

CAIN'S PIPELINE & INDUSTRIAL SERVICES, LLC.

7663 1st St – Addis – LA – 70710-2127

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DISCLAIMER

OSHA's "Safety and Health Regulations" are continuously being reinterpreted. Therefore, Safety Services Company is unable to completely guarantee the exactness of the information conveyed in this publication. Safety Services Company assumes no responsibility and shall be held harmless for any inaccuracies or omissions contained within this manual and shall not be held liable to any extent or form for any injury or loss resulting from the manner in which this information is interpreted and/or applied.

Careful effort has been dedicated in order to provide a simplified, understandable explanation of OSHA regulations based on currently available information. This "Safety and Health Manual" is distributed with the agreement that Safety Services Company is not employed in providing legal or other specialized business services. Should expert assistance be required, retain the services of a competent professional.

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Chapter 1

Company Safety Policy and Procedures

CAIN'S PIPELINE & INDUSTRIAL SERVICES, LLC.

7663 1st St – Addis – LA – 70710-2127

Brent Messina is the designated Company Safety Coordinator.

SAFETY & HEALTH POLICY STATEMENT

The Occupational Safety and Health Act of 1970 clearly defines the requirement to provide safe and healthful working conditions for all employees. Therefore, the safety and health of our employees is the first consideration in operating this business.

Safety and health in our business must be part of every operation. Without question, it is every employee's responsibility at all levels.

It is the intent of *Cain's Pipeline & Industrial Services, LLC.* to comply with all laws. To do this, we must constantly be aware of conditions in all work areas that can produce injuries. No employee is required to work at a job they know is not safe or healthful. Your cooperation in detecting hazards and, in turn, controlling them, is a condition of your employment. Inform your supervisor immediately of any situation beyond your ability or authority to correct.

The personal safety and health of each employee of *Cain's Pipeline & Industrial Services, LLC.* is of primary importance. Prevention of occupationally-induced injuries and illnesses is of such consequence that it will be given precedence over operating productivity, whenever necessary. To the greatest degree possible, management will provide all mechanical and physical activities required for personal safety and health, in keeping with the highest standards.

We will maintain an occupational safety and health program conforming to the best practices of organizations of this type. To be successful, such a program must embody proper attitudes towards injury and illness prevention on the part of supervisors and employees. It also requires cooperation in all safety and health matters, not only between supervisor and employee, but also between each employee and their co-workers. Only through such a cooperative effort can a safety and health program, in the best interest of all, be established and preserved.

Our objective is a safety and health program that will reduce the number of injuries and illnesses to an absolute minimum, not merely in keeping with, but surpassing, the best experience of operations similar to ours. Our goal is zero accidents and injuries.

Our safety and health program includes:

- Providing mechanical and physical safeguards to the maximum extent possible.
- Conducting a program of safety and health inspections to find and eliminate unsafe working conditions or practices, to control health hazards, and to fully comply with OSHA safety and health standards for every job.
- Training all employees in good safety and health practices.
- Providing necessary personal protective equipment, and instructions for proper use and care.
- Developing and enforcing safety and health rules, and requiring that employees cooperate with these rules as a condition of employment.
- Investigating, promptly and thoroughly, every accident to find out what caused it, and correct the problem so it will not happen again.

We recognize that responsibilities for occupational safety & health are shared:

- This employer accepts responsibility for leadership of the safety and health program, for its effectiveness and improvement, and for providing the safeguards required to ensure safe work conditions.
- Supervisors are responsible for developing proper attitudes toward safety and health in themselves and in those they supervise, and for ensuring that all operations are performed with the utmost regard for the safety and health of all personnel involved, including themselves.
- Employees are responsible for wholehearted, genuine operations of all aspects of the safety and health program – including compliance with the rules and regulations – and for continuously practicing safety and health while performing their duties.

Brent Messina shall see that all employees are properly instructed and supervised in the safe operation of any machinery, tools, equipment, process, or practice which they are authorized to use or apply while at work.

Production is never so urgent that we can not take the time to do our work safely.

Program Goals

Why have a workplace "Safety and Health Plan"? Taking risks is part of running a business, particularly for small business owners. You take risks in product development, marketing, and advertising in order to stay competitive. But there are some risks that should never be taken. One of these is risking the **safety** and **health** of workers. Safety begins at the top and goes downward throughout The Company. The primary goal of *Cain's Pipeline & Industrial Services, LLC.* is to continue operating a profitable business while protecting employees from injuries or illness. This can be achieved by delegating responsibility and accountability to all involved in *Cain's Pipeline & Industrial Services, LLC.*'s operation.

- **Responsibility:** Having to answer for activities and results.
- **Accountability:** The actions taken by management to insure the performance of responsibilities.

In other words, to reach our goal of a safe workplace everyone needs to take responsibility and be held accountable.

Benefits of achieving our goals are:

- Minimizing of injuries and accidents
- Minimizing the loss of property and equipment
- Elimination of potential fatalities
- Elimination of potential permanent disabilities
- Elimination of potential OSHA fines
- Reductions in Workers' Compensation costs
- Reductions in operating costs
- Having the best "Safety and Health" conditions possible in the workplace

Management Commitment

Cain's Pipeline & Industrial Services, LLC. is committed to building an effective ***injury*** and ***illness*** prevention plan, putting it in ***writing***, and ***integrating*** it into the entire operation.

The management of *Cain's Pipeline & Industrial Services, LLC.* is committed to the Company's safety policy, and to provide direction and motivation by:

- Appointing Safety Coordinator(s) and/or Safety Committee Chairmen.
- Establishing Company safety goals and objectives.
- Developing and implementing this written Safety and Health program.
- Ensuring total commitment to the Safety and Health program.
- Facilitating employees' safety training.
- Establishing responsibilities for management and employees to follow.
- Ensuring that management and employees are held accountable for performance of their safety responsibilities.
- Establishing and enforcing disciplinary procedures for employees.
- Reviewing the Safety and Health program annually, and revising or updating as needed.

Labor & Management Accountability

All employees, both *labor* and *management*, need to understand their responsibilities under OSHA rules and be held accountable for complying with the rules as well as the Company's related policies.

It is the responsibility of *Cain's Pipeline & Industrial Services, LLC.* to provide a safe and healthful work environment for their employees. However, holding everyone accountable for their part in workplace safety and health is critical for a successful injury and illness prevention plan.

Assignment of Responsibility

The Safety Coordinator(s) and/or Safety Committee Members

Cain's Pipeline & Industrial Services, LLC. has designated:

Safety Coordinator	Brent Messina
Safety Coordinator	
Safety Committee Chair	
Safety Committee Vice-chairman	
Safety Committee Alternate Chair/Vice-chair	

Their cell phone and office phone numbers are:

Safety Person's Name	Office Phone #	Cell Phone #

It shall be the duty of **Brent Messina** to assist the Supervisor/Foreman and all other levels of Management in the initiation, education, and execution of an effective safety program including the following:

- Introducing the safety program to new employees.
- Following up on recommendations, suggestions, etc., made at the "Weekly" safety meetings. All topics of safety concerns must be documented accordingly.
- Assisting the personnel in the execution of standard policies.
- Conducting safety inspections on a periodic basis.
- Addressing all hazards or potential hazards as needed.
- Preparing monthly accident reports and investigations.
- Maintaining adequate stock of first aid supplies and other safety equipment to insure their immediate availability.
- Making sure there is adequate number of qualified "First Aid Certified" people on the work site.
- Becoming thoroughly familiar with OSHA regulations and local and state safety codes.
- Defining the responsibilities for safety and health of all subordinates and holding each person accountable for their results through the formal appraisal system and where necessary, disciplinary procedures.
- Emphasizing to employees that accidents create unnecessary personal and financial losses.

Employee Involvement

Employees are required to *work in compliance* with the safety rules, *report* all accidents and near misses, and report all *unsafe* conditions or unsafe *practices*. To demonstrate *Cain's Pipeline & Industrial Services, LLC.*'s commitment to support the employees in these responsibilities, *Cain's Pipeline & Industrial Services, LLC.* will do the following:

Communication System:

- Encourage employees to inform *Cain's Pipeline & Industrial Services, LLC.* about workplace hazards without fear of reprisal.
- Establish and maintain a centrally located "Safety Bulletin Board" where current, relevant information may be easily reviewed by employees.
- Schedule general employee meetings at which time safety is freely and openly discussed by those present. These meetings will be regular, scheduled, and announced to all employees and managers to achieve maximum attendance. The purpose of these meetings is safety, and the concentration will be on:
 1. Occupational accident and injury history at our work sites, with possible comparison to other locations within The Company.
 2. Feedback from the Safety Committee.
 3. Guest speakers concerned with workplace safety and health.
 4. When possible, brief audio-visual materials that relate to our business.
 - Conduct training programs for communicating with employees.
 - Provide a safety suggestion box so that employees, anonymously if desired, can communicate their concerns with management.
 - Document all communication efforts to demonstrate that an effective communication system is in place.

Hazard Identification & Control

Periodic inspections and procedures for correction provide methods of identifying existing or potential hazards in the workplace, and eliminating or controlling them. Hazard control is essential to an effective injury and illness plan. We will be sure to look at safe work practices and ensure that they are being followed, and that unsafe conditions or procedures are identified and corrected properly and promptly.

Employees are encouraged to report possible hazardous situations, knowing their reports will be given prompt and serious attention.

Workplace equipment and personal protective equipment will be maintained in good, safe working condition.

Hazards, where possible, will be corrected as soon as they are identified. For those that can not be immediately corrected, a target date for correction will be set. *Cain's Pipeline & Industrial Services, LLC.* will provide interim protection for workers while hazards are being corrected. A written tracking system will be established to help monitor the progress of the hazard correction process.

Accident/Incident Investigation

Employers and safety committees are required to investigate or assign responsibility for investigating accidents. Accidents/incidents will be investigated by trained individuals, with the primary focus of understanding why the accident or incident occurred, and what actions can be taken to preclude recurrence. The focus will be on **solutions** and never on **blame**. They will be in writing, and adequately identify the causes of the accident or near-miss occurrence.

Worker Training

Training is another essential element of any injury and illness prevention plan. OSHA rules require each employer to train workers for any job or task they are assigned.

Our plan includes training and instruction:

- For all employees when they are first hired.
- For all new employees for each specific task.
- For all employees given new job assignments for which training has not already been received.
- Whenever new substances, processes, procedures, or equipment are introduced into the workplace and present a new hazard.
- Whenever new personal protective equipment or different work practices are used on existing hazards.
- Whenever *Cain's Pipeline & Industrial Services, LLC.* is made aware of a new or previously unrecognized hazard.
- For all supervisors to ensure they are familiar with the safety and health hazards to which employees under their immediate direction and control may be exposed.

An effective safety and health plan requires proper job performance by everyone in the workplace.

It is the determination of *Cain's Pipeline & Industrial Services, LLC.* to ensure that all employees are knowledgeable about the *materials* and equipment with which they work, what known *hazards* are present, and how they are *controlled*.

Periodic Program Evaluation

A periodic review is scheduled to look at each critical component in our safety and health plan to determine what is working well and what changes, if any, are needed. All employees are encouraged to participate by keeping *Cain's Pipeline & Industrial Services, LLC.* informed of their concerns regarding the elements of this safety and health plan.

The success of this safety and health plan is dependant upon two things: First, *Cain's Pipeline & Industrial Services, LLC.* must provide a **safe** and **healthful** environment in which the employee has the opportunity to work safe, and second, the employee must **choose** to work safe.

Supervisor/Foreman

The Supervisors and/or Foremen will establish an operating atmosphere to insure that safety and health is managed in the same manner and with the same emphasis as production, cost, and quality control. This will be accomplished by:

- Regularly emphasizing that accident and health hazard exposure prevention are not only moral responsibilities, but also a condition of employment.
- Identifying operational oversights that could contribute to accidents which often result in injuries and property damage.
- Participating in safety and health related activities, including routinely attending safety meetings, reviews of the facility, and correcting employee behavior that can result in accidents and injuries.
- Spending time with each person hired explaining the safety policies and the hazards of his/her particular work.
- Ensuring that initial orientation of "new hires" is properly carried out.
- Making sure that if a "Competent Person" is required, that one is present to oversee, and instruct employees when necessary.
- Never short-cutting safety for expediency, nor allowing workers to do so.
- Enforcing safety rules consistently, and following **Cain's Pipeline & Industrial Services, LLC.** discipline and enforcement procedures.
- Conducting daily job-site inspections and correcting noted safety violations.

Employees

It is the duty of each and every employee to know the safety rules, and conduct his work in compliance with these rules. Disregard of the safety and health rules shall be grounds for disciplinary action up to and including termination. It is also the duty of each employee to make full use of the safeguards provided for their protection. Every employee will receive an orientation when hired and receive a copy of any Company Safety and Health Programs. Employee responsibilities include the following:

- Reading, understanding and following safety and health rules and procedures.
- Signing the Code of Safe Practices and any other policy acknowledgements.
- Wearing Personal Protective Equipment (PPE) at all times when working in areas where there is a possible danger of injury.
- Wearing suitable work clothes as determined by the supervisor/foreman.
- Performing all tasks safely as directed by their supervisor/foreman.
- Reporting ALL injuries, no matter how slight, to their supervisor/foreman immediately and seeking treatment promptly.
- Knowing the location of first aid, fire fighting equipment, and safety devices.
- Attending any and all required safety and health meetings.
- Not performing potentially hazardous tasks, or using any hazardous material until properly trained, and following all safety procedures for those tasks.
- STOPPING AND ASKING QUESTIONS IF EVER IN DOUBT ABOUT THE SAFETY OF ANY OPERATION

Notes:

Handwriting practice lines consisting of 20 sets of three horizontal lines (top, middle, and bottom) for letter formation.

Chapter 2

Cain's Pipeline & Industrial Services, LLC.

Company Policy on Safety Committees

Cain's Pipeline & Industrial Services, LLC. Safety Committee members are:
Brent Messina and as designated by Brent Messina

The Safety Committee will meet a minimum of **4** times per year.

Committee Goal

Our Company will strive to meet the following goals:

- Minimize injury and illness in the workplace.
- Open up the lines of communication between management and employees concerning safety at every level of The Company.
- Improve safety of facilities(s) and equipment for a better work environment.

Mission Statement

It is our Company's and committee's goal to create clear avenues of communication among management and staff to create a safe working environment.

Company Commitment

The management of our Company is committed to excelling at safety and will support the safety committee's purpose and recommendations.

Communication of Safety Matters

The committee will handle all safety issues with diligence. We hope to encourage an atmosphere where all employees report safety violations or concerns, ask questions, seek training, or come to us with any safety issues.

Safety Committee Policy Statement

Introduction

Cain's Pipeline & Industrial Services, LLC. is committed to accident prevention in order to protect the safety and health of all our employees. Injury and illness losses due to hazards are needless, costly and preventable. To prevent these losses, a joint management/worker safety committee will be established. Employee involvement in accident prevention and support of safety committee members and activities is necessary to ensure a safe and healthful workplace for all employees.

Purpose

The purpose of our safety committee is to bring workers and management together in a non-adversarial, cooperative effort to promote safety and health in the workplace. The safety committee will assist management and make recommendations for change.

Organization

There shall be, in most cases, an equal number of employee and employer representatives. However, there may be more employee representatives than employer representatives if both groups agree. Employee representatives shall be volunteers or elected by their peers. If no employees volunteer or are elected, then they may be appointed by management. Employer representatives will be appointed. Safety committee members will serve a continuous term of at least one year.

Committee membership terms will be staggered so that at least one experienced member is always on the committee.

Extent of Authority

It must be clearly understood that the safety committee advises management on issues that will promote safety and health in the workplace. Written recommendations are expected from the safety committee and they will be submitted to management. In turn, management will give serious consideration to the recommendations submitted and will respond in writing to the committee within a reasonable time.

