dust generated from pulverized abrasive and surface materials. All workers shall wear appropriate protective clothing, that is disposable or removed and contained on site. Workers shall change into clean clothing before leaving the worksite.

5. Ventilation systems and dust collectors may be necessary in enclosed conditions.

6. Workers must wear proper approved respirators during clean up and until the work site atmosphere has been found safe to breathe without the need of respirators.

7. Spent abrasive and debris removed from surfaces must be disposed of in accordance with the Federal and State regulations on solid and hazardous waste.

8. Helmet air filters must meet OSHA's breathing air filter criteria with properly functioning pressure regulator, gauge and pressure relief valve.

9. Check air filter cartridge for cleanliness as described in the owner's manual.

10. Carbon monoxide monitor and alarm systems should include field calibration kit.

11. Never attach breathing air hose to plant or stationary fittings.

12. . Respiratory Protection must be NIOSH Approved and shall be regulated by 29 CFR 1910.134 OSHA'S Respirator Standard.

C. Hearing Protection

1. Noise from abrasive blast nozzles can be loud enough to damage the hearing of blasters and others on the work site. The noise level depends on nozzle size and pressure and noise generated in the surrounding area.

2. In accordance with OSHA regulations, workers must not be exposed to noise levels exceeding 80 decibels as an eight-hour time-weighted average (80 dBA TWA), therefore all blasters shall wear earplugs.

3. Other workers are required to wear earplugs. Industrial Noise and Hearing Conservation.

4. Length of exposure to noise, noise level readings, and distance from the noise source is factors used in determining level of hearing protection required.

D. Protective Clothing

1. Blaster must wear heavy-duty gloves.

2. Employees must wear steel toe boots.

3. Helmet lenses should be changed as soon as pitting or frosting takes place.

Use only the original respirator manufacturer's replacement lenses. Substituting lenses violates the respirator's NIOSH approval in addition to voiding the respirator manufacturer's warranty.

VII. TRAINING

A. Any and all employees subject to exposure to Silica, Lead and other heavy metals or other harmful substances shall be provided training about adverse health effects, work practices, HAZCOM, and use and care of personal protective equipment.

B. They shall be taught how to identify these substances and about their health effects.

VIII. Medical Surveillance

A. Workers exposed to Crystalline Silica shall receive medical monitoring. Such examinations should occur before job placement& at least every 3 years thereafter. More frequent examinations may be necessary for workers at risk for acute or accelerated silicosis. Exams should include at least the following items:

1. A medical & occupational history to collect data on worker exposure.
2. Chest x-rays (to be read by a "B" Reader)
3. Pulmonary function testing
4. Annual evaluation for tuberculosis
5. NIOSH encourages reporting of all cases of silicosis to the State Health Departments and to OSHA and or MSHA.

34. SILICA

CHRONIC TOXICITY SUMMARY

SILICA (CRYSTALLINE, RESPIRABLE)

(silicon dioxide, quartz, tridymite, cristobalite)

CAS Registry Number: 7631-86-9

I. Chronic Toxicity Summary

Inhalation Reference Exposure Level	3 µg/m^3 [respirable, as defined occupationally by ACGIH (2004)/ISO (1995)
Critical effect(s)	Silicosis in miners and other workers
Hazard index target(s)	Respiratory system

II. Physical and Chemical Properties (HSDB, 2001)

Description	Transparent crystals
Molecular formula	SiO_2
Molecular weight	60.09 g/mol
Density	2.65 g/cm^3 @ 0 °C (quartz)
Melting point	1610 °C
Boiling point	2230 °C (2503.20 °K)
Vapor pressure	10 torr @ 1732 °C
Solubility	Practically insoluble in water or acids, except hydrofluoric acid; very slightly sol. in alkali.
Conversion factor	Not applicable

In crystalline silica, the silicon and oxygen atoms are arranged in a definite regular pattern throughout the crystal. The characteristic crystal faces of a crystalline form of silica are the

outward expression of this regular arrangement of the atoms (HSDB, 2001). This REL is meant to be applied only to particles of crystalline silica (quartz, cristobalite, tridymite), of respirable size, as defined by the occupational hygiene methods described by ACGIH (2004)/ISO (1995) which has a 50% cut-point at 4 µm particle aerodynamic diameter. This occupational definition of respirable differs from the environmental definition of respirable, which is PM10. (The occupational particle category "thoracic" has a 50% cut-point at 10 µm particle diameter (ACGIH, 2004) and the category "inhalable" has a 50% cut-point at 100 µm particle diameter (ACGIH, 2004).)

III. Major Uses and Sources

At least 11 chemically identical forms (polymorphs) have been described for crystalline silica. Alpha-quartz is the most abundant polymorph and constitutes 12% of the earth's crust (Elzea, 1997). Silica is also found in the amorphous (non-crystalline) state. The amorphous silica in diatomaceous earth (composed mainly of the cell walls of diatoms) can be converted to the crystalline form cristobalite by heating to 1000-1100 ºC (calcining). Silica is often associated with silicates, which, in addition to silicon and oxygen, contain other metals such as iron, magnesium, aluminum, calcium, potassium, and sodium.

The major uses of silica are in the manufacture of glass, abrasives, ceramics, and enamels, in scouring and grinding compounds, and in molds for castings. Silica is also used in decolorizing and purifying oils and petroleum products; as a clarifying agent; in filtering liquids; and in the manufacture of heat insulators, firebrick, and fire- and acid-proof packing materials. As diatomite (naturally occurring diatomaceous earth), silica is used as a filtration agent, as an abrasive, and as an industrial filler. Sources of ambient respirable crystalline silica in California include mines, quarries, diatomaceous earth calcining plants, sand blasting, and entrained fines (e.g., PM10) from surface soil. The annual statewide industrial emissions from facilities reporting under the Air Toxics Hot Spots Act in California based on the most recent inventory were estimated to be 2,514,981 pounds of crystalline silica (CARB, 2001. The fraction, which is respirable as defined either occupationally or environmentally, is not known.

Measurement of crystalline silica has evolved. Instrumentation has varied by country. In South Africa since the 1930s, dust was collected with a konimeter (Le Roux, 1970; Cherrie and Aitken, 1999). A small volume of air (e.g., 5 cm^3 captured in less than a second) was collected (impacted) onto a small area of a glass slide coated with adhesive. Total dust particles were counted and expressed as dust particles per cubic centimeter. Later, slides were heated to 500- 550 ºC (ignition) to remove carbonaceous materials and immersed in hot 50% hydrochloric acid followed by a second ignition to remove acid-soluble materials. The remainder was mostly silica particles, which could be counted. The konimeter was superseded by the thermal precipitator, which also deposited particles onto glass but could sample larger air volumes at high flow rates (> 1 L/minute) for several hours. With time, particle counting was replaced by estimation of a particle's surface area, initially by examining slides but more recently by an automated method (Kitto, 1960; 1970).

In the United States the impinger method was used from 1922 until 1984 (Lippmann, 2001). Air was drawn into a trap containing fluid, particles in an aliquot of the fluid were counted under magnification, and concentrations were expressed as million particles per cubic foot of air sampled. Later, gravimetric analysis was introduced. Gravimetric analysis is dominated by the larger particles in any given size range.

When it was realized that only a fraction of the dust was responsible for silicosis, respirable dust was collected onto filters using size-specific dust collectors, such as horizontal plate elutriators in South Africa and cyclones in the United States. The sizes of particles collected on the filter were a function of the apparatus used and the rate of airflow through the apparatus.
Quartz dust was quantified by examining filters in an electron microscope with a specific X-ray diffraction beam absorbed by crystalline silica. The National Institute of Occupational Sciences and Health (NIOSH, 2003) has approved Method 7500, which uses one of three approved cyclones and a 5·:·m PVC membrane filter to sample, and X-ray diffraction to measure crystalline silica. The ARB has used Method 7500 in research projects.

In order to harmonize respirable particulate sampling methodology in workers, an international agreement has been reached to use dust samplers that have a 50% cut point for particles of 4 ·:·m aerodynamic diameter (ISO, 1995; ACGIH, 2004).

Various attempts have been made to estimate the changes in silica levels in workplaces over time (e.g., Seixas *et al.*, 1997 for diatomaceous earth facilities in California; Verma *et al.*, 1989 for Ontario hard rock miners). However, although some conversion factors have been proposed, correlation between dust particle number in earlier studies, when dust concentrations were higher, and dust particle weight in the later studies, when the dust concentrations have been lowered, is imprecise so it is difficult to compare the earlier silica measurements with the more recent ones.

IV. Effects of Human Exposures

Inhalation of crystalline silica initially causes respiratory irritation and an inflammatory reaction in the lungs (e.g., Vallyathan *et al.*, 1995). Acute exposures to high concentrations cause cough, shortness of breath, and pulmonary alveolar lipoproteinosis (acute silicosis). After chronic but lower workplace exposures to silica for six to sixteen years, the small airways become obstructed as measured by pulmonary function tests (e.g., decreased FEV_1) in granite quarry workers (no measurement of silica levels reported; Chia *et al.*, 1992). In a report on the hazards of exposure to crystalline silica, the American Thoracic Society (1997) stated: "Studies from many different work environments suggest that exposure to working environments contaminated by silica at dust levels that appear not to cause roentgenographically visible simple silicosis can cause chronic airflow limitation and/or mucus hypersecretion and/or pathologic emphysema." Hnizdo and Vallyathan (2003) also concluded that "chronic levels of silica dust that do not cause disabling silicosis may cause the development of chronic bronchitis, emphysema, and/or small airways disease that can lead to airflow obstruction, even in the absence of radiological

silicosis." Fibrotic lesions associated with crystalline silica have also been found at autopsy in the lungs of granite workers who lacked radiological evidence of silicosis (Craighead and Vallyathan, 1980).

Silicosis results from chronic exposure; it is characterized by the presence of histologically unique silicotic nodules and by fibrotic scarring of the lung. The histological progression of silicosis has been described as: (1) granuloma composed of histiocytic cells, collagen, and lymphocytes; (2) cellular fibrotic nodule with irregular collagen at the center and circular collagen at the periphery; (3) more mature nodule with acellular and avascular center; and (4) late mature nodule composed of dust and collagen including a calcified center (Green and Vallyathan, 1996). Lung diseases other than cancer associated with silica exposure include silicosis, tuberculosis/silicotuberculosis, chronic bronchitis, small airways disease, and emphysema (Oxman *et al.*, 1993; Park *et al.*, 2002; Hnizdo and Vallyathan, 2003; Balmes *et al.*, 2003). Silica exposure has been implicated in autoimmune diseases (rheumatoid arthritis, scleroderma, systemic lupus erythematosus) in gold miners and granite workers (Steenland and Goldsmith, 1995; Parks *et al.*, 1999) and in the causation of kidney disease in some occupations (Goldsmith and Goldsmith, 1993; Stratta *et al.*, 2001), possibly by an immune mechanism.

At the cellular level, silica particles are engulfed in the lung by alveolar macrophages (AM). According to the generally assumed pathological model, the AM subsequently release various growth factors and reactive oxygen species (ROS; superoxide anion, hydrogen peroxide, hydroxyl radical) (Lapp and Castranova, 1993; Mossman and Churg, 1998; Ding *et al.*, 2002). ROS and some growth factors (e.g., activator protein-1, platelet activating factor) are inflammatory and attract neutrophils to the site of inflammation, while other factors (fibronectin,

alveolar macrophage-derived growth factor) stimulate fibroblasts to proliferate and to make collagen. Since silica particles cannot be digested by the macrophage, the inflammatory process becomes chronic (frustrated phagocytosis). An increased silica burden leads to more foci of inflammation, nodule formation, and fibrosis. The internal process can continue after external exposure ends. Silica particles also enter into alveolar Type I epithelial cells (Churg, 1996), which can lead to cell death of Type I cells and to hypertrophy and proliferation of Type II epithelial cells to replace the Type I cells. The epithelial repair process is associated with a subsequent increase in collagen formation.

The initial diagnosis of silicosis is often based on chest radiographs. Recent papers have used the 1980 classification by the International Labor Organization (ILO, 1980) to identify and classify silicosis into categories and subcategories of seriousness by comparison of patient radiographs with ILO-supplied reference radiographs taken at various stages of silicosis (Table 1):

Table 1. International Labor Organization categorization of silicosis (ILO, 1980).

ILO Category	*Qualitative Description*
0/0	No small (up to 1 cm) silicotic opacities (nodules) are present

0/1	Probably no nodules, but some areas of radiograph are suspect [possible silicosis]
1/0	Small silicotic nodules are most likely present, but not certainly [probable silicosis]
1/1	Small silicotic nodules are definitely present
1/2	Small silicotic nodules are definitely present; other areas of the radiograph may indicate more advanced lesions including large opacities (> 1 cm), pleural thickening, etc.
2/1, 2/2, 2/3 3/2 3/3 , ,	More advanced stages of silicosis/increasing certainty of the presence of lung abnormalities

There are 3 types of Silicosis-

C. Chronic-10 years exposure to low concentrations

D. Accelerated- Exposure to high concentrations & develops 5-10 years after initial exposure

E. Acute- Exposure to extremely high concentrations & symptoms develop within a few weeks to a few years.

Silicosis is characterized by shortness of breath, fever, and bluish skin. It could be diagnosed as pulmonary edema, pneumonia, or tuberculosis. Silica dust causes severe fungal infections to develop. This condition could be fatal.

35. PROCESS SAFETY MANAGEMENT

Process Safety Management of Highly Hazardous Chemicals

(§1926.64)

1. THE PROBLEM

Unexpected releases of toxic, reactive, or flammable liquids and gases in processes involving highly hazardous chemicals have been reported for many years. Incidents continue to occur in various industries that use highly hazardous chemicals which may be toxic, reactive, flammable, or explosive, or may exhibit a combination of these properties. Regardless of the industry that uses these highly hazardous chemicals, there is a potential for an accidental release any time they are not properly controlled. This, in turn, creates the possibility of disaster.

Recent major disasters include the 1984 Bhopal, India, incident resulting in more than 2,000 deaths; the October 1989 Phillips Petroleum Company, Pasadena, TX, incident resulting in 23 deaths and 132 injuries; the July 1990 BASF, Cincinnati, OH, incident resulting in 2 deaths, and the May 1991 IMC, Sterlington, LA, incident resulting in 8 deaths and 128 injuries.

Although these major disasters involving highly hazardous chemicals drew national attention to the potential for major catastrophes, the public record is replete with information concerning many other less notable releases of highly hazardous chemicals. Hazardous chemical releases continue to pose a significant threat to employees and provide impetus, internationally and nationally, for authorities to develop or consider developing legislation and regulations to eliminate or minimize the potential for such events.

On July 17, 1990, OSHA published in the Federal Register (55 FR 29150) a proposed standard, - "Process Safety Management of Highly Hazardous Chemicals" - containing requirements for the management of hazards associated with processes using highly hazardous chemicals to help assure safe and healthful workplaces.