Functions

- Committee meetings and employee involvement.
- Hazard assessment and control.
- Safety and health planning.
- Evaluation of accountability system.
- Evaluation of management commitment to workplace safety and health.
- Evaluation of accident and incident investigation program.
- Safety and health training.

Recommendations

1. All recommendations submitted to management must be written and should:
2. Be clear and concise.
3. Provide reasons for implementation.
4. Give recommended options.
5. Show implementation costs and recommended completion dates.
6. List benefits to be gained.

Procedures

The committee's plan of action requires procedures by which the committee may successfully fulfill its role. Procedures developed should include but not be limited to:

- Meeting date, time, and location (Safety Committee Meeting Agenda)
- Election of chairperson and secretary
- Order of business
- Records (Safety Committee Meeting Minutes)

Duties of each member must include, but not be limited to:

- Reporting unsafe conditions and practices
- Attending all safety and health meetings
- Reviewing all accidents and near-misses
- Recommending ideas for improving safety and health
- Working in a safe and healthful manner
- Observing how safety and health is enforced in the workplace
- Completing assignments given to them by the chairperson
- Acting as a work area representative in matters of health and safety
- Others as determined by Company safety and health needs

The Safety Coordinator(s) and/or Safety Committee Members

Cain's Pipeline & Industrial Services, LLC. has designated:

Safety Coordinator	Brent Messina
Safety Coordinator	
Safety Committee Chair	
Safety Committee Vice-chairman	
Safety Committee Alternate Chair/Vice-chair	

Their cell phone and office phone numbers are:

Safety Person's Name	Office Phone #	Cell Phone #

It shall be the duty of **Brent Messina**, the Safety Coordinator to assist the Supervisor/Foreman and all other levels of Management in the initiation, education, and execution of an effective safety program.

Safety Committee Operations

The purpose of a safety committee is to bring workers and managers together to achieve and maintain a safe, healthful workplace. It is easy to start a safety committee, but developing an effective one – one that achieves and maintains a safe, healthful workplace – requires workers and managers who are committed to achieving that goal. Effective safety committees find solutions to problems that cause workplace accidents, illnesses, and injuries. And fewer accidents, injuries, and illnesses mean lower Workers' Compensation claims costs and insurance rates.

Understand a Safety Committee's Seven Essential Activities

Anyone can start a safety committee, but, to make it effective, the committee must be built on a foundation of **management commitment** and must be **accountable** for achieving its goals. The committee must do the following:

- Involve employees in achieving the committee's goals
- Identify workplace hazards
- Review reports of accidents and near misses
- Keep accurate records of committee activities
- Evaluate its strengths and weaknesses

Commitment

The committee will not survive without management support. Management demonstrates support by encouraging employees to get involved in achieving a safe, healthful workplace and by acting on the committee's recommendations. Representatives demonstrate commitment by attending committee meetings, following through on their assigned tasks, and encouraging other employees to get involved in identifying hazards.

Accountability

Representatives should understand that the committee expects them to contribute; each representative shares responsibility for accomplishing safety committee goals, which benefit everyone who works for The Company.

The safety committee is also responsible for monitoring how management holds employees accountable for working safely and for recommending ways to strengthen accountability.

Employee Involvement

To become effective, a safety committee needs help from everyone in The Company. The safety committee must have a method for employees to report hazards and to offer safety suggestions.

Ways the safety committee can encourage employees to get involved:

- Encourage employees to report hazards and unsafe work practices to a safety-committee representative.
- Act on employee suggestions and recognize their contributions to a safer workplace.
- Promote the committee's activities and accomplishments.

Make sure employees know that you are starting a safety committee. Tell them why you are starting the committee, describe its role in The Company's safety-and-health program, and explain management's commitment to the committee.

You can inform employees in a memo or a newsletter, by e-mail, or – better yet – meet with them to promote the committee and to answer questions.

Hazard Identification

The safety committee plays an important role in keeping the workplace hazard-free:

- Ensure that representatives know how to recognize hazards and understand basic principles for controlling them.
- Focus on identifying hazards and unsafe work practices that are likely to cause serious injuries.
- Conduct thorough workplace inspections at least quarterly.
- Document hazards during quarterly inspections and discuss how to control them at regular safety-committee meetings.
- Include employer and employee representatives on the inspection team.

Accident Investigation

The committee must have a procedure for investigating all workplace accidents, illness, and deaths. It is not necessary for the committee to conduct accident investigations or to participate in investigations; however, the committee should ensure that management does so. The committee should also carefully review accident reports to help management identify accident causes and determine how to control them.

Recordkeeping

You may not think of record keeping as an essential activity, but accurate, well-organized records document the committee's accomplishments and can inform the committee what it needs to do to improve.

The following documents are required for the safety committee's file:

- Accurate minutes of each safety committee meeting
- Committee reports, evaluations, and recommendations
- Management's response to committee recommendations
- Employee safety suggestions and hazard concerns

Evaluation

Evaluation answers the question "Are we effective?" Effective safety committees periodically evaluate their strengths and weaknesses, and the evaluation helps them set new goals.

At least once a year, schedule a half-day safety-committee meeting to accomplish the following: identify the committee's achievements over the past 12 months, review essential activities, and set goals for the next 12 months.

Notes:

Handwriting practice lines consisting of 20 sets of three horizontal lines (top, middle dashed, bottom).

Chapter 3

Cain's Pipeline & Industrial Services, LLC.

General Safety Rules and Code of Safe Practices

Brent Messina is responsible for the implementation and enforcement of the following safety rules. Disciplinary procedures will be enforced.

Employee Safety Training

OSHA requires that employees be trained in the safe methods of performing their job.

Cain's Pipeline & Industrial Services, LLC. is committed to:

- "Instructing all employees in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury."
- "Frequent and regular inspections of job sites, materials, and equipment will be made by the Company-designated competent person(s)."
- "Only employees qualified by training or experience will be permitted to operate equipment and machinery."
- Any machinery, tool, material, or equipment which is not in compliance with any applicable OSHA requirement is prohibited. *Brent Messina* will ensure that any such machine, tool, material, or equipment will either be identified as unsafe by tagging or locking the controls to render them inoperable, or will be physically removed from its place of operation.

Awareness of potential hazards, as well as knowledge of how to control them, is critical to maintaining a safe and healthful work environment and preventing injuries. To achieve this goal, we will provide training to each employee on general safety issues and safety procedures specific to that employee's work assignment.

Every new employee will be given instruction by their foreman in the general safety requirements of their job. A copy of our Code of Safe Practices shall also be provided to each employee. Tailgate or toolbox safety training will be conducted at least every 10 working days. All training will be documented on the forms provided. Managers, superintendents, and foremen will be trained at least twice per year on various applicable accident prevention topics.

Training provides the following benefits:

- Makes employees aware of job hazards
- Teaches employees to perform jobs safely
- Promotes two way communication
- Encourages safety suggestions
- Creates interest in the safety program
- Fulfills OSHA requirements

Employee training will be provided at the following times:

1. All new employees will receive a safety orientation their first day on the job.
2. All new employees will be given a copy of the Code of Safe Practices and required to read and sign for it.
3. All field employees will receive training at tailgate or toolbox safety meetings held at the job site.
4. All employees given a new job assignment for which training has not been previously provided will be trained before beginning the new assignment.

5. Whenever new substances, processes, procedures or equipment that represent a new hazard are introduced into the workplace.
6. Whenever *Cain's Pipeline & Industrial Services, LLC.* is made aware of a new or previously unrecognized workplace hazard.
7. Whenever management believes that additional training is necessary.
8. After all serious accidents.
9. When employees are not following safe work rules or procedures.

Training topics will include, but not be limited to:

- Employee's safety responsibilities
- General safety rules
- Code of Safe Practices
- Safe job procedures
- Use of hazardous materials
- Use of equipment
- Emergency procedures
- Safe lifting and material handling practices
- Use of boom and scissor lifts
- Use of fall-protection
- Contents of safety program

Documentation of Training

All employee safety training will be documented on one of the following three forms:

1. New Employee Safety Orientation.
2. Specialized, formal employee training plans. (confined spaces, fall protection, lockout/tagout, first aid, etc.)
3. Tailgate/Toolbox Safety Training Report.

The following informal training methods will be used. Actual demonstrations of the proper way to perform a task will be used in most cases, for example:

- Instruct employee how to do the job safely.
- Demonstrate to employee how to do the job safely.
- Have employee explain to instructor how to do the job safely.
- Have employee demonstrate to instructor how to do the job safely.
- Follow up to ensure they are still performing the job safely.

Safety Communication

Employee safety communication procedures are designed to develop and maintain employee involvement and interest in the Safety and Health Program. These activities will also ensure effective communication between management and employees on safety related issues that is of prime importance to The Company.

The following are some of the safety communication methods that may be used:

- Tailgate/Toolbox safety training with employees that encourage participation and open, two-way communication.
- New employee safety orientation and provision of the Code of Safe Practices.
- Provision and maintenance of employee bulletin boards discussing safety issues, accidents, and general safety suggestions.
- Written communications from management or the Safety Coordinator, including memos, postings, payroll stuffers, and newsletters.
- Anonymous safety suggestion program.

Employees will be kept advised of highlights and changes relating to the safety program. Supervisors will relay changes and improvements regarding the safety program to employees, as appropriate. Employees will be involved in future developments and safety activities, by requesting their opinions and comments, as necessary.

All employee-initiated safety related suggestions shall be properly answered, either verbally or in writing, by the appropriate level of management. Unresolved issues shall be relayed to **Brent Messina**.

All employees are encouraged to bring any safety concerns they may have to the attention of management. **Cain's Pipeline & Industrial Services, LLC** will not discriminate against any employee for raising safety issues or concerns.

The Company also has a system of anonymous notification, whereby employees who wish to inform The Company of workplace hazards without identifying themselves may do so, by phoning or sending written notification to the following address:

CODE OF SAFE PRACTICES

Cain's Pipeline & Industrial Services, LLC will maintain a "Safety and Health Program" conforming to the best practices of organizations of this type. To be successful, such a program must embody the proper attitudes toward injury and illness prevention on the part of supervisors and employees. It also requires cooperation in all safety and health matters, not only between supervisor and employee, but also between each employee and his or her co-workers. Only through such a cooperative effort can a safety program in the best interest of all be established and preserved. Safety and health in our business must be a part of every operation.

The Company Safety & Health Program includes:

- Providing mechanical and physical safeguards to the maximum extent possible.
- Conducting a program of safety and health inspections to find and eliminate unsafe working conditions or practices, to control health hazards, and to comply fully with the safety and health standards for every job.
- Training all employees in good safety and health practices.
- Providing necessary personal protective equipment and instructions for its use and care.
- Developing and enforcing safety and health rules and requiring that employees cooperate with these rules as a condition of employment.
- Investigating, promptly and thoroughly, every accident to find out what caused it and to correct the problem so that it will not happen again.
- Setting up a system of recognition and awards for outstanding safety service or performance.

We recognize that the responsibilities for safety and health are shared:

- ***Cain's Pipeline & Industrial Services, LLC.*** accepts the responsibility for leadership of the safety and health program, for its effectiveness and improvement, and for providing the safeguards required to ensure safe conditions.
- ***Supervisors*** are responsible for developing the proper attitudes toward safety and health in themselves and in those they supervise, and for ensuring that all operations are performed with the utmost regard for the safety and health of all personnel involved, including themselves.
- ***Employees*** are responsible for wholehearted, genuine operation with all aspects of the Safety and Health Program including compliance with all rules and regulations – and for continuously practicing safety while performing their duties.

GENERAL SAFETY RULES

- ***Cain's Pipeline & Industrial Services, LLC.*** employees shall follow these safe practice rules, render every possible aid to safe operations, and report all unsafe conditions or practices to their supervisor.
- ***Failure to abide*** by the Code of Safe Practices may result in disciplinary action up to and including termination.
- ***Supervisors shall*** insist that employees observe and obey every rule, regulation, and order necessary to the safe conduct of the work, and shall take such action necessary to obtain compliance.
- ***If you are unsure*** of the safe method to do your job, **STOP** and ask your supervisor. Ignorance is no excuse for a safety violation.
- ***All employees shall*** be given frequent accident prevention instructions. Instructions, practice drills, or articles concerning workplace safety and health shall be given at least once every 5 working days.
- ***No one shall knowingly*** be permitted to work while the employee's ability or alertness is impaired by fatigue, illness, and prescription or over the counter drugs. Employees who are suspected of being under the influence of illegal or intoxicating substances, impaired by fatigue or an illness, shall be prohibited from working.
- ***Anyone known*** to be under the influence of alcohol and/or drugs shall not be allowed on the job while in that condition. Persons with symptoms of alcohol and/or drug abuse are encouraged to discuss personal or work-related problems with the supervisor/employer.
- ***Employees should*** be alert to see that all guards and other protective devices are in proper places and adjusted, and shall report deficiencies. Approved protective equipment shall be worn in specified work areas.
- ***Horseplay, scuffling, fighting*** and other acts that tend to have an adverse influence on the safety or well being of the employees are prohibited. Do not run on the job site or in the shop or office area.
- ***Work shall be*** well-planned and supervised to prevent injuries when working with equipment and handling heavy materials. When lifting heavy objects, employees should bend their knees and use the large muscles of the legs instead of the smaller muscles of the back. Back injuries are the most frequent and often the most persistent and painful type of workplace injury.

- **Workers shall not** handle or tamper with any electrical equipment, machinery, or air or water lines in a manner not within the scope of their duties, unless they have received instructions from their supervisor. Do not operate equipment that you are not familiar with. Do not attempt to use such equipment until you are fully trained and authorized.
- **Keep your work area clean**, free of debris, electrical cords and other hazards. Immediately clean up spilled liquids.
- **Always notify** all other individuals in your area who might be endangered by the work you are doing.
- **A red tag system** identifies equipment that is NOT to be operated, energized or used. All lock-out/tag-out notices and procedures must be observed and obeyed.
- **Do not block exits**, fire doors, aisles, fire extinguishers, first aid kits, emergency equipment, electrical panels, or traffic lanes.
- **Do not leave tools**, materials, or other objects on the floor that might cause others to trip and fall.
- **Do not distract others** while working. If conversation is necessary, make sure eye contact is made prior to communicating.
- **Employees shall not** enter manholes, underground vaults, chambers, tanks, silos, or other similar places that receive little ventilation, unless it has been determined that it is safe to enter. Confined space protocols will be followed.
- **Materials, tools, or other objects** shall not be thrown from buildings or structures until proper precautions are taken to protect others from the falling objects.
- **Employees shall cleanse thoroughly** after handling hazardous substances, and follow special instructions from authorized sources.
- **Gasoline or other flammable liquids** shall not be used for cleaning purposes.
- **No burning, welding, or other source** of ignition shall be applied to any enclosed tank or vessel, even if there are some openings, until it has first been determined that no possibility of explosion exists, and authority for the work is obtained from the foreman or superintendent.
- **Any damage to scaffolds**, falsework, or other supporting structures shall be immediately reported to the foreman and repaired before use.
- **Possession of firearms**, weapons, illegal drugs or alcoholic beverages on Company or customer property or the job site is strictly prohibited.
- **All injuries shall** be reported promptly to your supervisor so that arrangements can be made for medical and/or first-aid treatment.

SPECIFIC SAFETY RULES

Electrical Safety

- **Only trained, qualified, and authorized employees** are allowed to make electrical repairs or work on electrical equipment or installations.
- **All electrical equipment** and systems shall be treated as energized until tested or otherwise proven to be de-energized.

- **All energized equipment** and installations will be de-energized prior to the commencement of any work. If the equipment or installation must be energized for test or other purposes, special precautions will be taken to protect against the hazards of electric shock.
- **All equipment shall be locked out** to protect against accidental or inadvertent operation when such operation could cause injury to personnel. Do not attempt to operate any switch, valve, or other energy-isolating device bearing a lock.
- **Safety grounds** shall always be used where there is a danger of shock from back feeding or other hazards.
- **Polyester clothing or other flammable types** of clothing shall not be worn near electrical circuits. Cotton clothing is much less likely to ignite from arc blast. Employees working on live circuits shall be provided Nomex or equivalent fire resistant clothing.
- **Suitable eye protection** must be worn at all times while working on electrical equipment.
- **Always exercise caution** when energizing electrical equipment or installations. Take steps to protect yourself and other employees from arc blast and exploding equipment in the event of a fault.
- **All power tools** will be grounded or double insulated. Tools with defective cords or wiring shall not be used.
- **Metal jewelry** should not be worn around energized circuits.
- **Extension and temporary power cords** must be heavy duty and grounded. Frayed or defective cords shall not be used.
- **Suitable temporary barriers** or barricades shall be installed when access to opened enclosures containing exposed energized equipment is not under the control of an authorized person.
- **Electrical installations** must be protected from accidental contact by enclosures or tight fitting covers.
- **GFCI's are required** on all power outlets.
- **Circuits shall not** be overloaded with equipment or extension cords.
- **Metal measuring tapes**, fish tapes, ropes or other metal devices are prohibited where they may contact energized parts of equipment or circuits.

Personal Protective Equipment (PPE)

- **Use the correct PPE** for each job assignment. If you do not know, ask.
- **PPE shall be maintained** in good condition and cleaned regularly.
- **PPE shall be stored properly** when not in use to protect it from damage.
- **Damaged or broken PPE** must be returned to your foreman for replacement.
- **Hard hats must be worn** on job sites at all times.
- **ANSI approved** safety glasses must be worn when working with power tools, compressed air or gasses, chemicals, or any other item that creates an eye injury hazard.
- **Face shields** with safety glasses are recommended when grinding or working with hazardous chemicals.

- **Employees must wear** industrial work shoes in the shop and on the job site. The shoes must have complete leather uppers and skid resistant soles and be in good condition. Steel toe protection is recommended.
- **Athletic style shoes**, tennis shoes, open toe shoes, plastic or vinyl shoes or shoes with decorative accessories are not allowed.
- **Hearing protectors must be worn** when working with loud equipment such as cut off saws, chain saws, air hammers or grinders.
- **Back support belts** should be worn for heavy lifting tasks. They do not help you lift more, but may provide some protection from back injuries.
- **Be sure the protective clothing you wear** will not hamper or restrict freedom of movement due to improper fit.
- **Long pants** of heavy-duty material must be worn. No shorts or sweat pants are allowed.
- **Do not wear loose, torn or frayed clothing**, dangling ties, finger rings, dangling earrings, jewelry items, or long hair unless contained in a hair net, while operating any machine that could cause entanglement.
- **If required, wear NIOSH approved respirators** when applying adhesives, paint, welding, grinding or working with chemicals. Read the applicable MSDS to find out which types of respirators are required. Facial hair may not be permitted in certain circumstances.

Hazardous Materials and Chemicals

- **Read all warning labels** and Material Safety Data Sheets (MSDS) before using any chemicals. MSDS contain personal protective equipment and safety information and are available from your foreman.
- **Hazardous materials shall be handled** in accordance with the MSDS and label. If protective equipment is required, use it.
- **Eye protection must be worn** when working with hazardous materials or chemicals.
- **Mixing of chemicals is prohibited** at all times unless required by the label. Before you mix - review all MSDS.
- **Always wash your hands thoroughly** after handling chemicals and before eating or smoking, even if you were wearing protective gloves.
- **Never use solvents** for hand cleaning. Use the non-toxic hand cleaners provided.
- **Store all hazardous materials properly** in suitable containers that are properly labeled.
- **Use chemicals** only in well-ventilated areas.
- **When using secondary containers**, ensure that they are labeled as to their contents and hazards.
- **Do not disturb any asbestos.** STOP work and tell your foreman. If you are not sure, STOP and ask.
- **Do not cut or weld** stainless steel or galvanized metal without respiratory protection. These items create toxic fumes.
- **Work with lead, asbestos**, cadmium and other toxic compounds require special precautions. Do not attempt to perform this work without special equipment and training.

Fire Prevention and Housekeeping

- ***Always take precautions*** to prevent fires which may be started, particularly from oily waste, rags, gasoline, flammable liquids, acetylene torches, improperly installed electrical equipment and trash.
- ***Fire fighting equipment is*** to be inspected on a regular basis. All discharged, damaged or missing equipment is to be immediately reported to a supervisor. Tampering with fire equipment is prohibited.
- ***Access to fire extinguishers*** must be kept clear at all times. Make note of the location of fire fighting equipment in your work area.
- ***Never use gasoline*** or flammable solvents for cleaning purposes.
- ***Smoking is prohibited*** within 20 feet of where flammable substances are present.
- ***In case of fire***, employees shall consider the safety of themselves and other individuals before saving property.
- ***Keep your work areas*** free of debris. Remove useless material from the work area as fast as required to help reduce tripping hazards.
- ***Maintain awareness*** of potential hazards when walking about the job site.
- ***Keep tools***, materials and equipment out of walkways and stairways at all times.
- ***Sharp wires*** or protruding nails must be kept bent.
- ***Place tools*** and equipment so they will not slide off the roof.
- ***Tie material down*** at day's end so the wind will not blow it off the roof.

Fall Protection

- ***Fall protection, such as standard railings*** or a safety harness and lanyard, shall be used at all times, when working 6 feet or more above the level below.
- ***Floor and wall openings***, unfinished balconies, elevator shafts and similar areas must be railed, covered or barricade to prevent falls.
- ***Never remove fall protection rails***, covers, or barricades without permission from your foreman and special precautions. Always replace these items when finished with your task.
- ***All safety harnesses*** shall be the full body type with a shock-absorbing lanyard attached to a substantial anchorage capable of supporting twice the maximum load. Lanyards shall be attached at the wearer's upper back. Body belts are not to be worn as fall protection.
- ***Read and obey all*** manufacturers' instructions relating to your fall arrest system (safety harness and lanyard).
- ***Inspect all components*** of your harness and lanyard prior to each use and after a fall. Defective equipment is not to be used. Lanyards must be destroyed after a fall and never reused.
- ***Safety harnesses and lanyards*** should limit free fall distance to less than 4 feet and prevent contact with any level or objects below you.
- ***Never use any part*** of a fall arrest system, such as a harness or lanyard, to hoist materials or for any other purpose.
- ***Safety harnesses*** and shock absorbing lanyards are required to be worn at all times while in boom lifts.

Ladder Safety

- **Inspect the ladder before using it.** If it is broken, throw it out. Never repair a broken ladder, get a new one. Keep portable stairways, ladders and step stools in good condition and use them only in a safe manner.
- **Use the proper ladder for the job.** Do not use "A" frame ladders as straight ladders. Make sure the ladder is tall enough to reach the work area. Do not use metal ladders for electrical work.
- **Do not place ladders** in passageways, doorways, or any location where they might be hit or jarred, unless protected by barricades or guards.
- **Ladder rungs and steps** must be kept free of grease, oil, mud, or other slippery substances.
- **Ladders should only be placed** on hard level surfaces. Make sure the ladder feet are not placed on sandy, slippery, or sloping surfaces. Clean or sweep the area where the ladder feet will be and make sure the rubber feet are in good shape.
- **Arrange your work** so you are able to face the ladder and use both hands while climbing. Do not carry tools or equipment while climbing a ladder. Climb the ladder, and then hoist the tools or equipment with a line or a hoisting device.
- **Avoid temporary ladders.** Always use a commercially made, construction grade ladder of the proper length for the work being performed.
- **Secure portable ladders** in place and at a pitch so the leveling indicator is in alignment or the distance from the wall to the base of the ladder is at least 1 foot for every 4 feet of height.
- **Straight ladders shall** be tied off the top of the ladder to prevent slipping.
- **Be aware of objects** below you, move or cover sharp objects in case you fall. Cap or bend all rebar.
- **Do not stand** on or work from the 2nd rung from the top or above. Also do not reach too far from the ladder. Keep your belt buckle between the side rails.
- **Extension ladders shall** extend at least 36" above the level being accessed.
- **On all ladders,** do not step on cross bracing that is not intended to be used for climbing.

Scaffolds

- **Scaffolds are to be erected,** dismantled, altered, or repaired by the Company competent person or the scaffold contractor ONLY.
- **Inspect scaffolds prior** to use and report any damage immediately to your foreman. Do not use damaged scaffolds.
- **You are not permitted** to ride on rolling scaffolds being moved.
- **At least 2 people are required** to move rolling towers. Secure or remove all tools and materials before moving.
- **Always use guard railings** on all scaffolds regardless of height.
- **Use only high quality planking** on scaffolds and be sure the planks are secure to prevent shifting.
- **Always apply caster brakes** and use outriggers when scaffolds are stationary.
- **Do not use planks** or guard rails as a temporary means of obtaining greater height.

- **Be aware of the objects below you;** move or cover sharp objects in case you fall. Cap or bend all rebar.

Lockout/Tagout

- **All machinery** and electrical equipment shall be locked out and tagged prior to repair, cleaning, or adjustment unless power is necessary to perform the work. If so, other precautions, specified by your foreman, will be taken.
- **Use your own lock** and key. No one else should have a key for your lock. Destroy all duplicate keys.
- **Maintain control** of your key at all times to prevent unauthorized use.
- **Never remove another** employee's lock or energize tagged equipment.
- **If multiple employees** are working on the same equipment, each employee should install their own lock.
- **Notify all affected employees** that lockout/tagout is required and reasoning.
- **If the equipment is operating**, shut it down by the normal stopping procedure (depress stop button, open toggle switch, etc.).
- **Operate the switch**, valve or other energy isolating devices so that the energy source(s) (electrical, mechanical, hydraulic, etc.) is disconnected or isolated from the equipment.
- **Stored energy**, such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas or water pressure, etc. must also be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.
- **Lock-out all** energy isolation devices with an individual lock.
- **After ensuring** that no employees are exposed and as a check of having disconnected the energy sources, operate the push button or other normal operating controls to make certain the equipment will not operate. Caution: Return operating controls to neutral position after the test. The equipment is now locked-out. Install red lock-out tag on operating controls.
- **After repair is complete** and the equipment is ready for testing or normal operation, check the equipment to see that all cover plates and safety devices have been reinstalled.
- **When the equipment is clear**, remove all locks and tags. The energy isolating devices may be operated to restore energy to the equipment.

Boom and Scissor Lifts

- **Only trained and authorized employees** are allowed to use boom or scissor lifts. If you are not trained, stay off.
- **Read and obey all** manufacturers' instructions and safety precautions.
- **Inspect all lifts** prior to use. Defective equipment shall not be used.
- **A safety harness** with shock absorbing lanyard or a safety belt positioning device must be worn while using boom lifts. Harnesses are not required for scissor lifts, provided guardrails are adequate and you do not leave the work platform.
- **Always stay inside** the platform railing. Do not use planks or ladders to extend your reach.
- **Always lower** the lift before moving.

- **Never use scissor lifts** on uneven ground. They are designed primarily for use on concrete floors.

Hand and Power Tools

- **Proper eye protection** must be worn when using hand and power tools.
- **Know your** hand and power tool applications and limitations. Always use the proper tool for the job.
- **Inspect cords** and tools prior to use. Do not use tools that are faulty in any way. Exchange them for safe tools immediately.
- **Power tools must** be grounded or double insulated. All power tools are to be plugged into a grounded GFCI outlet.
- **Do not use** power tools in damp, wet or explosive atmospheres.
- **Do not lift,** lower or carry portable electrical tools by the power cord.
- **Keep all safety guards** in place and in proper working order.
- **Use clamps** or vises to secure work pieces.
- **Do not force** hand power tools. Apply only enough pressure to keep the unit operating smoothly.
- **Return all tools** and other equipment to their proper place after use.
- **Unplug all** power tools before changing bits and/or grinding disks.
- **Never leave** chuck keys in the tool during operation.
- **Do not use** a screwdriver as a chisel.
- **Before using sledges,** axes or hammers, be sure the handles are securely fastened with a wedge made of sound material.
- **Do not use a handle extension** or "cheater" on any wrench.
- **Files shall be equipped** with handles and should not be used as a punch or pry.

Trenching and Excavation

- **All excavations and trenches 5 feet deep** or greater must be shored, sloped, or benched to protect workers from the hazards of moving earth. All trenching must be done in accordance with OSHA regulations.
- **Always locate underground utilities** before digging. Also contact regional notification centers in advance.
- **Do not work under loads** handled by lifting or digging equipment.
- **Ladders shall be provided** for access to trenches and excavations 4' deep or greater. Use them.
- **Keep all spoil piles** a minimum of 2 feet from the edge of the trench.
- **Barricade trenches** or use caution tape to warn others of their presence.
- **All trenches and excavations** must be inspected by the Company competent person each day, before work, to look for signs of shifting earth.

Cranes and Rigging

- **No employee is permitted** to ride on loads, hooks, or slings of any crane, hoist, or derrick.
- **Do not work or stand under** any suspended load. Crane operators shall avoid swinging loads over people.

- **Inspect all slings**, chains, ropes, and hooks prior to use. Do not use defective slings, chains, or rigging.

Welding and Cutting

- **Make sure** your welding equipment is installed properly, is properly grounded, and in good working condition.
- **Always wear** protective clothing suitable for the welding or cutting to be done.
- **Always wear proper eye protection** when welding, brazing, soldering or flame cutting. Once you remove your welding helmet, put on safety glasses.
- **Keep your work area** clean and free of hazards. Make sure that no flammable, volatile or explosive materials are in or near the work area.
- **Handle all compressed gas cylinders** with extreme care. Keep caps on when not in use. Make sure that all compressed gas cylinders are secured to the equipment carriage, wall or other structural supports. When compressed gas cylinders are empty close the valve, install the cap and return to correct bottle storage area.
- **Store compressed gas cylinders** in a safe place with good ventilation. Acetylene cylinders and oxygen cylinders should be kept at least 20 feet apart.
- **Do not weld or cut** in confined spaces without special precautions and your foreman's authorization.
- **Do not weld on containers** that have held combustibles or flammable materials.
- **Use mechanical exhaust ventilation** at the point of welding when welding lead, cadmium, chromium, manganese, brass, bronze, zinc or galvanized metals. These metals are highly toxic and their fumes should not be breathed.
- **Make sure all electrical connections** are tight and insulated. Do not use cables with frayed, cracked or bare spots in the insulation.
- **When the electrode holder** or cutting torch is not in use, hang it on the brackets provided. Never let it touch a compressed gas cylinder.
- **Dispose of electrode** and wire stubs in proper containers since stubs and rods on the floor are a safety hazard.
- **Use weld curtains** to shield others from the light rays produced by your welding.
- **Make sure all compressed gas connections** are tight and check for leaks. Do not use hoses with frayed or cracked spots.
- **Keep your leads** orderly and out of walkways. Suspend them whenever possible.
- **DO NOT WELD** if leads or machine are in or near water.
- **Make sure** a portable fire extinguisher is nearby.
- **Keep your work area clean** and free of hazards. When flame cutting, sparks can travel 30-40 feet. Do not allow flame cut sparks to hit hoses, regulators or cylinders.
- **Use oxygen and acetylene** or other fuel gases with the appropriate torches and tips only for the purpose intended.
- **Never use acetylene** at a pressure in excess of 15 pounds per square inch. Higher pressure can cause an explosion.

- **Never use oil, grease or any other** material on any apparatus or thread fitting in the oxyacetylene or oxy-fuel gas system. Oil and grease in contact with oxygen will cause spontaneous combustion.
- **Always use the correct** sequence and technique for assembling and lighting the torch. Always use the correct sequence and technique for shutting off a torch.
- **Check valves must be used** on all compressed gas cylinders to prevent back flow of the gas.