OSHA's proposed standard emphasized the management of hazards associated with highly hazardous chemicals and established a comprehensive management program that integrated technologies, procedures, and management practices.

The notice of proposed rulemaking invited comments on any aspect of the proposed standard for process safety management of highly hazardous chemicals and announced the scheduling of a hearing to begin on November 27, 1990, in Washington, DC.

On November 1, 1990, OSHA published a Federal Register notice (55 FR 46074) scheduling a second hearing to begin on February 26, 1991, in Houston, TX, enumerating additional issues, and extending the written comment period until January 22, 1991.

The hearings on the proposed standard were held in Washington, DC, from November 27, 1990, through December 4, 1990, and in Houston, TX, from February 26, 1991, through March 7, 1991. The Administrative Law Judge presiding i the hearings allowed participants to submit post-hearing comments until May 6, 1991, and file post-hearing briefs un-June 5, 1991. OSHA received more than 175 comments in response to the notice of proposed rulemaking. In addition to these comments, the hearings resulted in almost 4,000 pages of testimony and almost 60 post-hearing comments and briefs. State plan States, approved under section 18(b) of the Occupational Safety and Health Act of 1970 must adopt standards and enforce requirements which are at least as effective as Federal requirements. There are currently 25 State plan States: 23 covering private and public (State and local government) sectors and two covering public sector only. Plan States must adopt comparable standards to the Federal within 6 months of a Federal standard's promulgation.

Management of highly hazardous chemicals, the Clean Air Act Amendments (CAAA) were enacted into law (November 15, 1990). Section 304 of the CAAA requires that the Secretary of Labor, in coordination with the Administrator of the Environmental Protection Agency (EPA), promulgate, pursuant to the Occupational Safety and Health Act of 1970, a chemical process safety standard to prevent accidental releases of chemicals that could pose a threat to employees.

The CAAA require that the standard include a list of highly hazardous chemicals which includes toxic, flammable, highly reactive, and explosive substances. The CAAA also specified minimum elements that the OSHA standard must require employers to do, as follows:

1. Develop and maintain written safety information identifying workplace chemical and process hazards, equipment used in the processes, and technology used in the processes;

2. Perform a workplace hazard assessment, including, as appropriate, identification of potential sources of accidental releases, identification of any previous release within the facility that had a potential for catastrophic consequences in the workplace, estimation of workplace effects of a range of releases, and estimation of the health and safety effects of such a range on employees;

3. Consult with employees and their representatives on the development and conduct of hazard assessments and the development of chemical accident prevention plans and provide access to these and other records required under the standard;

4. Establish a system to respond to the workplace hazard assessment findings, which shall address prevention, mitigation, and emergency responses;

5. Review periodically the workplace hazard assessment and response system;

6. Develop and implement written operating procedures for the chemical processes, including procedures for each operating phase, operating limitations, and safety and health considerations;

7. Provide written safety and operating information for employees and employee training in operating procedures, by emphasizing hazards and safe practices that must be developed and made available;

8. Ensure contractors and contract employees are provided with appropriate information and training;

9. Train and educate employees and contractors in emergency response procedures in a manner as comprehensive and effective as that required by the regulation promulgated pursuant to section 126(d) of the Superfund Amendments and Reauthorization Act;

10. Establish a Quality assurance program to ensure that initial process-related equipment, maintenance materials, and spare parts are fabricated and installed consistent with design specifications;

11. Establish maintenance systems for critical process-related equipment, including written procedures, employee training, appropriate inspections, and testing of such equipment to ensure ongoing mechanical integrity;

12. Conduct pre-startup safety reviews of all newly installed or modified equipment;

13. Establish and implement written procedures managing change to process chemicals, technology, equipment, and facilities, and

14. Investigate every incident that results in or could have resulted in a major accident in the workplace, with any findings to be reviewed by operating personnel and modifications made, if appropriate.

Also, the CAAA identify specific duties for EPA relative to the prevention of accidental releases [see section 301 (r)). Generally, EPA must develop a list of chemicals and a Risk Management Plan

2. HOW THE STANDARD WORKS

This discussion summarizes the OSHA final process safety management (PSM) standard. The standard mainly applies to manufacturing industries - particularly, those pertaining to chemicals, transportation equipment, and fabricated metal products. Other affected sectors include natural gas liquids; farm product warehousing; electric, gas, and sanitary services; and wholesale trade. It also applies to pyrotechnics and explosives manufacturers covered under other OSHA rules and has special provisions for contractors working in covered facilities.

In each industry, PSM applies to those companies that deal with any of more than 130 specific toxic and reactive chemicals in listed quantities; it also includes flammable liquids and gases in quantities of 10,000 pounds (4,535.9 Kg) or more.

Subject to the rules and procedures set forth in OSHA's Hazard Communication Standard [29 Code of Federal Regulations (CFR) 1926.59(i)(1) through 1926.59(i)(12)], employees and their designated representatives must be given access to trade secret information contained within the process hazard analysis and other documents required to be developed by the PSM standard.

The key provision of PSM is process hazard analysis - a careful review of what could go wrong and what safeguards must be implemented to prevent releases of hazardous chemicals. Covered employers must identify those processes that pose the greatest risks and begin evaluating those first. PHA's must be completed as soon as possible. At least one-quarter of the processes must be evaluated by May 26, 1994, with an additional 25 percent completed each following year so that by May 26, 1997, if not sooner, employers will have evaluated all affected processes. PSM clarifies the responsibilities of employers and contractors involved in work that affects or takes place near covered processes to ensure that the safety of both plant and contractor employees is considered. The standard also mandates written operating procedures; employee training; pre-startup safety reviews; evaluation of mechanical integrity of critical equipment; and written procedures for managing change. PSM specifies a permit system for hot work; investigation of incidents involving releases or near misses of covered chemicals; emergency action plans; compliance audits at least every 3 years; and trade secret protection.

To understand PSM and its requirements, employers and employees need to understand how OSHA uses the term "process" in PSM. Process means any activity involving a highly hazardous chemical including using, storing, manufacturing, handling, or moving such chemicals at the site, or any combination of these activities. For purposes of this definition, any group of vessels that are interconnected, and separate vessels located in a way that could involve a highly hazardous chemical in a potential release, are considered a single process.

1. PROCESS SAFETY INFORMATION

Mechanical Services & Design Inc. will complete a compilation of written process safety information before conducting any process hazard analysis required by the standard. The compilation of written process safety information, completed under the same schedule required for process hazard analyses, will help the employer and the employees involved in operating the process to identify and understand the hazards posed by those processes involving highly hazardous chemicals. Process safety information must include information on the hazards of the highly hazardous chemicals used or produced by the process, information on the technology of the process, and information on the equipment in the process.

Information on the hazards of the highly hazardous chemicals in the process shall consist of at least the following:

Toxicity,

Permissible exposure limits,

Physical data,

Reactivity data, Corrosivity

data, and

Thermal and chemical stability data, and hazardous effects of inadvertent mixing of different materials.

Information on the technology of the process must include at least the following: A block

flow diagram or simplified process flow diagram,

Process chemistry,

Maximum intended inventory,

Safe upper and lower limits for such items as temperatures, pressures, flows or compositions,

and

An evaluation of the consequences of deviations, including those affecting the safety and

health of employees.

Where the original technical information no longer exists, such information may be developed in conjunction with the process hazard analysis in sufficient detail to support the analysis.

Information on the equipment in the process must include the following:

Materials of construction,

Piping and instrument diagrams (P&IDs),

Electrical classification,

Relief system design and design basis,

Ventilation system design,

Design codes and standards employed,

Material and energy balances for processes built after May 26, 1992;

and Safety systems (e.g., interlocks, detection, or suppression systems).

The employer shall document that equipment complies with recognized and generally accepted good engineering practices. For existing equipment designed and constructed in accordance with codes, standards, or practices that are no longer in general use, the employer shall determine and document that the equipment is designed, maintained, inspected, tested, and operated in a safe manner.

The compilation of the above-described process safety information provides the basis for identifying and understanding the hazards of a process and is necessary in developing the process hazard analysis and may be necessary for complying with other provisions of PSM such as management of change and incident investigations.

2. PROCESS HAZARD ANALYSIS

The process hazard analysis is a thorough, orderly, systematic approach for identifying, evaluating, and controlling the hazards of processes involving highly hazardous chemicals. The employer must perform an initial process hazard analysis (hazard evaluation) on all processes covered by this standard. The process hazard analysis methodology selected must be appropriate to the complexity of the process and must identify, evaluate, and control the hazards involved in the process.

First, we must determine and document the priority order for conducting process hazard analyses based on a rationale that includes such considerations as the extent of the process hazards, the number of potentially affected employees, the age of the process, and the operating history of the process. All initial process hazard analyses should be conducted as soon as possible

Process hazard analyses completed after May 2, 2013, that meet the requirements of the PSM standard are acceptable as initial process hazard analyses. All process hazard analyses must be updated and revalidated, based on their completion date, at least every 5 years.

We must use one or more of the following methods, as appropriate, to determine and evaluate the hazards of the process being analyzed:

What-if, Checklist,

What-If/checklist,

Hazard and operability study (HAZOP), Failure

mode and effects analysis (FMEA), Fault tree

analysis, or

An appropriate equivalent methodology.

Whichever method(s) are used, the process hazard analysis must address the following:

The hazards of the process;

The identification of any previous incident that had a potential for catastrophic consequences in the workplace;

Engineering and administrative controls applicable to the hazards and their interrelationships, such as appropriate application of detection methodologies to provide early warning of releases.

Acceptable detection methods might include process monitoring and control instrumentation with alarms, and detection hardware such as hydrocarbon sensors;

Consequences of failure of engineering and administrative controls; Facility siting;

Human factors; and

A qualitative evaluation of a range of the possible safety and health effects on employees in the workplace if there is a failure of controls.

OSHA believes that the process hazard analysis is best performed by a team with expertise in engineering and process operations, and that the team should include at least one employee who has experience with, and knowledge of the process being evaluated. Also, one member of the team must be knowledgeable in the specific analysis methods being used.

The employer must establish a system to address promptly the team's findings and recommendations; ensure that the recommendations are resolved in a timely manner and that the resolutions are documented; document what actions are to be taken; develop a written schedule of when these actions are to be completed; complete actions as soon as possible; and communicate the actions to operating, maintenance, and other employees whose work assignments are in the process and who may be affected by the recommendations or actions.

At least every 5 years after the completion of the initial process hazard analysis, the process hazard analysis must be updated and revalidated by a team meeting the standard's requirements to ensure that the hazard analysis is consistent with the current process.

Employers must keep on file and make available to OSHA, on request, process hazard analyses and updates or revalidation for each process covered by PSM, as well as the documented resolution of recommendations, for the life of the process.

3. OPERATING PROCEDURES

Mechanical Services & Design Inc. will develop and implement written operating procedures, consistent with the process safety information, that provide clear instructions for safely conducting activities involved in each covered process. OSHA believes that tasks and procedures related to the covered process must be appropriate, clear, consistent, and most importantly, well communicated to employees. The procedures must address at least the following elements:

Steps for each operating phase: Initial startup;

Normal operations; Temporary operations;

Emergency shutdown, including the conditions under which emergency shutdown is required, and the assignment of shutdown responsibility to qualified operators to ensure that emergency shutdown is executed in a safe and timely manner;

Emergency operations; Normal shutdown; and

Startup following a turnaround, or after an emergency shutdown.

Operating limits:

Consequences of deviation, and

Steps required to correct or avoid deviation.

Safety and health considerations:

Properties of, and hazards presented by, the chemicals used in the process;

Precautions necessary to prevent exposure, including engineering controls, administrative controls, and personal protective equipment;

Control measures to be taken if physical contact or airborne exposure occurs;

Quality control for raw materials and control of hazardous chemical inventory levels; and Any special or

unique hazards.

Safety systems (e.g., interlocks, detection, or suppression systems) and their functions.

To ensure that a ready and up-to-date reference is available, and to form a foundation for needed employee training, operating procedures must be readily accessible to employees who work in or maintain a process. The operating procedures must be reviewed as often as necessary to ensure that they reflect current operating practices, including changes in process chemicals, technology, and equipment, and facilities. To guard against outdated or inaccurate operating procedures, the employer must certify annually that these operating procedures are current and accurate.

We will develop and implement safe work practices to provide for the control of hazards during work activities such as lockout/tagout; confined space entry; opening process equipment or piping; and control over entrance into a facility by maintenance, contractor, laboratory, or other support personnel. These safe work practices must apply both to employees and to contractor employees.

4. EMPLOYEEPARTICIPATION

Mechanical Services & Design Inc. will develop a written plan of action to implement the employee participation required by PSM. Under PSM, employers must consult with employees and their representatives on the conduct and development of process hazard analyses and on the development of the other elements of process management, and they must provide the employees and their representatives access to process hazard analyses and to all other information required to be developed by the standard.

5. TRAINING

Initial Training

We believe that the implementation of an effective training program is one of the most important steps that an employer can take to enhance employee safety. Accordingly, PSM requires that each employee presently involved in operating a process or a newly assigned process must be trained in an overview of the process and in its operating procedures. The training must include emphasis on the specific safety and health hazards of the process, emergency operations including shutdown, and other safe work practices that apply to the employee's job tasks. Those employees already involved in operating a process on the PSM effective date do not necessarily need to be given initial training. Instead, the employer may certify in writing that the employees have the required knowledge, skills, and abilities to safely carry out the duties and responsibilities specified in the operating procedures.

Refresher Training

Refresher training must be provided at least every 3 years, or more often, if necessary, to each employee involved in operating a process to ensure that the employee understands and adheres to the current operating procedures of the process. The employer, in consultation with the employees involved in operating the process, must determine the appropriate frequency of refresher training.

Training Documentation

Mechanical Services & Design Inc. will determine whether each employee operating a process has received and understood the training required by PSM. A record must be kept containing the identity of the employee, the date of training, and how the employer verified that the employee understood the training.

6. CONTRACTORS

Application

Any categories of contract labor may be present at a jobsite; such workers may actually operate the facility or do only a particular aspect of a job because they have specialized knowledge or skill. Others work only for short periods

The employer must establish and implement written procedures to maintain the ongoing integrity of process equipment. Employees involved in maintaining the ongoing integrity of process equipment must be trained in an overview of that process and its hazards and trained in the procedures applicable to the employees' job tasks.

Inspection and testing must be performed on process equipment, using procedures that follow recognized and generally accepted good engineering practices. The frequency of inspections and tests of process equipment must conform to manufacturers' recommendations and good engineering practices, or more frequently if determined to be necessary by prior operating experience. Each inspection and test on process equipment must be documented, identifying the date of the inspection or test, the name of the person who performed the inspection or test, the serial number or other identifier of the equipment on which the inspection or test was performed, a description of the inspection or test performed, and the results of the inspection or test.

Equipment deficiencies outside the acceptable limits defined by the process safety information must be corrected before further use. In some cases, it may not be necessary that deficiencies be corrected before further use, as long as deficiencies are corrected in a safe and timely manner, when other necessary steps are taken to ensure safe operation.