Company Vehicles

- **Only authorized employees** are permitted to operate Company vehicles. Do not let anyone else drive your Company vehicle.
- **Company vehicles** are to be used for Company business only. Personal, off duty and family use is prohibited.
- **Drive defensively** and obey all traffic and highway laws.
- **Always wear** your seat belt, whether the driver or a passenger.
- **Report all accidents** as soon as possible to your supervisor and obtain a police report.
- **Keys must be removed** from all unattended vehicles and the vehicles must be locked, unless parking inside the facility.
- **Do not jump** from the cab or bed of Company vehicles. Always use the stairs or a ladder.
- **Inspect your vehicle** and report any defects or operating problems to your supervisor so that repairs can be made.
- **No smoking** while refueling.
- **If your driver's license** is revoked or expired, immediately notify your supervisor and do not drive or operate Company vehicles or equipment.

Traffic Safety

- **All employees exposed** to traffic hazards are required to wear orange flagging garments (shirts, vests, jackets) at all times.
- **When possible,** construction vehicles are to be placed between the employees and traffic to prevent vehicles from entering the work area and hitting members of the crew.
- **All traffic controls** will be established in accordance with the Manual of Traffic Controls for Construction and Maintenance Work Zones.
- **Traffic controls** are to be properly maintained throughout the workday. Signs and cones must be kept upright, visible and in their proper position at all times.

CODE OF SAFE PRACTICES RECEIPT

Cain's Pipeline & Industrial Services, LLC.

This is to certify that I have received a copy of The Company Code of Safe Practices.

I have read these instructions, understand them, and will comply with them while working for the Company.

I understand that failure to abide by these rules may result in disciplinary action and possible termination of my employment with *Cain's Pipeline & Industrial Services, LLC.*

I also understand that I am to report any injury to my foreman or superintendent immediately and report all safety hazards.

I further understand that I have the following "Safety Rights":

- I am not required to work in any area I feel is not safe.
- I am entitled to information on any hazardous material or chemical I am exposed to while working.
- I am entitled to see a copy of The Company Safety and Health Manual.
- I will not be discriminated against for reporting safety concerns.

Employee Name

Signature

Date

Supervisor Name

Signature

Date

cc: Employee File

Chapter 4

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Abrasive Blasting (Sandblasting)

This policy for the prevention of employee exposure to hazards from toxic dust or hazards of abrasive blasting is adopted by ***Cain's Pipeline & Industrial Services, LLC.*** in accordance with the following OSHA regulations:

§1926.57 (f) – Ventilation/Abrasive Blasting

§1910.244 (b) – Abrasive Blast Cleaning Nozzles

Cain's Pipeline & Industrial Services, LLC. has implemented this policy to ensure that no employee is exposed to hazards from toxic dust or hazards of abrasive blasting at levels in excess of the Permissible Exposure Limits (PEL). ***Brent Messina*** is the supervisor responsible for ensuring the following engineering controls and work practices are enforced:

- *Brent Messina* will ensure that any employee involved in abrasives blasting work will be trained in proper safety techniques and procedures to prevent injury from the physical hazards of abrasive blasting or from exposure to airborne particulates or toxic dust. Employees will be trained in accordance with Company policy on use of respiratory protection.
- Whenever hazardous substances such as dusts, fumes, mists, vapors, or gases exist or are produced in the course of construction work, their concentrations will not exceed the PEL specified in §1926.55(a).
- Signs will be posted to warn workers about the hazard of airborne particulates and specify any protective equipment required.
- When ventilation is used as an engineering control method, the system will be installed and operated according to the requirements of this section.
- Abrasives and the surface coatings on the materials blasted are shattered and pulverized during blasting operations and the dust formed will contain particles of respirable size. The composition and toxicity of the dust from these sources will be considered in making an evaluation of the potential health hazards.
- Workers will change into disposable or washable work clothes at the worksite.
- Workers will change into clean clothing before leaving the worksite.
- All employees required to perform abrasive blasting work are required to wear eye/face protection, heavy canvas or leather gloves, and aprons or equivalent protection to protect them from the impact of abrasives. Safety shoes will be worn to protect against foot injury where heavy pieces of work are handled, and respiratory protection will be worn at all times during work operations.
- Equipment for protection of the eyes and face will be supplied to the operator when the respirator design does not provide such protection and to any other personnel working in the vicinity of abrasive blasting operations. This equipment will conform to the requirements of §1926.102.
- If engineering controls cannot keep silica exposures below the NIOSH PEL, respiratory protection will be used. A respiratory protection program as defined and described in §1926.103 and §1910.134 will be established wherever it is necessary to use respiratory protective equipment.

- The required respiratory protection will conform to *Cain's Pipeline & Industrial Services, LLC.* policy and program for respiratory protection which is administered by *Brent Messina*.
- Only respirators approved by the National Institute for Occupational Safety and Health (NIOSH) under 42 CFR Part 84 will be used for abrasive blasting to protect employees from dust produced during blasting operations.
- Air for abrasive-blasting respirators will be free of harmful quantities of dusts, mists, or noxious gases, and will meet the requirements for supplied-air quality and use specified in §1910.134(i).
- Engineered ventilation will be used to keep the concentration of respirable dust or fume in the breathing zone of the abrasive-blasting operator or any other exposed worker, below the permissible exposure level of 30mg/m as specified in §1910.1000. Other engineering controls include:
 - Use of an alternate blasting media.
 - Containment methods such as blast cleaning machines and cabinets, blasting rooms, or portable equipment.
- Only non-combustible abrasives will be used for blasting by *Cain's Pipeline & Industrial Services, LLC.*. Any abrasive blasting enclosure used will conform to the requirements set forth below in §1910.94(3)(i).
- Organic abrasives which are combustible will be used only in automatic systems. Where flammable or explosive dust mixtures may be present, the construction of the equipment, including the exhaust system and all electric wiring, will conform to the requirements of American National Standard Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying, Z33.1-1961 (NFPA 91-1961), and Subpart S of this part.
- The blast nozzle will be bonded and grounded to prevent the build up of static charges.
- Where flammable or explosive dust mixtures may be present, the abrasive blasting enclosure, the ducts, and the dust collector will be constructed with loose panels or explosion venting areas, located on sides away from any occupied area, to provide for pressure relief in case of explosion, following the principles set forth in the National Fire Protection Association Explosion venting Guide. NFPA 68-1954.
- Dust will not be permitted to accumulate on the floor or on ledges outside of an abrasive-blasting enclosure, and dust spills will be cleaned up promptly.
- Aisles and walkways will be kept clear of steel shot or similar abrasive which may create a slipping hazard.
- The blast cleaning nozzles will be equipped with an operating valve which will be held open manually. A support will be provided on which the nozzle may be mounted when it is not in use.
- All personnel that operate sandblasting equipment and their co-workers that have the same exposure to silica will be provided information and instruction about adverse health effects, work practices, HazCom, and use and care of PPE.
- Symptoms of silicosis are characterized by shortness of breath, fever, and bluish skin. It could be diagnosed as pulmonary edema (fluid in lungs), pneumonia, or tuberculosis. Silica dust causes severe fungal infections to develop. This condition could be fatal.

- The three types of silicosis include:
 - Chronic – 10 years exposure to low concentrations.
 - Accelerated – Exposure to high concentrations & develops 5-10 yrs. after initial exposure.
 - Acute – Exposure to extremely high concentrations & symptoms develop within a few weeks to a few years.
- Air monitoring will be performed to measure worker exposure to airborne crystalline silica and to provide a basis for selecting engineering controls.
- Required personal hygiene practices include:
 - All sandblasters will wash their hands & faces before eating, drinking, or smoking.
 - No eating, drinking, or tobacco products in the blasting area.
 - Workers will shower before leaving worksite.
 - Vehicles will not be parked in contaminated area.
- Medical monitoring and examination of workers exposed to crystalline silica will occur before job placement and at least every 3 years thereafter. More frequent examinations (for example, annual) may be necessary for workers at risk or displaying symptoms of acute or accelerated silicosis.
- Exams will include at least the following items:
 - A medical and occupational history to collect data on worker exposure.
 - Chest X-rays.
 - Pulmonary function testing.
 - Annual evaluation for tuberculosis.
- All cases of silicosis discovered through medical surveillance will be reported to the State Health Departments and to OSHA or MSHA.
- Compressed air will not be used for cleaning purposes except where reduced to less than 30 p.s.i. and then only with effective chip guarding and personal protective equipment.

§1926.57 – Ventilation

(f) Abrasive blasting.

(1) Definitions applicable to this paragraph.

(i) Abrasive. A solid substance used in an abrasive blasting operation.

(ii) Abrasive-blasting respirator. A respirator constructed so that it covers the wearer's head, neck, and shoulders to protect him from rebounding abrasive.

(iii) Blast cleaning barrel. A complete enclosure which rotates on an axis, or which has an internal moving tread to tumble the parts, in order to expose various surfaces of the parts to the action of an automatic blast spray.

(iv) Blast cleaning room. A complete enclosure in which blasting operations are performed and where the operator works inside of the room to operate the blasting nozzle and direct the flow of the abrasive material.

(v) Blasting cabinet. An enclosure where the operator stands outside and operates the blasting nozzle through an opening or openings in the enclosure.

(vi) Clean air. Air of such purity that it will not cause harm or discomfort to an individual if it is inhaled for extended periods of time.

(vii) Dust collector. A device or combination of devices for separating dust from the air handled by an exhaust ventilation system.

(viii) Exhaust ventilation system. A system for removing contaminated air from a space, comprising two or more of the following elements (a) enclosure or hood, (b) duct work, (c) dust collecting equipment, (d) exhauster, and (e) discharge stack.

(ix) Particulate-filter respirator. An air purifying respirator, commonly referred to as a dust or a fume respirator, which removes most of the dust or fume from the air passing through the device.

(x) Respirable dust. Airborne dust in sizes capable of passing through the upper respiratory system to reach the lower lung passages.

(xi) Rotary blast cleaning table. An enclosure where the pieces to be cleaned are positioned on a rotating table and are passed automatically through a series of blast sprays.

(xii) Abrasive blasting. The forcible application of an abrasive to a surface by pneumatic pressure, hydraulic pressure, or centrifugal force.

(2) Dust hazards from abrasive blasting.

(i) Abrasives and the surface coatings on the materials blasted are shattered and pulverized during blasting operations and the dust formed will contain particles of respirable size. The composition and toxicity of the dust from these sources shall be considered in making an evaluation of the potential health hazards.

(ii) The concentration of respirable dust or fume in the breathing zone of the abrasive-blasting operator or any other worker shall be kept below the levels specified in §1910.1000.

(iii) Organic abrasives which are combustible shall be used only in automatic systems. Where flammable or explosive dust mixtures may be present, the construction of the equipment, including the exhaust system and all electric wiring, shall conform to the requirements of American National Standard Installation of Blower and Exhaust Systems for Dust, Stock, and Vapor Removal or Conveying, Z33.1-1961 (NFPA 91-1961) which is incorporated by reference as specified in §1910.6, and Subpart S of this part.

The blast nozzle shall be bonded and grounded to prevent the build up of static charges. Where flammable or explosive dust mixtures may be present, the abrasive blasting enclosure, the ducts, and the dust collector shall be constructed with loose panels or explosion venting areas, located on sides away from any occupied area, to provide for pressure relief in case of explosion, following the principles set forth in the National Fire Protection Association Explosion Venting Guide, NFPA 68-1954, which is incorporated by reference as specified in §1910.6.

(3) Blast-cleaning enclosures.

(i) Blast-cleaning enclosures shall be exhaust ventilated in such a way that a continuous inward flow of air will be maintained at all openings in the enclosure during the blasting operation.

[a] All air inlets and access openings shall be baffled or so arranged that by the combination of inward air flow and baffling the escape of abrasive or dust particles into an adjacent work area will be minimized and visible spurts of dust will not be observed.

[b] The rate of exhaust shall be sufficient to provide prompt clearance of the dust-laden air within the enclosure after the cessation of blasting.

[c] Before the enclosure is opened, the blast shall be turned off and the exhaust system shall be run for a sufficient period of time to remove the dusty air within the enclosure.

[d] Safety glass protected by screening shall be used in observation windows, where hard deep-cutting abrasives are used.

[e] Slit abrasive-resistant baffles shall be installed in multiple sets at all small access openings where dust might escape, and shall be inspected regularly and replaced when needed.

[1] Doors shall be flanged and tight when closed.

[2] Doors on blast-cleaning rooms shall be operable from both inside and outside, except that where there is a small operator access door, the large work access door may be closed or opened from the outside only.

(ii) [Reserved]

(4) Exhaust ventilation systems.

(i) The construction, installation, inspection, and maintenance of exhaust systems shall conform to the principles and requirements set forth in American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems, Z9.2-1960, and ANSI Z33.1-1961, which are incorporated by reference as specified in §1910.6.

[a] When dust leaks are noted, repairs shall be made as soon as possible.

[b] The static pressure drop at the exhaust ducts leading from the equipment shall be checked when the installation is completed and periodically thereafter to assure continued satisfactory operation. Whenever an appreciable change in the pressure drop indicates a partial blockage, the system shall be cleaned and returned to normal operating condition.

(ii) In installations where the abrasive is re-circulated, the exhaust ventilation system for the blasting enclosure shall not be relied upon for the removal of fines from the spent abrasive instead of an abrasive separator. An abrasive separator shall be provided for the purpose.

(iii) The air exhausted from blast-cleaning equipment shall be discharged through dust collecting equipment. Dust collectors shall be set up so that the accumulated dust can be emptied and removed without contaminating other working areas.

(5) Personal protective equipment.

(i) Employers must use only respirators approved by the National Institute for Occupational Safety and Health (NIOSH) under 42 CFR Part 84 to protect employees from dust produced during abrasive-blasting operations.

(ii) Abrasive-blasting respirators shall be worn by all abrasive-blasting operators:

[a] When working inside of blast-cleaning rooms, or

[b] When using silica sand in manual blasting operations where the nozzle and blast are not physically separated from the operator in an exhaust ventilated enclosure, or

[c] Where concentrations of toxic dust dispersed by the abrasive blasting may exceed the limits set in §1910.1000 and the nozzle and blast are not physically separated from the operator in an exhaust-ventilated enclosure.

(iii) Properly fitted particulate filter respirators, commonly referred to as dust-filter respirators, may be used for short, intermittent, or occasional dust exposures such as cleanup, dumping of dust collectors, or unloading shipments of sand at a receiving point, when it is not feasible to control the dust by enclosure, exhaust ventilation, or other means. The respirators used must be approved by NIOSH under 42 CFR Part 84 for protection against the specific type of dust encountered.

[a] Dust-filter respirators may be used to protect the operator of outside abrasive-blasting operations where non-silica abrasives are used on materials having low toxicities.

[b] Dust-filter respirators shall not be used for continuous protection where silica sand is used as the blasting abrasive, or toxic materials are blasted.

(iv) For employees who use respirators required by this section, the employer must implement a respiratory protection program in accordance with 29 CFR 1910.134.

(v) Operators shall be equipped with heavy canvas or leather gloves and aprons or equivalent protection to protect them from the impact of abrasives. Safety shoes shall be worn to protect against foot injury where heavy pieces of work are handled.

[a] Safety shoes shall conform to the requirements of American National Standard for Men's Safety-Toe Footwear, Z41.1-1967, which is incorporated by reference as specified in §1910.6.

[b] Equipment for protection of the eyes and face shall be supplied to the operator when the respirator design does not provide such protection and to any other personnel working in the vicinity of abrasive blasting operations. This equipment shall conform to the requirements of §1910.133.

(6) Air supply and air compressors. Air for abrasive-blasting respirators must be free of harmful quantities of dusts, mists, or noxious gases, and must meet the requirements for supplied-air quality and use specified in 29 CFR 1910.134(i).