In constructing new plants and equipment, the employer must ensure that equipment as it is fabricated is suitable for the process application for which it will be used. Appropriate checks and inspections must be performed to ensure that equipment is installed properly and is consistent with design specifications and the manufacturer's instructions.

The employer also must ensure that maintenance materials, spare parts, and equipment are suitable for the process application for which they will be used.

7. HOT WORK PERMIT

A permit must be issued for hot work operations conducted on or near a covered process. The permit must document that the fire prevention and protection requirements in OSHA regulations (29 CFR 1926.352) have been implemented prior to beginning the hot work operations; it must indicate the date(s) authorized for hot work; and identify the object on which hot work is to be performed. The permit must be kept on file until completion of the hot work.

8. MANAGEMENT OF CHANGE

We believe that contemplated changes to a process must be thoroughly evaluated to fully assess their impact on employee safety and health and to determine needed changes to operating procedures. To this end, the standard contains a section on procedures for managing changes to processes. Written procedures to manage changes (except for "replacements in kind") to process chemicals, technology, equipment, and procedures, and change to facilities that affect a covered process, must be established, and implemented. These written procedures must ensure that the following considerations are addressed prior to any change:

The technical basis for the proposed change,

Impact of the change on employee safety and health, Modifications to operating procedures,

Necessary time period for the change, and Authorization

requirements for the proposed change.

Employees who operate a process, and maintenance and contract employees whose job tasks will be affected by a change in the process must be informed of, and trained in, the change prior to startup of the process or startup of the affected part of the process. If a change covered by these procedures results in a change in the required process safety information, such information also must be updated accordingly. If a change covered by these procedures changes the required operating procedures or practices, they also must be updated.

9. INCIDENT INVESTIGATION

A crucial part of the process safety management program is a thorough investigation of incidents to identify the chain of events and causes so that corrective measures can be developed and implemented. Accordingly, PSM requires the investigation of each incident that resulted in, or could reasonably have resulted in, a catastrophic release of a highly hazardous chemical in the workplace.

Such an incident investigation must be initiated as promptly as possible, but not later than 48 hours following the incident. The investigation must be by a team consisting of at least one person knowledgeable in the process involved, including a contract employee if the incident involved the work of a contractor, and other persons with appropriate knowledge and experience to investigate and analyze the incident thoroughly.

An investigation report must be prepared including at least: Date of incident, Date investigation began, Description of the incident, PSM, therefore, applies to contractors performing maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process. It does not apply, however, to Factors that contributed to the incident, and Recommendations resulting from the investigation.

A system must be established to promptly address and resolve the incident report findings and recommendations. Resolutions and corrective actions must be documented, and the report reviewed by all affected personnel whose job tasks are relevant to the incident findings (including contract employees when applicable). The employer must keep these incident investigation

reports for 5 years.

2. EMERGENCY PLANNING AND RESPONSE

If, despite the best planning, an incident occurs, it is essential that emergency pre-planning and training make employees aware of, and able to execute, proper actions. For this reason, an emergency action plan for the entire plant must be developed and implemented in accordance with the provisions of other OSHA rules [29 CFR 1926.35 (a)]. In addition, the emergency action plan must include procedures for handling small releases of hazardous chemicals. Employers covered under PSM also may be subject to the OSHA hazardous waste and emergency response regulation [29 CFR 1926.65(a), Cp), and (q)].

3. COMPLIANCE AUDITS

To be certain process safety management is effective, we will certify that they have evaluated compliance with the provisions of PSM at least every 3 years. This will verify that the procedures and practices developed under the standard are adequate and are being followed. The compliance audit must be conducted by at least one person knowledgeable in the process and a report of the findings of the audit must be developed and documented noting deficiencies that have been corrected. The two most recent compliance audit reports must be kept on file.

4. TRADE SECRETS

Mechanical Services & Design Inc. will make available all information necessary to comply with PSM to those persons responsible for compiling the process safety information, those developing the process hazard analysis, those responsible for developing the operating procedures, and those performing incident investigations, emergency planning and response and compliance audits, without regard to the possible trade secret status of such information. Nothing in PSM, however, precludes the employer from requiring those persons to enter into confidentiality agreements not to disclose the information.

All contract employers must respect the confidentiality of Trade Secret information when the process safety information is released to them.

PSM, therefore applies to contractors performing maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process. It does not however apply to contractors providing incidental services that do not influence process safety, such as janitorial, food and drink, laundry, delivery, or other supply services.

5. EMPLOYER RESPONSIBILITIES

When selecting a contractor, we will obtain and evaluate information regarding the contract employer's safety performance and programs. The employer also must inform contract employers of the known potential fire, explosion, or toxic release hazards related to the contractor's work and the process; explain to contract employers the applicable provisions of the emergency action plan; develop and implement safe work practices to control the presence, entrance, and exit of contract employers and contract employees in covered process areas; evaluate periodically the performance of contract employers in fulfilling their obligations; and maintain a contract employee injury and illness log related to the contractor's work in the process areas.

6. CONTRACT EMPLOYER RESPONSIBILITIES

The contract employer must:

Ensure that contract employees are trained in the work practices necessary to perform their job safely;

Ensure that contract employees are instructed in the known potential fire, explosion, or toxic release hazards related to their job and the process, and in the applicable provisions of the emergency action plan;

Document that each contract employee has received and understood the training required by the standard by preparing a record that contains the identity of the contract employee, the date of training, and the means used to verify that the employee understood the training;

Ensure that each contract employee follows the safety rules of the facility including the required safe work practices required in the operating procedures section of the standard; and

Advise the employer of any unique hazards presented by the contract employer's work. All contract employers must respect the confidentiality of trade secret information when the process safety information is released to them. No video or photographs are allowed where trade secret information or processes are utilized.

7. PRE-STARTUP SAFETY REVIEW

It is important that a safety review takes place before any highly hazardous chemical is introduced into a process. PSM, therefore, requires the employer to perform a pre-startup safety review for new facilities and for modified facilities when the modification is significant enough to require a change in the process safety information. Prior to the introduction of a highly hazardous chemical to a process, the pre-startup safety review must confirm the following:

Construction and equipment are in accordance with design specifications;

Safety, operating, maintenance, and emergency procedures are in place and are adequate;

A process hazard analysis has been performed for new facilities and recommendations have been resolved or implemented before startup, and modified facilities meet the management of change requirements; and

Training of each employee involved in operating a process has been completed.

8. MECHANICAL INTEGRITY

We believe it is important to maintain the mechanical integrity of critical process equipment to ensure it is designed and installed correctly and operates properly. PSM mechanical integrity requirements apply to the following equipment:

Pressure vessels and storage tanks;

Piping systems (including piping components such as valves);

Relief and vent systems and devices;

Emergency shutdown systems;

Controls (including monitoring devices and sensors, alarms, and interlocks)

36. FIRST AID

MSD FIRST AID POLICY 

I. MSD ADOPTS THE FOLLOWING POLICY WITH REGARD TO WORK-RELATED FIRST AID INJURIES.

The company will do all that is reasonable to ensure that the best appropriate, authorized care is provided for all work-related injuries. The company will make direct payment to the treatment center for billings that comply with the Official Medical Fee Schedule for the treatment of work- related ***First Aid*** injuries.

II. IT IS MSD's POLICY THAT FIRST AID INJURIES MUST MEET THE FOLLOWING REQUIREMENTS:

1. An employee who experiences a work-related injury shall notify the supervisor immediately.
2. The employee and supervisor agree that one doctor's visit is adequate care; and the injury fits the labor code definition of ***First Aid***.
3. Care must be performed at an authorized medical PPO clinic or medical treatment facility, by authorized personnel, and the injury should be defined by the doctor as ***First Aid***.

III. THE SUPERVISOR WILL MAKE SURE:

1. The employee is aware of and understands the company's ***First Aid*** Policies and Procedures;
2. The employee may be given an Employee's Claim for Workers' Compensation Benefits form (FIRST REPORT OF AN INJURY, OCCUPATIONAL DISEASE OR DEATH (FROI-1));
3. A Medical Referral form and if you choose, a copy of the completed Employee's Claim for Workers' Compensation Benefits (FIRST REPORT OF AN INJURY, OCCUPATIONAL DISEASE OR DEATH (FROI-1)) are given to the employee, and taken to the authorized treatment center;
4. The employee is treated at the authorized treatment center;
5. The employee is medically released;

6. Copies of all completed forms are submitted to the person responsible for keeping a log of workers' compensation injuries.

IV. THE SAFETY ADMINISTRATOR/ RISK MANAGER WILL MAKE SURE:

1. Proper forms are completed and kept at your worksite,
2. There is a release of medical care;
3. There is appropriate notification of injury;
4. Appropriate record keeping is performed; and
5. All medical bills from the clinic are paid promptly.
6. Follow-up on care for the injured party to make sure the rehabilitation process is as successful as possible.
7. The contents of the first aid kits being sent out to each job will meet the minimal requirements of ANSI Z308.1.

EMPLOYEE'S RESPONSIBILITIES

1. Do all that is possible to prevent any injury/accident and ensure a safe working environment for self, co-workers, and public.

2. Notify your supervisor immediately of any injury and the nature of injury.

3. Take Medical Referral form and a copy of the completed '"FIRST REPORT OF AN INJURY, OCCUPATIONAL DISEASE OR DEATH (FROI-1)" form to authorized treatment center.

4. Report back to supervisor following authorized treatment with a completed copy of the Medical Referral form.

5. Follow care directions of authorized treating personnel and obtain medical release.

SUPERVISOR'S RESPONSIBILITIES

1. Provide a safe working environment for self, co-workers, and public.

2. Educate employees about the company's ***First Aid*** policies and procedures.

3. Determine whether injury is work-related. Contact office if there is any doubt

4. Make sure the employee completes a "FIRST REPORT OF AN INJURY, OCCUPATIONAL DISEASE OR DEATH (FROI-1)" form if that is your company policy.

5. Make sure employee seeks timely, appropriate, authorized treatment.

6. Make sure employee takes a Medical Referral form and a copy of the completed, "FIRST REPORT OF AN INJURY, OCCUPATIONAL DISEASE OR DEATH (FROI-1)" form to authorized treatment center.

7. Contact the employee following authorized treatment.

8. Make sure employee is medically released to return to work.

9. Make sure communication regarding injury is maintained with Safety Administrator/Office Manager/Risk Manager.

10. Make sure appropriate forms are submitted to the person who keeps the injury log.

11. At least WEEKLY, inspect the first aid kit and replaced expended items

12. Make sure 911 is available for all emergencies. In areas where 911 is NOT available, post local emergency numbers on site in a conspicuous location – including fire, hospital, ambulance, and police numbers.

13. Ensure proper equipment is available for prompt transportation of the injured person to a physician or hospital or a communication system for contacting necessary ambulance service shall be provided.

14. Where eye wash and showers are needed, such as jobs that require working with corrosives suitable facilities shall be provided.

15. There shall be at least one (1) person on each job site current in First Aid/CPR training.

FIRST AID PROGRAM POLICIES & PROCEDURES

Using the current regulations, the following procedures all Employers to maximize control over ***First Aid*** injuries while at the same time minimizing the amount of work required to manage them.

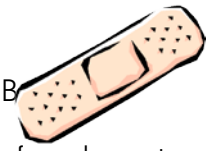
First Aid injuries can be broken down into two categories:

First Aid injuries that can be treated on site. 'Band-Aid Box Injuries"

First Aid injuries that are sent to your local clinic for treatment

FIRST AID INJURIES - ON SITE TREATMENT "BAND-AID BOX INJURIES"

These represent the major portion of injuries on the job. They are small and can usually be treated simply on site. You do not have to submit or call in an Employer's Report of Occupational Injury or Illness (FROI-1).



Minor injuries can turn into major problems if not managed. It is important to have a responsible supervisor keep a log of all such injuries and to monitor them. This simply means asking someone 'how is your finger?' or how is that bump on your head?" within a reasonable time after the injury. By doing this, the employer or supervisor shows the employee that their welfare is important to the company and, at the same time, keeps minor injuries from becoming major ones thus reducing severity.

SPECIFIC STEPS TO BE FOLLOWED BY EMPLOYER

1. Train all employees to report all injuries to their supervisors.
2. You have no obligation to do anything:
    a. If the injured employee does not report an injury to you.
    b. The employee does not request an Employee's Claim for Workers' Compensation Benefits form (FIRST REPORT OF AN INJURY, OCCUPATIONAL DISEASE OR DEATH (FROI-1)).
    c. You do not have any knowledge of the injury.

Your supervisors should watch for obvious injuries for which you could be held responsible. The law is unclear about whether it is necessary to complete the employee claim for workers' Compensation Benefits form (FIRST REPORT OF AN INJURY, OCCUPATIONAL DISEASE OR DEATH (FROI-1)). If you do decide to complete it, be sure to give the employee a copy.

If you have knowledge of an injury (even if the employee has not reported it), you may have an obligation to provide an Employee Claim for Workers' Compensation Benefits form, (FIRST REPORT OF AN INJURY, OCCUPATIONAL DISEASE OR DEATH (FROI-1)) to the employee.

a. At the time you learn of the injury, have the employee complete, sign and return to you an Employee's Claim for Workers' Compensation Benefits form (FIRST REPORT OF AN INJURY, OCCUPATIONAL DISEASE OR DEATH (FROI-1)).

b. Be sure to complete the employer's portion and give the employee a copy.

Mark the form, FIRST REPORT OF AN INJURY, OCCUPATIONAL DISEASE OR DEATH (FROI-1)
First Aid *Injury across the face.*

You should also create a follow-up tracking system. Little injuries can become big injuries, and you should do everything you can to avoid this problem.

Do not report ***First Aid*** claims to your insurance career.

FIRST AID INJURIES - TREATED AT THE CLINIC

Treatment of many injuries will be beyond the capabilities of your staff unless, of course, you have a nurse on site. In fact, there are many Employers who provide no treatment on site and send all their injuries to a clinic.

Even though a doctor has treated a ***First Aid*** injury, you do not have to file a report to your insurance carrier. However, this does not excuse the doctor from completing the Doctor's First Report of Occupational Injury or Illness form.

1. If your Employee has gone to the clinic for treatment, we recommend that you deliver the Employee's Claim for Workers' Compensation Benefits form (FIRST REPORT OF AN INJURY, OCCUPATIONAL DISEASE OR DEATH (FROI-1)) to the Employee within the time set by law. (Refer to number 4 on page 2 regarding this.)

2. The possibility exists that an Employee could go to a clinic for treatment without telling anyone; you should have an agreement with the clinic to call you, should anyone arrive without a Medical Referral from you. This is an important part of managing the injury.

3. If the injury falls within the definition of ***First Aid***, the doctor should note that this is a minor injury on the Doctor's First Report of Occupational Injury or Illness form, as well as on the Authorization to Return to work form.