(7) Operational procedures and general safety. Dust shall not be permitted to accumulate on the floor or on ledges outside of an abrasive-blasting enclosure, and dust spills shall be cleaned up promptly. Aisles and walkways shall be kept clear of steel shot or similar abrasive which may create a slipping hazard.

(8) Scope. This paragraph (a) applies to all operations where an abrasive is forcibly applied to a surface by pneumatic or hydraulic pressure, or by centrifugal force. It does not apply to steam blasting, or steam cleaning, or hydraulic cleaning methods where work is done without the aid of abrasives.

§1910.244 - Other portable tools and equipment

(b) **Abrasive blast cleaning nozzles.** The blast cleaning nozzles shall be equipped with an operating valve which must be held open manually. A support shall be provided on which the nozzle may be mounted when it is not in use.

Chapter 5

Cain's Pipeline & Industrial Services, LLC.

Policy for Elevating Work Platforms and Aerial Devices

Cain's Pipeline & Industrial Services, LLC. has adopted this program for the safety of employees when working on or around "Vehicle Mounted Elevating and Rotating Work Platforms" from the following OSHA regulations:

§1910.67 – Vehicle-Mounted Elevating and Rotating Work Platforms

§1926.453 – Aerial Lifts

§1926.952 – Aerial Devices Working Near Energized Lines or Equipment

Brent Messina is designated by *Cain's Pipeline & Industrial Services, LLC.* as the Competent Person in authority over all aerial device work procedures. *Brent Messina* will ensure that all safety measures and systems are in place and correctly installed, all safety procedures are adhered to, and ensure regular inspections of the operational site and aerial equipment are made. *Cain's Pipeline & Industrial Services, LLC.* has implemented and will enforce the following work practices and procedures to assure that no employee will be exposed to hazards during aerial lifting operations:

- *Brent Messina* will verify that all employees are trained in and familiar with required work practices and procedures in the use of any equipment required, proper PPE, and safety procedures which must be followed to safeguard personnel involved in aerial lifting operations or who work in the vicinity of aerial lifting operations.
- Only authorized personnel will be permitted to operate an aerial lift.
- Aerial lifts acquired for use on or after January 22, 1973 will be designed and constructed in conformance with the applicable requirements of the American National Standards for "Vehicle Mounted Elevating and Rotating Work Platforms," ANSI A92.2-1969, including appendix. Aerial lifts acquired before January 22, 1973 which do not meet the requirements of ANSI A92.2-1969, may not be used after January 1, 1976, unless they will have been modified so as to conform with the applicable design and construction requirements of ANSI A92.2-1969.
- Each work platform will be inspected, maintained, repaired, and kept in proper working order in accordance with the manufacturer's maintenance and repair manuals.
- On a daily basis, before the work platform is used, it must be given a thorough inspection, which will include:
 - Inspection for defects such as cracked welds, hydraulic leaks, damaged control cable, loose wire connections, and tire damage.
 - Inspection of functional controls for proper operation.
- Lift controls will be tested each day prior to use to determine that such controls are in safe working condition. Tests will be made at the beginning of each shift during which the equipment is to be used to determine that the brakes and operating systems are in proper working condition.

- Critical safety components of mechanical elevating and rotating equipment whose failure would result in a free fall or free rotation of the boom will receive a thorough visual inspection before use on each shift.
- Vehicles will have a reverse signal alarm audible above the surrounding noise level or the vehicle will be backed up only when an observer signals that it is safe to do so.
- For power lines rated 50 kV. or below, minimum clearance between the lines and any part of the crane or load will be 10 feet.
- Any suspect items discovered through inspection must be carefully examined and a determination made by a qualified service person as to whether they constitute a safety hazard. All unsafe items must be corrected before further use of the work platform.
- Any work platform not in safe operating condition will be removed from service until it is repaired. All repairs will be made by a qualified service person in conformance with the manufacturer's operating, maintenance, and repair manuals.
- Aerial lifts may be "field modified" for uses other than those intended by the manufacturer provided the modification has been certified in writing by the manufacturer or by any equivalent entity.
- Boom, basket, and platform load limits specified by the manufacturer will not be exceeded.
- Each work platform will be equipped with a mechanical parking brake, which will hold the unit on any slope it is capable of climbing. When possible, wheel chocks will be installed before using an aerial lift on an incline.
- Employees will always stand firmly on the floor of the basket, and will not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.
- Approved fall protection will be worn and a lanyard attached to the boom or basket when working from an aerial lift.
- No aerial vehicular equipment having an obstructed view to the rear may be operated on off-highway jobsites where any employee is exposed to the hazards created by the moving the vehicle, unless the vehicle has a reverse signal alarm audible above the surrounding noise level or the vehicle is backed up only when a designated employee signals that it is safe to do so.
- Aerial vehicular equipment, if provided with outriggers, will be operated with the outriggers extended and firmly set as necessary for the stability of the specific configuration of the equipment. Outriggers may not be extended or retracted outside of clear view of the operator unless all employees are outside the range of possible equipment motion.
- When the work area or the terrain prevents the use of outriggers, the equipment may be operated only within its maximum load ratings for the particular configuration of the equipment without outriggers.
- Mechanical elevating and rotating equipment used to lift or move material will be used within its maximum load rating and other design limitations for the conditions under which the work is being performed.

- A designated employee other than the equipment operator will observe the approach distance to exposed lines and equipment and give timely warnings before the minimum approach distance is reached.
- The following clearances will be maintained when operating aerial work platforms or other equipment under, over, by, or near energized electric power lines:

Minimum Clearance Distances for Equipment		
Voltage	Clearance With Boom Raised	Clearance Boom Lowered and No Load in Transit
To 50 kV	10 feet	4 feet
Over 50 kV	10 feet + .4 inch per each 1 kV over 50 kV	10 feet
50 to 345 kV		10 feet
346 to 750 kV		15 feet

- Before using the work platform, the operator will:
 - Read and understand the manufacturer's operating instructions and safety rules, and be trained by a qualified person on the contents of the manufacturer's instructions and safety rules.
 - Read and understand all decals, warnings, and instructions on the work platform.
- Before the work platform is used, the operator will survey the area for hazards such as:
 - Untamped earth fills.
 - Ditches.
 - Dropoffs or holes.
 - Bumps & floor obstructions.
 - Debris.
 - Overhead obstructions and high-voltage conductors.
 - Other possible hazardous conditions.
- Before each elevation of the work platform, the operator will:
 - Check for overhead obstructions and high-voltage conductors. A minimum distance of ten feet from energized high-voltage conductors must be maintained at all times between the conductors and the operator and platform equipment.
 - Ensure that the load and its distribution on the platform are in accordance with the manufacturer's rated capacity. The manufacturer's recommended load limits must never be exceeded.
 - Ensure that outriggers and stabilizers are used if the manufacturer's instructions require their use.
 - Ensure that guardrails are properly installed and gates are closed.
- Before and during driving while the platform is elevated, the operator will:
 - Be required to look in the direction of, and keep a clear view of, the path of travel and assure that the path of travel is firm and level.
 - Maintain a safe distance from obstacles, debris, drop-offs, holes, depressions, ramps, or other hazards to safe elevated travel.
 - Maintain a safe distance from overhead obstacles.

- The operator will limit travel speed according to conditions. Conditions to be observed are: Ground surface, congestion, slope, location of personnel, and other factors that may create a hazard of collision or injury to personnel.
- Personnel will maintain a firm footing on the platform while working thereon unless they are secured by safety harness and lanyard devices fixed to manufacturer-approved anchor points. Use of railings or planks, ladders or any other device on the work platform for achieving additional height is prohibited.
- The operator will immediately report defects or malfunctions which become evident during operation and must stop use of the work platform until correction has been made.
- Altering or disabling of safety devices or interlocks is prohibited.
- Stunt driving and horseplay is prohibited.
- An aerial device acquired before December 31, 1976, which does not meet the requirements will not be used unless it has been inspected and modified as required to conform to the essential stability, structural, electrical insulation, and operational requirements of ANSI A92.2.
- Each aerial device placed in service will have a conspicuously displayed legible plate or other legible marking verifying the aerial device is designed and manufactured in accordance with the following applicable specifications:
 - **ANSI Standard A92.2-1990**, "Vehicle-Mounted Elevating Work Platforms", which applies to vehicle-mounted devices installed on commercial chassis and covers the following type of units:
 1. Extensible boom aerial devices.
 2. Aerial ladders.
 3. Articulating boom aerial devices.
 4. Vertical towers.
 5. A combination of any of the equipment specified.
 - **ANSI Standard A92.3-1990**, "Manually Propelled Elevating Work Platforms", which applies to work platforms which are manually propelled, which are vertically adjustable by manual or powered means, and which may be towed or manually moved horizontally on wheels or casters that are an integral part of the work platform base.
 - **ANSI Standard A92.5-1992**, "Boom-Supported Elevating Work Platforms", which applies to all integral frame, boom-supported elevating work platforms which telescope, articulate, rotate, or extend beyond the base dimensions.
 - **ANSI Standard A92.6-1999**, "Self-Propelled Elevating Work Platforms", which applies to self-propelled vertically adjustable integral chassis work platforms. Such work platforms are power operated with primary controls for all movement operated from the platform.
- The following information will be displayed on all work platforms in a clearly visible, accessible area and in as permanent a manner as possible:
 - Warnings, cautions, or restrictions for safe operation in accordance with ANSI requirements.
 - The rated work load will be clearly displayed at each entrance to the platform.

Vehicle Mounted Elevating & Rotating Work Platforms

Basic Types of Elevating Work Platforms and Aerial Devices

There are two basic types of elevating work platforms – boom and scissor. Both types come in:

1. “On-Slab” models for use on smooth hard surfaces such as concrete or pavement.
2. “Rough-Terrain” models for use on firm level surfaces such as graded and compacted soil or gravel.

Both types share three major components: base, lifting mechanism, and platform assembly.

Scissor-Type Machines

These are raised and lowered by hydraulic pistons and an expanding scissor mechanism. Platforms are available in various configurations with different capabilities for extension and movement. Some have extendable platforms or platforms that can rotate. Extendable platforms should be retracted before raising or lowering the device.

On-Slab Units

- Not designed for uneven or sloping ground.
- Normally have solid rubber tires.
- Generally powered by rechargeable DC battery.
- Some are powered by internal combustion engine, either gasoline or propane.
- Most have “pothole protection” – a metal plate lowered close to the ground to afford some protection against inadvertent movement into depressions or debris.

Rough-Terrain Units

- Similar in design to on-slab machines.
- Built to handle rigorous off-slab challenges.
- Normally have wider wheel bases, larger wheels, and pneumatic tires.
- Some fitted with outriggers for extra stability.
- Usually powered by internal combustion engines: gasoline, diesel, or propane.
- DC Battery powered units are also available, but are not common.
- Lifting mechanism is hydraulic.

Scissor-lifts range in capacity from 500 to several thousand pounds. They are available with platform heights often reaching 50 feet or more.

Scissor-lifts must be set up on stable, level ground, even with outriggers deployed. A slight imbalance or instability is amplified when the machine is raised.

Although fixed to the platform, the controls are moveable from one side of the platform to the other. This enables the operator to see the path of travel. The controls must be oriented correctly so that the operator does not inadvertently move the machine in the wrong direction. Many machines have color-coded directional arrows on the chassis to aid the operator in moving the machine.

Self-Propelled Boom-Supported Platforms

- Normally fitted with rough-terrain undercarriages.
- Some smaller on-slab units.
- Platforms have lifting capacity of about 500 pounds or two workers.
- Lack capacity of scissor-type machines; not intended for lifting materials.
- Usually powered by an internal combustion engine: gasoline, diesel, or propane.

Booms

- Telescopic, articulating, or combination of both.
- Raised and extended by hydraulic cylinders.
- Can reach up to 150 feet.
- Can extend well beyond the wheelbase.

As with mobile cranes, stability decreases with length of boom and boom angle as the center of gravity moves in relation to the platform position. The machine will overturn if the center of gravity moves outside the machine's base.

Machines come with load charts that show safe operating configurations. Machines with booms long enough to cause overturning at low boom angles are required to have radius-limiting interlocks to prevent operation in unstable configurations. The reach chart indicates the safe operating configurations for a machine operating on a level surface. The reach diagram shows the safe operating envelope. The machine does not achieve its maximum height directly overhead, nor does it achieve its maximum reach at ground level.

Users must be familiar with the operating range of the individual make and model of the equipment they are using. This knowledge is essential in order to position the machine correctly and reach the work location safely.

Non-Self-Propelled or Push-Arounds

As the name indicates, these units are not self-propelled and must be transported from one location to another with an independent power source or manually in the case of the smaller devices.

The machines are intended primarily for use on smooth, level, hard surfaces or on-slab conditions. Some trailer-mounted units are available.

Many of these devices can fold up to pass through a standard door and can be transported by pick-up truck. As a result, they are suitable for maintenance or renovation work.

Push-Arounds

- Raising mechanism normally powered by gasoline or propane engine or by electric motors, either AC or DC.
- Normally raised and lowered by hydraulic cylinders.
- Platform capacities vary from 300 to 1000 pounds or more but are generally less than 500 pounds.
- Devices with capacity less than 500 pounds are ***Not Recommended*** for construction – this type is better suited to maintenance activities.
- Platforms usually do not exceed 36 feet in height.
- As platform is raised, risk of overturning increases.
- Extra care required when operating at maximum height.

Equipment Selection

Elevating work platforms are designed for different uses. It is essential to select the appropriate equipment for the job.

Typical Mistakes

- Using an on-slab machine on rough terrain.
- Using a unit undersized with respect to height, reach, and lifting capacity.
- Lifting large materials that overhang the platform.
- Using a scissor lift where the reach of a boom-type machine is needed.
- Extending the platform with planks, ladders, or other devices because the machine cannot reach the required height.

Factors to Consider

- *Capacity* – Does the machine have the lifting capacity, the reach, and the height to complete the task?
- *Surface Conditions* – Are the surface conditions hard or soft, sloped or level? Will the ground have an effect on the type of machine selected?
- *Platform Size and Configuration* – Do you need a regular or extendable platform? Is rotation required? Are there space restrictions to consider?
- *Mobility* – Is a boom type better suited than a scissor lift to the task at hand?
- *Material to be Lifted* – Will the machine be able to lift the size and weight of material required for the job?
- *Access* – Will the machine be able to travel around the workplace safely? Are there obstructions or depressions that will restrict the use of certain machines?
- *Operator Skill or Training* – Are the people on site competent to operate the machine? If a propane-powered engine is used, has the operator received propane training?
- *Work Environment* – If the work is to be done indoors, or in a poorly ventilated area, will an electrically powered machine be required?

Fundamental Elevating Work Platform Hazards

The following are some of the basic hazards to be aware of during operations:

- *Machine Tipping or Overturning* – Many factors cause instability – sudden stops, depressions, drop-offs, overreaching, overloading, etc. Overturning and tipping result in many fatalities and injuries.
- *Overriding Safety Features* – Disarming features such as the tilt or level warning and the deadman switch can prevent operators from knowing when they are in a dangerous situation. Overriding the deadman switch has resulted in fatalities; so has malfunction of the tilt warning.
- *Overhead Power line Contact* – Contacting overhead wires can cause electrocution. This can happen with any type of machine – and with the loads carried by or overhanging the machine.
- *Falls from Elevated Platforms* – Many falls occur because workers get in a hurry and fail to observe standard fall protection procedures. Many such falls cause serious injury or even fatalities.