   Arrange with the Clinic to have the Doctor's First Report of Occupational Injury or Illness form sent directly to you. This report should NOT be sent to your insurance carrier, or they will set up the CLAIM. The ***First Aid*** designation tells you that you need NOT call in or mail an Employer's Report of Occupational Injury or Illness form (FROI-1) to your insurance carrier.

4. Work with your * PPO clinic to have them bill you directly for ***First Aid*** treatment. Make sure that that the bills comply with the Official Medical Fee Schedule. You do not want to pay more than is appropriate under the law. Please note that the billing is not sent to your insurance carrier for review.

- PPO refers to Preferred Provider Organization. These are medical providers that your insurance carrier has contracted with in order to maximize medical cost savings and quality medical care. Contact your examiner to determine if your clinic is a PPO provider or to obtain additional information in selecting a PPO provider.

37. HEAT STRESS

OSHA Standard: 29 U.S.C. § 654, 5(a)1: **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 are likely to cause death or serious physical harm to his employees."

1) **Purpose**

   a. The following Heat Stress Program has been established for all employees of Mechanical Services & Design Inc. who in the course and scope of their work have a potential for exposure to heat related illness.

2) **Scope**

   a. The written Heat Stress Program shall apply to all Mechanical System of Dayton employees and temporary employees as well as employees of subcontractors. This program shall be considered the minimum requirements and if conflicts arise between customer/client programs or applicable regulatory requirements, the most stringent shall apply.

3) **RESPONSIBILITY**

   a. The Safety Manager shall be responsible for disciplinary action resulting from failure to follow the guidelines as set forth in this program.

   b. The Field Superintendent/Project Manager/Service Manager/ Plumbing Service Manager or designee shall be responsible for the monitoring and guidance for the implementation of this program.

   c. The Foreman/Lead Tech/Lone Worker shall be responsible for the implementation and execution of the Heat Stress Program.

4) **Definitions**

   a. "Acclimatize"- to adjust or adapt to a new climate, place, or situation

   b. "Heat Exhaustion"- a condition whose symptoms may include heavy sweating and a rapid pulse, a result of your body overheating. It's one of three heat- related syndromes, with heat cramps being the mildest and heatstroke being the most severe

c. "Heat Index"- combines air temperature and relative humidity, in shaded areas, as an attempt to determine the human-perceived equivalent temperature, as how hot it would feel if the humidity were some other value in the shade.

    i. It surprises many people to learn that the heat index values in the chart above are for shady locations. If you are exposed to direct sunlight, the heat index value can be increased by up to 15°F.

d. "Heat Stroke"- a condition caused by your body overheating, usually as a result of prolonged exposure to or physical exertion in high temperatures. This most serious form of heat injury, heatstroke can occur if your body temperature rises to 104 F (40 C) or higher.

5) <u>Hazards and Signs</u>

a. Heat Exhaustion

    i. Dizziness
    ii. Headache
    iii. Sweaty skin
    iv. Weakness
    v. Cramps
    vi. Nausea, vomiting
    vii. Elevated heart rate

b. Heat Stroke

    i. Dizziness
    ii. Throbbing Headache
    iii. Dry skin- Unable to sweat anymore
    iv. Red and hot skin
    v. Weakness
    vi. Cramps
    vii. Nausea, vomiting

viii. Elevated heart rate- may be weak or strong- (over 100 beats/min. means immediate help is needed)

ix. Rapid shallow breathing

x. Seizures

xi. Unconsciousness

6) Work Practice and Control Methods

a. Each Foreman/Lead Tech/Lone Worker/ Field Superintendent/Project Manager/Service Manager/ Plumbing Service Manager shall install OSHA's "Heat Safety Tool App". The app will be checked on a daily basis when the ambient temperature is 80 degrees or higher.

b. The charts below will determine the actions taken.

i. Lower Caution:

1. Cool to cold water and a shaded or air-conditioned place to take breaks will be made available.

2. Encourage workers to wear sunscreen.

ii. Moderate- Same as "Lower Caution" plus:

1. Mandatory 5-minute break after every hour.

2. Remind workers to drink small amounts of water before they become thirsty.

3. Employees who have not been working in "hot conditions" (new workers, workers who have been out sick or on vacation, or workers who have been working on another project without heated conditions) will be acclimated to this environment. Workers should begin with 20% of the workload on the first day, increasing incrementally by no more than 20% each subsequent day. During a rapid change leading to excessively hot weather or conditions such as a heat wave, even experienced workers should begin on the first day of work in excessive heat with 50% of the normal workload and time spent in the hot environment, 60% on the second day, 80% on day three, and 100% on the fourth day.

4. Strenuous work should be scheduled for the coolest part of the day. Work schedule may be altered to come in early or later.

iii. High- Same as "Moderate" plus:

1. 45-minute work/ 15-minute rest schedule.
2. Actively encourage workers to drink small amounts of water often.

iv. Very High to Extreme- Same as "High" plus:

1. Re-schedule ALL NON-ESSENTIAL work for days with reduced heat index.
2. Establish clear drinking schedule every 15 minutes.

Heat Index	Risk Level	Protective Measures
Less than 91°F	Lower (Caution)	Basic heat safety and planning
91°F to 103°F	Moderate	Implement precautions and heighten awareness
103°F to 115°F	High	Additional precautions to protect workers
Greater than 115°F	Very High to Extreme	Triggers even more aggressive protective measures

NOAA's National Weather Service

Heat Index

Temperature (°F)

Relative Humidity (%)	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

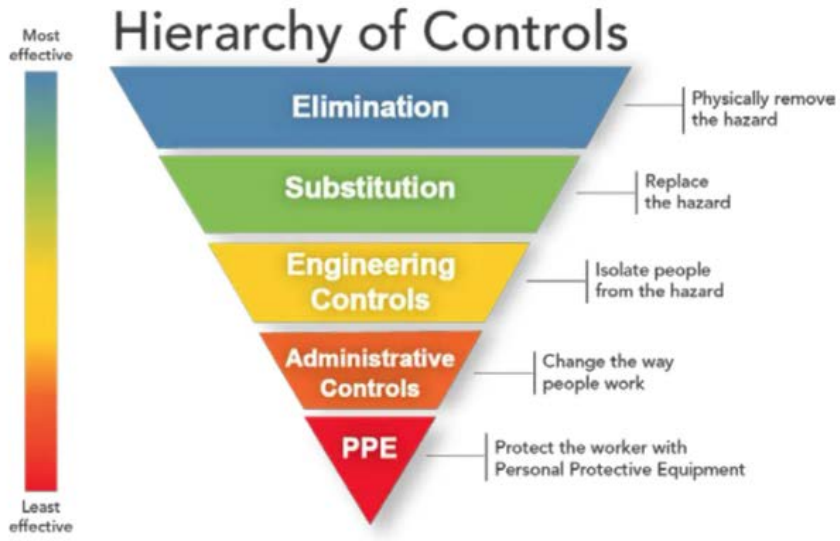
Caution | Extreme Caution | Danger | Extreme Danger

38. HAZARD IDENTIFICATION, RISK ASSESSMENT, & CONTROL

The purpose of this program is to identify job site hazards and their associated risks to effectively manage hazards that may occur. Hazard Identification, risk assessment, and control is an ongoing process and should be performed when the work has not been performed before; when a hazard has been identified; anytime a change in the workplace occurs; at regularly scheduled intervals, and after an incident/accident occurs. Site safety inspections shall be conducted in a timely manner as needed – documentation shall include the name of person(s) performing the inspection, job site name, and date.