- *Makeshift Extensions* – When the machine cannot reach the working height desired, do not compensate by using scaffold planks, ladders, blocks of wood, or other makeshift arrangements. Such practices lead to falls and machine instability.
- *Overloading the Platform* – Elevating work platforms overloaded or loaded unevenly can become unstable and fail. Boom-type machines are especially sensitive to overloading. Always stay within the operating range specified by the manufacturer.
- *Failure to Cordon Off* –
 - Elevating work platforms have been struck by other construction equipment or oncoming traffic when the work area is not properly marked or cordoned off.
 - Workers have been injured when they inadvertently entered an unmarked area and were struck by falling material, tools, or debris.
 - In unmarked areas, workers have also been injured by swinging booms and pinched by scissor mechanisms.
- *Accidental Contact* – Many elevating work platforms have blind spots. Moving the machine or platform may cause contact with workers or with obstacles. Use a designated signaller on the ground to guide the operator when the path of travel is not clear or access is tight.
- *Improper Maintenance or Modifications* – Elevating work platforms should be maintained by competent workers in accordance with manufacturer's instructions. No modifications should be made to the machine without the manufacturer's approval.
- *Improper Blocking During Maintenance* – Failing to block, or improperly blocking the machine, boom, or platform can cause serious crushing injuries and property damage.
- *Improper Access* – Do not enter or leave the platform by climbing the scissors or the boom. Do not use extension ladders to gain access. Ladders exert lateral loads on the platform that can cause overturning. For the safest access, lower the machine completely.
- *Moving with Platform Raised* – Lower the platform before moving the machine unless:
 1. The machine is designed to move with platform raised.
 2. The supporting surface is smooth and level. Slight dips and drops are amplified when the platform is raised and can cause the machine to overturn.
- *Improper Refueling* – Take care when refueling. Gasoline, for instance, should be kept in approved containers and dispensed to prevent spills and sparking.
- *Pinch Points* – Clothing, fingers, and hands can get caught in scissor mechanisms. As platforms are raised, machines may sway. Workers can be pinched between guardrails and the structure. Position the platform so that work takes place above guardrail height.

Responsibilities During Elevating Work Platform Operations

Because elevating work platforms are often rented from an equipment supplier, there is confusion as to the responsibilities of the parties involved. Generally, the responsibilities can be summarized in the following way:

The owner or supplier must ensure that the machine:

- Is maintained in good operating condition.
- Conforms to appropriate regulations and standards.
- Includes the operator's manual and correct load rating charts.

Cain's Pipeline & Industrial Services, LLC. and supervisors on the project must:

- Ensure that the operator is fully trained and is competent to operate the particular equipment being used.
- Ensure that the machine has the correct load rating capacity for the job.
- Maintain the equipment and all its protective devices.
- Maintain a daily inspection log for each platform.
- Ensure that workers use appropriate personal protective equipment.
- Keep the manufacturer's operating manual with the equipment.
- Train workers on each type of equipment that they will be using.

The operators and workers using the equipment must:

- Receive adequate training to be fully competent.
- Only operate the machine when competent.
- Operate the machine in a safe manner as prescribed by the manufacturer and according to Company safety and health policies.
- Inspect the equipment each day or each shift before use.
- Perform function tests before use.
- Report any defects to the supervisor.
- Read, understand, and obey the manufacturer's safety rules, including the operating manual and warning decals. When a defect is reported to the supervisor, the equipment must be taken out of service until the repairs are completed and the equipment is inspected and approved for use.

Stability and Tipping

In general, elevating work platforms are well manufactured and are safe to use within their specific limitations. However, as with any equipment or tool, there are do's and don'ts to follow.

One of the most dangerous hazards in operating elevating work platforms is tipping over. This can be caused by one or more of the following factors:

- Sudden movement of the unit or parts of the unit when elevated.
- Making sudden stops while in motion with platform elevated.
- Uneven or overloading of the platform.
- Traveling or operating on a slope or uneven terrain.
- Changing the weight distribution of the machine by replacing parts with others of a different weight or adding attachments not approved by the manufacturer.
- Holes or drop-offs in the floor surface causing one wheel to drop suddenly.

- Operating the equipment in windy conditions (refer to the operator's manual for safe operating conditions).

It is important that users understand what makes a platform stable and what causes it to overturn. To understand stability, one must understand the concept of center of gravity, tipping axis (or tipping point), and forces that shift the center of gravity.

Stability is resistance against tipping over. Stability depends on the location of the center of gravity in relation to the tipping axis.

Center of Gravity

Every object has a center of gravity. It is the point where the object's weight would be evenly distributed or balanced. If a support is placed under that point, the object would be perfectly balanced.

The center of gravity is usually located where the mass is mostly concentrated. However, the location does not always remain the same.

Any action that changes the machine's configuration – such as raising the platform, extending the boom, or traveling on a slope – can change the location of the center of gravity.

Tipping Axis and Area of Stability

When an EWP turns over, it tips around an axis or point. This is called the tipping axis or tipping point. EWPs typically have four tipping axes – front, back, left, and right.

Each EWP has its own area of stability. This varies from platform to platform and from model to model. In most cases, the area of stability is bound by the four tipping axes (or the four tires or outriggers). The platform is stable as long as the center of gravity remains inside the area of stability. This is the key to safe operation.

When the center of gravity shifts beyond the area of stability, the machine will tip over. Some factors that can cause a shift beyond the stability area are overloading, moving on excessively sloped ground, a sudden drop of one wheel, and shock loading.

Raising the platform also raises the EWP's center of gravity. When a scissor lift is situated on a slope, and the platform is raised, the platform's center of gravity will move toward the tipping axis. If the center of gravity moves beyond the tipping axis, the platform will overturn.

Boom-supported aerial devices work in the same way. When the boom is extended outward, the center of gravity moves outwards towards the tipping axis. The aerial device will overturn if the boom is extended such that the center of gravity moves beyond the axis. Boom-type machines have an interlocking system that prevents the machine from moving into an unstable configuration.

Factors Affecting Stability

Dynamic Forces

Dynamic forces are forces generated by movement or change of movement. For example, applying the brakes suddenly or traveling too fast around corners can cause instability – as in a car or van. Sudden stops while raising or lowering the platform can also cause instability.

Traveling

Traveling the platform over rough or uneven ground can also cause instability. Figure 10 shows how a tire dropping 4 inches can cause the boom to sway 2 feet. It is important to lower the platform fully or to retract telescoping sections while traveling, particularly on uneven surfaces.

Equipment Inspection

All components that bear directly on the safe operation of the EWP and can change from day to day must be inspected daily. Inspection is mostly visual – done in a quick but thorough manner.

Users must check the operator's manual for a complete list of pre-operational checks. See the end of this section for Daily Inspection Checklists for Elevating Work Platforms and Aerial Devices.

Minimum Requirements

Before climbing onto the platform, check:

- Tires for proper pressure and wheels for loose or missing lug nuts.
- Steer cylinder, linkage, and tie rods for loose or missing parts, damage, & leaks.
- Hydraulic oil for leaks and fluid level. Hydraulic hoses, lift cylinder(s), and connections for leaks or loose connections.
- Fuel supply – adequate fuel, filler cap in place, no damage, leaks, or spills.
- Battery for fluid level and state of charge.
- Proper connection of all quick-disconnect hoses.
- Structural components for damage, broken parts, cracks in welds, including scissor arms, outrigger arms, and pads.
- Ladder or steps for damage and debris (ladder must be firmly secured to the platform and relatively free of grease, mud, and dirt).
- Beacon and warning lights for missing and defective lenses or caps.
- Ground controls (manual and powered) – including emergency stop switch and platform lower/lift switch – for proper function and damaged and missing control sticks/switches
- Decals and warning signs to make sure they are clean, legible, and conspicuous.

After mounting the platform, check:

- Platform assembly for missing or loose parts, missing or loose lock pins & bolts.
- Platform floor for structural damage, holes, or cracked welds and any dirt, grease, or oil that can create a hazard.
- Operator's manual to make sure it is in place.
- Extendable platform deck for ease of extension/retraction and proper function of locking position of platform
- Guardrails to make sure they are in place and secure.
- Access gate for ease of movement, missing parts, latch, and locking capabilities.
- All fall protection anchorage points.
- All control mechanisms for broken or missing parts.
- All emergency controls for proper function – stopping, descending, master OFF switch.
- All safety devices such as tilt and motion alarms for malfunction.
- Swivels for freedom of rotation.
- Scissors for smooth movement up and down.
- Brakes for stopping capabilities.
- Horn for proper function.

Manuals, Signs, and Decals

Signs clearly visible to the operator at the controls must indicate:

- The equipment's rated working load.
- All limiting operating conditions, including the use of outriggers, stabilizers, and extendable axles.
- The specific firm, level surface conditions required for use in elevated position.
- Such warnings as may be specified by the manufacturer.
- Other than for a boom-type elevating work platform, the direction of machine movement for each operating control.
- The name/number of the ANSI standard to which the platform was designed.
- The name and address of the owner.

In addition to the above, ANSI standards require the following signs:

- The make, model, serial number, and manufacturer's name and address.
- The maximum platform height.
- The maximum travel height, if not equal to the maximum platform height.
- The nominal voltage rating of the batteries, if battery-powered.
- A warning to study the operating manual before using the equipment.
- A statement as to whether or not the platform is insulated.
- A notice outlining the required inspections.
- The capacity in each configuration.
- Diagrams/description of various configurations in which the platform can be used.
- Warnings against replacing, without the manufacturer's consent, components critical to the machine's stability – for example, batteries or ballasted tires with lighter weight components (the minimum weights of such components must be specified).

Many of these signs are vital to the operation of the machine and the protection of workers. All signs and decals must be kept clear of dust and grease so they can be easily read. Torn or damaged signs must be replaced.

Standards also require that the manufacturer provide a manual containing the following information:

- Description, specifications, and capacities of the platform.
- The operating pressure of the hydraulic or pneumatic system that is part of the work platform.
- Instructions regarding operation and maintenance, including recommended daily, weekly, and monthly inspection checklists.
- Information on replacement parts.

The manual must be stored on the equipment in a weatherproof storage container.

Safe Practices

Operators must be familiar with the requirements for the specific machine they will use:

- The manufacturer's operating manual.
- The manufacturer's warning and caution signs on the machine.
- The location of all emergency controls and emergency procedures.
- The daily maintenance checks to perform.

General Safety Guidelines for EWP's and Aerial Devices

- Always check for overhead power lines before moving the machine or operating the platform. The limits of approach from overhead power lines must be observed. If work must be done within these limits, make arrangements with the owner of the utility to have the power line de-energized. Allow for movement or sway of the lines as well as the platform. Be aware of overhanging tools or equipment.
- Wear a full body harness and tie off to a designated tie-off point while the machine is moving.
- Do not leave the machine unattended without locking it or otherwise preventing unauthorized use.
- Do not load the platform above its Rated Working Load (RWL). Wherever possible, keep the load below $\frac{2}{3}$ of the RWL.
- Make sure that all controls are clearly labeled with action and direction.
- Keep guardrails in good condition and ensure that gate is securely closed before moving the platform. Do not remove guardrails while the platform is raised.
- Shut off power and insert the required blocking before maintenance or servicing.
- Deploy stabilizers or outriggers according to the manufacturer's instructions.
- Position the boom in the direction of travel where possible.
- Keep ground personnel away from the machine and out from under platform.
- Do not access the platform by walking on the boom.
- Do not try to push or move the machine by telescoping the boom.
- Do not use the machine as a ground for welding.
- Do not use a boom-supported platform as a crane.
- Do not operate the equipment in windy conditions. For safe wind speeds, refer to the operator's manual.
- Do not place the boom or platform against any structure to steady either the platform or the structure.
- Secure loads and tools on the platform so that machine movement will not dislodge them.
- Make sure that extension cords are long enough for the full platform height and will not be pinched or severed by the scissor mechanism.
- Use three-point contact and proper climbing techniques when mounting or dismounting from the machine

Important Note: *Never operate equipment on which you have not been trained or which you are not comfortable operating. Your safety and that of others on site depends on competent, knowledgeable operation of the equipment.*

Work Area Inspection

Before operating elevating work platforms and aerial devices, check the work area for:

- Drop-offs or holes in the ground.
- Slopes.
- Bumps or floor obstructions.
- Debris.
- Overhead obstructions.
- Overhead wires, power lines, or other electrical conductors.
- Hazardous atmospheres.
- Adequate operating surface – ground or floor.
- Sufficient ground or floor support to withstand all forces imposed by the platform in every operating configuration.
- Wind and weather conditions.

FALL PROTECTION REQUIREMENTS **for Elevating Work Platforms & Aerial Devices**

The fall protection required for persons who work on aerial lifts depends on the type of aerial lift used. The table below shows acceptable fall protection.

Type of Lift	Fall Protection Required
Vehicle-Mounted Elevating and Rotating Work Platforms (ANSI A92.2 devices)	Platforms other than buckets or baskets must include guardrail systems – guardrails, a midrail, and toeboards. Each person who works on a boom-supported platform must wear a body harness and lanyard attached to the boom or basket.
Manually Propelled Elevating Aerial Platforms (ANSI A92.3 devices)	The platform must have a guardrail at least 42 inches $\pm$ 3 inches above the floor, a midrail, and toeboards at least 4 inches high.
Boom-Supported Elevating Work Platforms (ANSI A92.5 devices)	The platform must have a guardrail at least 42 inches $\pm$ 3 inches above the floor, a midrail, and toeboards at least 4 inches high. Each worker on the platform must wear a body harness and lanyard attached to the boom or platform.
Self-Propelled Elevating Work Platforms (ANSI A92.6 devices)	The platform must have a guardrail 42 inches $\pm$ 3 inches above the floor, a midrail, and toeboards at least 4 inches high.

Fall Protection for Elevating Work Platforms

- Personnel will maintain firm footing on the platform while working on the platform. The use of railings, planks, ladders, or any other devices on the platform for achieving additional height is prohibited.
- A safety harness that has a lanyard which is in compliance with construction safety standard "Fall Protection" and which is affixed to attachment points provided and approved by the manufacturer will be provided by *Cain's Pipeline & Industrial Services, LLC.* and used by any occupant of an aerial work platform described in this section. A fall arrest system will only be used where the aerial lift is designed to withstand the vertical and lateral loads caused by an arrested fall.
- A body belt may be used with a restraint device with the lanyard and the anchor arranged so that the employee is not exposed to any fall distance. A restraint device is required where the aerial lift cannot withstand the vertical and lateral loads imposed by an arrested fall.
- Belting off to an adjacent pole, structure, or equipment while working from an aerial work platform is prohibited.
- An employer will not allow employees to exit an elevated aerial work platform, except where elevated work areas are inaccessible or hazardous to reach. Employees may exit the platform with the knowledge and consent of *Cain's Pipeline & Industrial Services, LLC.* When employees exit to unguarded work areas, fall protection will be provided and used as required.

Fall Protection for Aerial Devices

- Employees will always stand firmly on the floor of the basket, and will not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position.
- Boom and basket load limits specified by the manufacturer will not be exceeded.
- A safety belt or harness will be used with a lanyard attached to the boom or basket when working from an aerial lift. The safety belt, harness, and lanyard will be provided by *Cain's Pipeline & Industrial Services, LLC.* An in-plant, industrial-type aerial device used on a level surface and equipped with a platform with approved railings is exempt from this rule.
- Body belts are not acceptable as part of a personal fall arrest system. The use of a body belt in a tethering system or in a restraint system is acceptable.
- A boom platform will be provided with a rail or other structure around its upper periphery that will be not less than 38 inches above the floor of the platform and with a toeboard not less than 4 inches high. A basket of a cherry picker will be considered to meet this requirement. A platform may have the guardrail removed from the working side if a safety belt and lanyard is worn by the employee on the platform.
- Belting off to an adjacent pole, structure, or equipment while working from an aerial device will not be permitted.
- Climbers will not be worn while working from an aerial device unless gaff guards are provided.

OSHA Regulations & Responsibilities

OSHA Regulations include the following requirements:

- Elevating work platforms must be engineered and tested to meet the relevant standard for that equipment.
- Aerial devices must be checked each day before use by a trained worker.
- The owner or supplier must keep a log of all inspections, tests, repairs, modifications, and maintenance.
- The log must be kept up to date and include names and signatures of persons who performed inspections and other work.
- Workers must be given oral and written instruction before using the platform for the first time. Instruction must include items to be checked daily before use.