1. Actions to Take
    a. Identify the Hazard
    b. Assess the Risk
        i. Use a hazard risk assessment to identify the severity/consequences of each hazard.
    c. Implement Risk Controls – refer to the Hierarchy of Controls
        i. Actions to be taken should include implementation of a timeline; and the person(s)/team responsible for the implementation of the actions.
    d. Monitor & Review
        i. Monitor and review controls to ensure compliance.

2. Hierarchy of Controls



39. EMPLOYEE SAFETY ORIENTATION

The purpose of this program is to provide new team members have adequate basic safety training to effectively perform assigned duties and tasks in a safe manner. New team members include, but are not limited to:

- New employees
- Rehired employees
- Employee whose position changed
- Subcontractor employees.
- Temporary Workers

Safety orientation includes, but is not limited to the review of:

- Tour of the facility
- Emergency Action Plan
- General Safety Rules
- Safety Manual Policies & Procedures
- Review of PPE (cleaning, storage, donning, use, fit-test, demonstration)
- Drug-Free Workplace Training

40. ERGONOMICS

1. 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 exceed the body's capabilities, 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:

- Cumulative Trauma Disorders (CTDs)
- Repetitive stress or repetitive strain injuries (RSIs)
- Repetitive motion injuries (RMIs)
- 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. ERGONOMICS PROGRAM

It is the policy of Mechanical Services & Design, Inc. to provide all employees with a safe and healthy workplace. This program is a collaborative effort that includes all levels of the Mechanical Services & Design, Inc. team. The Safety Manager is responsible for the program's implementation, management, and recordkeeping requirements.

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 incorporating ergonomics into the design phase of a new facility or process, into purchasing new equipment or tools, and into the contemplation of scheduling changes. Mechanical Services & Design, Inc. has such a program which includes the following components:

A. Management Leadership. The management of Mechanical Services & Design, Inc. is committed to the ergonomics process. Management supports the efforts of the Safety Manager 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 communicate with employees about the program.

B. 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.

C. 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 for medical evaluation/treatment. Active surveillance may use observations, interviews, surveys, questionnaires, checklists, and formal worksite evaluation tools to identify specific high-risk activities. Mechanical Services & Design, Inc. will be using both passive and active surveillance to identify problem jobs.

D. Worksite Evaluations.

(1) Triggers for a worksite evaluation:

(a) When an employee reports an MSD sign or symptom.
(b) Jobs, processes, or work activities where work-related ergonomic risk factors have been identified which may cause or aggravate MSDs.
(c) Changes of jobs, tasks, equipment, tools, processes, scheduling, or extreme changes in work shift hours.
(d) When a safety walk-through or scheduled inspection or survey has uncovered potential MSD hazards.

(2) Work-related risk factors to be considered in the evaluation process include, but are not limited to:

(a) Physical risk factors including force, postures (awkward and static), static loading and sustained exertion, fatigue, repetition, contact stress, extreme temperatures, and vibration.
(b) 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 psychosocial issues.
(c) Environmental risk factors including noise, lighting, glare, air quality, temperature, humidity, and personal protective equipment and clothing.
(d) Combination of risk factors such as, but not limited to, highly repetitive, forceful work with no job rotation or precision work done in a dimly lit room.

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

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

F. Worksite Evaluations Methods. Various methods may be used to evaluate problem jobs including:

(1) Walk-through and observations
(2) Employee interviews
(3) Surveys and questionnaires
(4) Checklists
(5) Detailed worksite evaluations

G Control of Ergonomic Risk Factors. Mechanical Services & Design, Inc. will take steps to identify ergonomic risk factors and reduce hazards by using a five-tier hierarchy of control (in order of preference):

(1) Elimination. Physically remove the hazard.
(2) Substitution. Replace the hazard.
(3) Engineering Controls. Isolate people from the hazard – this is achieved by focusing on the physical modifications of jobs, workstations, tools, equipment, or processes.
(4) Administrative controls. Change the way people work - this means controlling or preventing workplace exposure to potentially harmful effects by implementing administrative changes such as job rotation, job enlargement, rest/recovery breaks, work pace adjustment, redesign of methods, and worker education.
(5) Personal protective equipment (PPE). Protect the worker with personal protective equipment (PPE), some acceptable forms of PPE include kneepads and anti-vibration gloves.

H. 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:

(1) To employees during orientation.
(2) To employees assuming a new job assignment, as applicable.
(3) When new jobs, tasks, tools, equipment, machinery, workstations, or processes are introduced.
(4) When high exposure levels to ergonomic risk factors have been identified.

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

(1) An explanation of Mechanical Services & Design, Inc. ergonomics program and their role in the program;
(2) A list of the exposures which have been associated with the development of MSDs;
(3) A description of MSD signs and symptoms and consequences of injuries caused by work and non work-related risk factors;
(4) An emphasis on the importance of early reporting of MSD signs and symptoms and injuries to management, and;
(5) The methods used by Mechanical Services & Design, Inc. to minimize work and non work-related risk factors.

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

(1) Oral presentations
(2) Visual Aids (videos, online training, PowerPoint, etc.)
(3) Distribution of educational literature
(4) 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 will be familiar with Mechanical Services & Design, Inc. operations. Training will be provided from one, or a combination, of the sources listed below:

(1) Internally developed resources
(2) The workers' compensation carrier
(3) An outside consultant

4. INDIVIDUAL RESPONSIBILITIES

A. Safety Manager. The Safety Manager 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 Manager in collaboration with management. The Safety Manager will monitor the results of the program to determine additional areas of focus as needed.

The Safety Manager will:

(1) ensure that evaluators performing worksite evaluations and training are properly trained;
(2) ensure that control measures are implemented in a timely manner;
(3) 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;
(4) ensure that accurate records are maintained;

(5) schedule manager, supervisor, and employee training and maintain records to include date, name of instructor, and topic.
(6) follow-up with any ergonomics strategy and/or solutions.

B. Managers. Duties of all managers will include:

(1) accountability for the health and safety of all employees within their departments through the active support of the ergonomics program;
(2) 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;
(3) ensuring that recommended controls are implemented and/or used appropriately through active follow-up.

C. Supervisors. Duties of all supervisors will include:

(1) 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.
(2) ensuring that employees are provided with and use the appropriate tools, equipment, parts, and materials in accordance with ergonomic requirements;
(3) ensuring that employees understand the MSD signs and symptoms and early reporting system;
(4) responding promptly to employee reports;
(5) maintaining clear communication with managers and employees.

D. Employees. Every employee of Mechanical Services & Design, Inc. is responsible for conducting himself/herself in accordance with this policy and program. All employees will:

(1) when provided, use the appropriate tools, equipment, parts, materials, and procedures in the manner established by managers and supervisors.
(2) ensure that equipment is properly maintained in good condition and when not, report it immediately:
(3) provide feedback to supervisors regarding the effectiveness of design changes, new tools or equipment, or other interventions;
(4) attend ergonomics training as required and apply the knowledge and skills acquired to actual jobs, tasks, processes, and work activities;
(5) report MSD signs or symptoms and work-related MSD hazards to the supervisor as early as possible to facilitate medical treatment and initiate proactive interventions, and take responsibility in their personal health and safety.

5. ANNUAL PROGRAM REVIEW

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

(1) Evaluation of all training programs and records.

(2) The need for retraining of managers, supervisors, and employees.
(3) The jobs, processes, or operations which have produced a high incidence rate of work-related MSDs.
(4) The program's success based upon comparison to previous years using the following criteria:
    (a) Number and type of lost workdays associated with OSHA recordable cases.
    (b) Employee feedback through direct interviews, walk-through observations, written surveys and questionnaires, and reevaluations.