Vehicle Mounted Elevating and Rotating Work Platforms & Aerial Devices

This section provides for the safe operation and maintenance by *Cain's Pipeline & Industrial Services, LLC.* and the safe use by the employee of vehicle mounted elevating and rotating work platforms in, around, and about a place of employment. Fire fighting equipment and powered industrial trucks are not included in these rules.

Employer Responsibility

An employer will provide each employee who will operate the aerial work platform with instruction and training regarding the equipment that will be used. Such instruction and training will ensure that each operator is in compliance with the minimum following provisions:

- Is instructed by a qualified person in the intended purpose and function of each of the controls.
- Is trained by a qualified person or reads and understands the manufacturer's operating instructions and safety rules.
- Understands by reading or by having a qualified person explain, all decals, warnings, and instructions displayed on the aerial work platform.
- Reads and understands the provisions of these rules or be trained by a qualified person on their content.

The manufacturer's operating instructions and safety rules will be provided and maintained in a legible manner on each unit by *Cain's Pipeline & Industrial Services, LLC.*

Maintain an aerial device in a condition free of known defects and hazards which could cause an injury.

Employee Responsibility

An employee will:

- Operate an aerial device only after being trained and authorized by *Cain's Pipeline & Industrial Services, LLC.*
- Report known defects and hazards concerning an aerial device to the supervisor.

Equipment Instructions and Marking

Each unit will have a manual containing instructions for maintenance and operations. If a unit is able to be operated in different configurations, then these will be clearly described, including the rated capacity in each configuration.

Each aerial device placed in service will have a conspicuously displayed legible plate or other legible marking verifying the aerial device is designed and manufactured in accordance with the following applicable specifications:

ANSI A92.2 – Vehicle Mounted Elevating and Rotating Aerial Devices.

ANSI A92.3 – Manually Propelled Elevating Work Platforms.

ANSI A92.5 – Boom Supported Elevating Work Platforms.

ANSI A92.6 – Self-Propelled Elevating Work Platforms.

The above plates will contain the following data, when applicable:

- Make, model, and manufacturer's serial number.
- Rated capacity.
 - Maximum capacity at the maximum platform height.
- Platform height.
 - Maximum travel height.
- Maximum recommended operating pressure of hydraulic or pneumatic system(s) or both.
- Caution or restrictions of operation or both.
- Operating instructions.
- Manufacturer's rated line voltage (dielectric capability).
- Alternative configurations will require in addition to the above:
 - Chart, schematic, or scale showing capacities of all combinations in their operating positions.
 - Cautions, restrictions, or both, of operation of all alternate or combinations of alternate configurations.

Employees will be instructed in the proper use of the platform.

All aerial devices and elevating work platforms will be assembled and erected in accordance with these rules and will be maintained in safe operating condition.

All electrical tests will conform to the requirements of the applicable NFPA 70 Standard or equivalent DC voltage test approved by the equipment manufacturer or equivalent entity.

Factors of Safety in Design of Work Platform Assembly

- Where the platform is supporting its rated workload by a system of wire ropes or lift chains, or both, the safety factor of the wire or chain will not be less than 6 to 1.
- All critical components of a hydraulic or pneumatic system used in a work platform will have a bursting strength that exceeds the pressure attained when the system is subjected to the equivalent of four times the rated workload. Critical components are those in which a failure would result in a free fall or free rotation of the boom. All noncritical hydraulic components will have a bursting safety factor of at least 2 to 1.
- Automatic safety devices or systems will be provided to prevent free fall of the work platform should a failure of the power supply or elevating system occur.

Construction, Modification, Remounting, Testing, and Use

- An aerial device purchased, modified, or remounted after December 28, 1974, will be as prescribed in ANSI A92.2-1969, standard for Vehicle-Mounted Elevating and Rotating Work Platforms.
- A permanent label or tag will be affixed to an aerial device purchased, modified, or remounted certifying compliance.
- An employer modifying the basic design of an aerial device will secure approval of the modification in writing from the manufacturer of the aerial device, a firm offering an equivalent service, or a qualified engineer knowledgeable in the aerial device operations. The results of the modification will be at least as safe as the original design.
- An aerial device will bear a permanent plate stating the designed rating capacity.
- An aerial device will be mounted on a vehicle capable of sustaining, or reinforced to sustain, the imposed load. The vehicle will be a stable support for the aerial device.
- The lifting and outrigger system of an aerial device will be equipped with a means, such as but not limited to, a pilot operated check valve to ensure that the system will not permit the work platform to drop in a free fall in event of a power or hydraulic line failure.
- An aerial device acquired before December 31, 1976, which does not meet the requirements will not be used unless it has been inspected and modified as required to conform to the essential stability, structural, electrical insulation, and operational requirements of ANSI A92.2.
- In addition to the welding requirements prescribed in ANSI A92.2, an aerial device will conform to the AWS D2.0-69, Specifications for Welding Highway and Railway Bridges standard.

Maintenance and Repairs

- The materials used in the repair of aerial devices and elevating work platforms will conform to standard specifications of strength, dimensions, and weights, and will be selected to safely support the rated workload.
- Electrical wiring and equipment will meet NFPA 70 provisions.
- All exposed surfaces will be free from sharp edges, burrs, or other hazardous projections.

Electrical Ratings

- The rating plate required will include a statement as to whether the aerial device is insulated or is noninsulated and, if insulated, the rated line voltage for which the aerial device was designed and tested.
- The insulating portion of an aerial device will not be altered in any manner that might reduce its insulating value.

Safety Factors and Yield Points

- The design of the basic structural elements of the aerial device including the platform and its component parts will have a yield point of not less than 3 times the rated load. Structural materials not having a clearly defined yield or break point will have a designed safety factor of not less than 5.
- The designed safety factor of not less than 4 will apply to those hydraulic and pneumatic components which would, on failure, permit a free fall, free rotation of the boom, or loss of stability.
- Noncritical components will have a bursting safety factor of not less than 2.

Controls

- The controls for the operation of an aerial device will be permanently labeled as to their functions.
- Controls for an aerial device will be designed or guarded to prevent inadvertent actuation.
- Articulating, extensible boom platforms, or both, primarily designed as personnel carriers, will be equipped with both upper and lower controls.
- Upper controls will be located within reach of the operator.
- Lower controls will be capable of overriding the upper controls. Except in case of an emergency, the lower controls will not be operated unless permission has been obtained from the employee in the basket or on the work platform.

Stability Requirements for New or Modified Aerial Devices

Each new or modified aerial device will be inspected and tested before initial use to assure compliance with all of the following requirements.

- Each aerial device, when mounted on a vehicle which meets the manufacturer's minimum vehicle specifications and when used in a specific configuration, will comprise a mobile unit capable of sustaining a static load $1 \frac{1}{2}$ times its rated load capacity in every position in which the load can be placed within the definition of the specific configuration when the vehicle is on a firm and level surface. If having the outriggers extend to a firm footing is part of the definition of the configuration, they will be extended to provide leveling for the purpose of determining whether the mobile unit meets the stability requirements.
- Each aerial device, when mounted on a vehicle which meets the manufacturer's minimum vehicle specifications and when used in a specific configuration, will comprise a mobile unit capable of sustaining a static load $1 \frac{1}{3}$ times its rated load capacity in every position in which the load can be placed within the definition of the specific configuration when the vehicle is on a slope of 5 degrees downward in the direction most likely to cause overturning. If having the outriggers extended to a firm footing is part of the definition of the configuration, they will be extended to provide leveling for the purpose of determining whether the mobile unit meets the stability requirements. If other facilities, such as a means of turntable leveling, are provided to minimize the effect of the sloping surface, then those facilities will be utilized for the purpose of determining whether the mobile unit meets the stability requirements. Vertical towers designed specifically for operation only on a level surface will be excluded from this requirement.

- None of the stability tests described will produce instability of the mobile unit, or cause permanent deformation of any component. The lifting of a tire or outrigger on the opposite side of the load does not necessarily indicate a condition of instability.

Verification by the manufacturer or an equivalent entity that the stability of an aerial device meets the requirements may be used to demonstrate compliance.

Inspection and Tests

- An aerial device will be inspected and tested at least annually for permanent deformation and cracks by using 1 ½ times the rated load and for defects by visual inspection during and following the load test.
- An annual electrical test of insulated aerial devices will be made. An equivalent DC voltage test may be used in place of the prescribed AC voltage.
- Field inspection and tests will be performed only by an authorized and trained employee or outside service.
- Lift controls will be tested each day before use to determine that the controls are in safe working condition. An aerial device with defective controls will not be used until repaired.

Use

- Any overhead line will be considered energized until the owner, owner representative, or utility indicates otherwise and the line has been visibly grounded, and the owner, owner representative, or utility will be notified and provided with all pertinent information of the job before the commencement of operations near electrical lines.
- Except as prescribed or where insulating barriers not a part of or an attachment to the aerial device have been erected to prevent physical contact with the lines, an aerial device will maintain the distances from energized distribution and transmission power lines and equipment prescribed in table 1.
- A qualified lineman or a qualified line clearance tree trimmer performing work on or near an exposed power transmission or distribution line from an aerial lift will maintain distances prescribed in table 2, unless the employee is insulated or guarded from the energized part by gloves or gloves and sleeves, or insulated, isolated, or guarded from any other conductive part or the energized part is insulated from the employee.
- A qualified telecommunications employee will maintain the distances prescribed in table 3 when working from an aerial lift, unless the employee is insulated, isolated, or guarded from any other conductive part or the energized part is insulated from the employee.
- The insulated bucket, gloves, and sleeves used to comply will be rated at more than the voltage to be worked on or that with which they might come into contact.
- An in-plant, industrial-type aerial lift designed to be used on level surfaces will not be used on slopes, unless the aerial lift is adjusted to a firm, level plane.
- A safety belt or harness will be used with a lanyard attached to the boom or basket when working from an aerial lift. The safety belt, harness, and lanyard will be provided by *Cain's Pipeline & Industrial Services, LLC.*. An in-plant, industrial-type aerial device used on a level surface and equipped with a platform with approved railings is exempt from this rule.
- A boom platform will be provided with a rail or other structure around its upper periphery that will be not less than 38 inches above the floor of the platform and

with a toeboard not less than 4 inches high. A basket of a cherry picker will be considered to meet this requirement. A platform may have the guardrail removed from the working side if a safety belt and lanyard is worn by the employee on the platform.

- The designed rated capacity for a given altitude will not be exceeded.
- A proximity warning device may be used, but not in place of meeting the requirements of this rule.
- Belting off to an adjacent pole, structure, or equipment while working from an aerial device will not be permitted.
- An employee will stand firmly on the floor of the basket and will not sit or climb on the edge of the basket, except that an employee may sit in the basket if it is equipped with a specifically designed seat. A plank, ladder, or other device will not be used from a basket.
- Climbers will not be worn while working from an aerial device unless gaff guards are provided.
- Tables 1, 2, and 3 read as follows:

Table 1

Minimum Clearance Distances for Equipment		
Voltage	Clearance With Boom Raised	Clearance Boom Lowered and No Load in Transit
To 50 kV	10 feet	4 feet
Over 50 kV	10 feet + .4 inch per each 1 kV over 50 kV	10 feet
50 to 345 kV		10 feet
346 to 750 kV		15 feet

Table 2

Minimum Working Distances for Qualified Line Clearance Tree Trimmers and Qualified Linemen	
Voltage Range Phase to Phase (KV)	Minimum Working Distance
2.1 to 15.0	2'0"
15.1 to 35.0	2'4"
35.1 to 46.0	2'6"
46.1 to 72.5	3'0"
72.6 to 121.0	3'4"
138.0 to 145.0	3'6"
161.0 to 169.0	3'8"
230.0 to 242.0	5'0"
345.0 to 362.0	*7'0"
550.0 to 552.0	*11'0"
700.0 to 765.0	*15'0"

***NOTE:** For 345 — 362 kV., 500 — 552 kV., and 700 — 765 kV., the minimum working distance and the minimum clear hot stick distance may be reduced that such distances are not less than the shortest distance between the energized part and a grounded surface.

Table 3

Minimum Approach Distances for Qualified Telecommunications Employees	
Voltage Range (Nominal Phase to Phase)	Minimum Approach Distances
300 V and less	12"
Over 300 V, not over 750 V	18"
Over 750 V, not over 2 kV	24"
Over 2 kV, not over 15 kV	36"
Over 15 kV, not over 37 kV	42"
Over 37 kV, not over 87.5 kV	48"
Over 87.5 kV, not over 121 kV	54"
Over 121 kV, not over 140 kV	--

Vehicles

- Before a vehicle supporting an aerial ladder is moved for highway travel, the ladders will be secured in the lower position, and the manually operated device at the base of the ladder, or other effective means, will be used to prevent elevation or rotation of the ladder.
- Before a vehicle supporting an aerial lift is moved for travel, the boom will be inspected to insure that it is properly cradled and the outriggers are in the stowed position.
- A vehicle supporting an aerial device will not be moved when the boom is elevated with employees in working position, unless the equipment is specifically designed for this type of operation and meets the requirements.
- Brakes will be set and outriggers, when used, will be positioned on pads or a solid surface.
- Wheel chocks will be installed before using an aerial device on an incline.

Elevating Work Platforms

These rules apply to equipment that has a primary function of elevating personnel, together with their tools and necessary materials, on a platform that is mechanically positioned. The following units are covered:

- ***ANSI Standard A92.2-1990***, "Vehicle-Mounted Elevating Work Platforms", which applies to vehicle-mounted devices installed on commercial chassis and covers the following type of units:
 - Extensible boom aerial devices.
 - Aerial ladders.
 - Articulating boom aerial devices.
 - Vertical towers.
 - A combination of any of the equipment specified.
- ***ANSI Standard A92.3-1990***, "Manually Propelled Elevating Work Platforms", which applies to work platforms which are manually propelled, which are vertically adjustable by manual or powered means, and which may be towed or manually moved horizontally on wheels or casters that are an integral part of the work platform base.
- ***ANSI Standard A92.5-1992***, "Boom-Supported Elevating Work Platforms", which applies to all integral frame, boom-supported elevating work platforms which telescope, articulate, rotate, or extend beyond the base dimensions.
- ***ANSI Standard A92.6-1999***, "Self-Propelled Elevating Work Platforms", which applies to self-propelled vertically adjustable integral chassis work platforms. Such work platforms are power operated with primary controls for all movement operated from the platform.

Equipment not Covered

- Equipment that has a primary function other than elevating personnel, such as fork trucks or cranes that are adapted to elevating personnel, is not covered by these rules.
- Also excluded from coverage of these rules is fire fighting equipment that is covered by the provisions of the publication entitled "American National Practices for the Maintenance, Care, Testing, and Use of Fire Department Aerial Ladders and Elevating Platforms."

Construction

- Aerial work platforms will be designed, constructed, and tested so as to be in compliance with the requirements of ANSI standards A92.2, A92.3, A92.5, and A92.6
- Aerial work platforms will not be field-modified for uses other than those intended by the manufacturer, unless the modification has been certified in writing by the manufacturer or by any other equivalent entity, such as a nationally recognized testing laboratory, to be in compliance with the applicable ANSI standard and this rule, and to be at least as safe as the equipment was before modification.
- Directional controls will be in compliance with all of the following provisions:
 - Be of the type that will automatically return to the off or neutral position when released.
 - Be protected against inadvertent operation.
 - Be clearly marked as to their intended function.
 - An overriding control will be provided in the platform which must be continuously activated for platform directional controls to be operational and which automatically returns to the off position when released.
- Aerial work platforms will be equipped with emergency controls at ground level.
- Emergency ground level controls will be clearly marked as to their intended function and be capable of overriding the platform controls.
- All of the following information will be clearly marked in a permanent manner on each aerial work platform.
 - Special workings, cautions, or restrictions necessary for operation.
 - Rated workload.
 - A clear statement of whether or not the aerial work platform is electrically insulated.
- Rotating shafts, gears, and other moving parts that are exposed to contact will be guarded as required.
- Attachment points will be provided for fall protection devices for personnel who occupy the platform on aerial work platforms.

Inspection, Maintenance, and Testing

An employer will comply with all of the following requirements:

- Each aerial work platform will be inspected, maintained, repaired, and kept in proper working condition in accordance with the manufacturer's operating, maintenance, and repair manuals.
- Any aerial work platform found not to be in a safe operating condition will be removed from service until repaired. All repairs will be made by an authorized person in accordance with the manufacturer's operating, maintenance, and repair manuals.
- If the aerial work platform is rated and used as an insulated aerial device, the electrical insulating components will be tested for compliance with the rating of the aerial platform in accordance with ANSI standard A92.2-1990, Section 6.

Such testing will comply with all of the following provisions:

- The test will be performed not less than annually.
 - Written, dated, and signed test reports will be made available by *Cain's Pipeline & Industrial Services, LLC.* for examination by OSHA.
 - The insulated portion of an aerial device will not be altered in any manner that might reduce its insulating value.
- All danger, caution, and control markings and operational plates will be legible and not obscured.

Preoperation Procedures

- Before use on each work shift, an aerial work platform will be given a visual inspection by the operator for defects that would affect its safe operation and use. The inspection will consist of not less than both of the following procedures:
 - Visual inspection for all of the following:
 - ☑ Cracked welds.
 - ☑ Bent or broken structural members.
 - ☑ Hydraulic or fuel leaks.
 - ☑ Damaged controls and cables.
 - ☑ Loose wires.
 - ☑ Tire condition.
 - ☑ Fuel and hydraulic fluid levels.
 - ☑ Slippery conditions on the platform.
 - Operate all platform and ground controls to ensure that they perform their intended function.
- Before the aerial work platform is used, and during use on the job site, the operator will inspect the operational area for all of the following:
 - Ditches.
 - Drop-offs.
 - Holes.
 - Debris.
 - Bumps and floor obstructions.
 - Overhead obstructions.
 - Power lines.

The area around the aerial work platform will also be inspected to assure clearance for the platform and other parts of the unit.

- All unsafe items found as a result of the inspection of the aerial work platform or work area will be corrected before further use of the aerial work platform.
- When the specified clearances cannot be maintained, the owner of electrical lines or the authorized representative will be notified and provided with all pertinent information before the commencement of operations near electrical lines.
- Any overhead wire will be considered to be an energized line until the owner of the line or the authorized representative states that it is de-energized.

Operating Procedures

- The aerial work platform will be used only in accordance with the manufacturer's operating instructions and safety rules.
- The following clearances will be maintained when operating aerial work platforms or other equipment under, over, by, or near energized electric power lines:

VOLTAGE	MINIMUM CLEARANCE
0 to 50 kV	10 feet
More than 50 kV	10 feet + .4 inch per kV

- The clearance requirements of this rule do not apply to the following situations:
 - Where work is performed from an insulated aerial device that is insulated for the work and the work is performed in accordance with the provisions of construction safety standard "Power Transmission and Distribution" and "Telecommunications."
 - Where the electric power transmission or distribution lines have been de-energized and visibly grounded at the point of work or where insulating barriers that are not a part of an attachment to the aerial work platform have been erected to prevent physical contact with the line.
 - Where work is being performed by journeymen electricians on equipment up to .5kV.
- Two journeymen electricians will be required for work within the minimum clearance on equipment over .5kV.
- Proximity warning devices may be used, but will not be used instead of meeting the requirements of this rule.
- The manufacturer's rated load capacity will not be exceeded. *Cain's Pipeline & Industrial Services, LLC.* will ensure that the load and its distribution on the platform are in accordance with the manufacturer's specifications. The aerial work platform rated load capacity will not be exceeded when loads are transferred to the platform at elevated heights.
- Only personnel, their tools, and necessary materials will be on or in the platform.
- The guardrail system of the platform will not be used to support any of the following:
 - ☐ Materials.
 - ☐ Other work platforms.
 - ☐ Employees.
- Personnel will maintain firm footing on the platform while working on the platform. The use of railings, planks, ladders, or any other devices on the platform for achieving additional height is prohibited.
- Fuel gas cylinders will not be carried on platforms that would allow the accumulation of gases.
- A safety harness that has a lanyard which is in compliance with construction safety standard "Fall Protection" and which is affixed to attachment points provided and approved by the manufacturer will be provided by *Cain's Pipeline & Industrial Services, LLC.* and used by any occupant of an aerial work platform described in these rules. A fall arrest system will only be used where the aerial lift is designed to withstand the vertical and lateral loads caused by an arrested fall.

- A body belt may be used with a restraint device with the lanyard and the anchor arranged so that the employee is not exposed to any fall distance. A restraint device is required where the aerial lift cannot withstand the vertical and lateral loads imposed by an arrested fall.
- Belting off to an adjacent pole, structure, or equipment while working from an aerial work platform is prohibited.
- An employer will not allow employees to exit an elevated aerial work platform, except where elevated work areas are inaccessible or hazardous to reach. Employees may exit the platform with the knowledge and consent of *Cain's Pipeline & Industrial Services, LLC.* When employees exit to unguarded work areas, fall protection will be provided and used as required.
- Only aerial work platforms that are equipped with a manufacturer's installed platform controls for horizontal movement will be moved while in the elevated position.
- Before and during driving while elevated, an operator of a platform will do both of the following:
 - Look in the direction of, and keep a clear view of, the path of travel and make sure that the path is firm and level.
 - Maintain a safe distance from all of the following:

☑ Obstacles.	☑ Ramps.
☑ Debris.	☑ Overhead obstructions.
☑ Drop-offs.	☑ Overhead electrical lines.
☑ Holes.	☑ Other hazards to safe elevated travel.
☑ Depressions.	
- Outriggers or stabilizers, when provided, are to be used in accordance with the manufacturer's instruction. Outriggers and stabilizers will be positioned on pads or a solid surface.
- Aerial work platforms will be elevated only when on a firm and level surface or within the slope limits allowed by the manufacturer's instructions.
- A vehicle-mounted aerial work platform will have its brakes set before elevating the platform.
- A vehicle-mounted aerial work platform will have wheel chocks installed before using the unit on an incline.
- Climbers will not be worn while performing work from an aerial work platform.
- Platform gates will be closed while the platform is in an elevated position.
- Stunt driving and horseplay are prohibited.
- Altering, modifying, or disabling safety devices or interlocks is prohibited.
- Care will be taken by *Cain's Pipeline & Industrial Services, LLC.* to prevent ropes, cords, and hoses from becoming entangled in the aerial work platform.
- A platform operator will ensure that the area surrounding the aerial work platform is clear of personnel and equipment before lowering the platform.

- Before and during travel, except as provided for horizontal movement, an operator will do all of the following:
 - Inspect to see that booms, platforms, aerial ladders, or towers are properly cradled or secured.
 - Ensure that outriggers are in a stored position.
 - Limit travel speed according to the following factors:

☑ Condition of the surface ☑ Congestion ☑ Slope	☑ Location of personnel ☑ Other hazards
- The aerial work platform will not be positioned against another object to steady the platform.
- The aerial work platform will not be operated from a position on a truck, trailer, railway car, floating vessel, scaffold, or similar equipment.
- The boom and platform of the aerial work platform will not be used to move or jack the wheels off the ground unless the machine is designed for that purpose by the manufacturer.
- If the platform or elevating assembly becomes caught, snagged, or otherwise prevented from normal motion by adjacent structures or other obstacles so that control reversal does not free the platform, all personnel will be removed from the platform before attempts are made to free the platform.

Elevating Work Platform Equipment

- The platform deck will be equipped with a guardrail or other structure around its upper periphery that will be 42 inches high, plus or minus 3 inches, with a midrail. (Chains or the equivalent may be substituted where they give equivalent protection.) Where the guardrail is less than 39 inches high, an approved personal fall protection system will be used.
- The configuration of an elevating work platform may include a ladder for personnel to use in reaching the platform deck. Any ladder device used in this way will have rungs located on uniform centers not to exceed 12 inches.
- Any elevating work platform equipped with a powered elevating assembly and having a platform height exceeding 60 inches will be supplied with safe emergency lowering means compatible with the specific elevating assembly employed.
- Any powered elevating work platform will have both upper and lower control devices. Controls will be plainly marked as to their function and guarded to prevent accidental operation. The upper control device will be in or beside the platform, within easy reach of the operator. The lower control device will have the capability to lower the platform where the operator's safety is in jeopardy.
- An emergency stopping device will be provided at the upper controls of elevating work platforms.
- Elevating Work Platforms will include:
 - Toeboards at sides and ends which will not be less than 4 inches high.
EXCEPTION: Toeboards may be omitted at the access openings.
 - A hinged trap access door, if applicable.
 - A platform whose minimum width will not be less than 16 inches.

Guarding of Moving Parts

All rotating shafts, gearing, and other moving parts will be guarded.

Stability on Inclined Surfaces

Unless recommended for such use by the manufacturer, no elevating work platform will be used on an inclined surface. Procedures for maintaining stability must be clearly outlined in the special warnings section of user's manual. The user will not deviate from the manufacturer's instructions.

Operating Instructions (Elevating Work Platforms)

- No employee will ride, nor tools, materials, or equipment be allowed on a traveling elevated platform unless the following conditions are met:
 - The travel speed at Maximum Travel Height does not exceed 3 feet per second.
 - Self-propelled units will be equipped with electrical or other interlock means that will prevent driving them with the platform height greater than the Maximum Travel Height or at speeds greater than permitted at Maximum Travel Height.
 - The surface upon which the unit is being operated is level with no hazardous irregularities or accumulation of debris that might cause a moving platform to overturn.
- Units will be assembled, used, and disassembled in accordance with the manufacturer's instructions.
- Units will be assembled, and used only by personnel who have been trained in their use. Units will be inspected for damaged and defective parts before use.
- Units will not be loaded in excess of the design working load and will be taken out of service when damaged or weakened from any cause. They will not be used until repairs are completed.
- Employees will not sit, stand, or climb on the guardrails of an elevating work platform or use planks, ladders, or other devices to gain greater working height or reach.
- Employees will not work on units when exposed to high winds, storms, or when they are covered with ice or snow (unless provisions have been made to ensure the safety of the employees).
- Employees climbing or descending vertical ladders will have both hands free for climbing.
- **NOTE:** Employees should remove foreign substances, such as mud or grease from their shoes.
- Where moving vehicles are present, the work area will be marked with warnings such as flags, roped off areas or other effective means of traffic control will be provided.
- Unstable objects such as barrels, boxes, loose brick, tools, debris, will not be allowed to accumulate on the work level.
- In operations involving production of small debris, chips, etc., and the use of small tools and materials, and where persons are required to work or pass under the equipment, screens will be required between toeboards and guardrails. The screen will extend along the entire opening, will consist of No. 18 gage U.S. Standard Wire ½-inch mesh, or equivalent.

Pin-On Platforms

- Pin-on platforms will be securely pinned to the boom or boom extension.
- Employees on the elevated pin-on platform will be secured to the boom by a safety belt and lanyard or a body belt and safety strap.

Operating Instructions (Aerial Devices)

- Aerial baskets or platforms will not be supported by adjacent structure(s) when workers are on the platform or in the basket while in an elevated position.
- Lift controls will be tested in accordance with the manufacturer's recommendations or instructions prior to use to determine that such controls are in safe working condition.
- Only authorized persons will operate an aerial device.
- Belting off to an adjacent pole, structure, or equipment while working from an aerial device will not be permitted.
- Employees will not sit or climb on the edge of the basket or use planks, ladders or other devices to gain greater working height.
- Boom and basket and platform load limits specified by the manufacturer will not be exceeded.
- When elevating personnel with the vehicle stationary the braking systems will be set.
- Provided they can be safely installed, wheel chocks will be installed before using an aerial device on an incline.
- When used, outriggers will be positioned on pads or a solid surface. All outriggers will be equipped with hydraulic holding valves or mechanical locks at the outriggers.
- Climbers will not be worn while performing work from an aerial device.
- When an insulated aerial device is required, the aerial device will not be altered in any manner that might reduce its insulating value.
- An aerial device truck will not be moved when the boom is elevated in a working position with employees in the basket or platform except when all of the following are complied with:
 - The equipment is specifically designed for this type of operation.
 - All controls and signaling devices are tested and are in good operating condition.
 - An effective communication system will be maintained at all times between the basket or platform operator and where applicable, the vehicle operator.
 - The route to be traveled is surveyed immediately prior to the work trip, checking for overhead obstructions, traffic, holes in the pavement, ground or shoulder, ditches, slopes, etc., for areas other than paved, a survey should be made on foot.
 - The speed of the vehicle does not exceed three (3) miles per hour.
 - Only one employee is in the basket.
 - Both the driver and/or the elevated employee have been specifically trained for this type of work (towering) in accordance with the manufacturer's recommendations.
- Lower level controls will not be operated unless permission has been obtained from the employee in the device, except in case of emergency.

- Before moving an aerial device for travel, the boom(s) will be inspected to see that it is properly cradled and outriggers are in stowed position.
- An employee, while in an elevated aerial device, will be secured to the boom, basket or tub of an aerial device through the use of a safety belt, body belt, or body harness equipped with safety strap or lanyard.
 - Safety belts/body belts are prohibited for use in personal fall arrest systems, but may be used as part of a fall restraint or positioning device system.
 - Safety belts/body belts used as part of a positioning device system will be rigged such that an employee cannot free fall more than 2 feet.
 - A body harness may be used in a personal fall restraint, positioning or fall arrest system. When a body harness is used in a fall arrest system, the lanyard will be rigged with a deceleration device to limit maximum arresting force on an employee to 1,800 pounds and prevent the employee from hitting any levels or objects below the basket or platform, and will limit free fall to a maximum of 6 feet.

DEFINITION OF TERMS RELATING TO AERIAL DEVICES

Aerial Device or Aerial Work Platform – means any vehicle-mounted device, telescoping or articulating or both, that is designed and manufactured to raise personnel to an elevated work position on a platform supported by scissors, masts, or booms.

Aerial Ladder – means an aerial device that consists of a single- or multiple-section rung ladder.

Articulating Boom Platform – means an aerial device that has two or more hinged boom sections.

Authorized Person – means a person who is approved and assigned to perform specific types of duties by the employer and who is qualified to perform those duties because of his or her training or experience.

Boom – An elevating member, the lower end of which is so attached to a rotating or non-rotating base that permits elevation of the free or outer end in vertical plane.

Commercial Chassis – means a vehicle that is built for over-the-road (roadway) travel.

Elevating Work Platform – A device designed to elevate a platform in a substantially vertical axis (Vertical Tower, Scissor Lift).

Extensible Boom Platform – means an aerial device, except for the aerial ladder-type, with a telescopic or extensible boom. A telescopic derrick with a personnel platform attachment will be considered to be an extensible boom platform when used with a personnel platform.

Instability – means a condition of a mobile unit in which the sum of the moments tending to overturn the unit is equal to or exceeds the sum of the moments tending to resist overturning.

Insulated Aerial Device – means an aerial work platform that is designed with dielectric components to meet specific electrical insulating ratings for work on or near energized lines and apparatus.

Mechanically Positioned – means that the elevating assembly, whether a mechanical (cable or chain), hydraulic, pneumatic, electric or other powered mechanism, is used to raise or lower the platform.

Mobile Unit – means a combination of an aerial device, vehicle and related equipment.

Override – means to transfer or to take away platform control functions by another station.

Pin-On Platform – A platform other than basket or tub, without a guardrail which is attached to a boom by hinge or pivot connection allowing movement in the vertical plane, including such hinge down platforms used at the upper end of aerial ladders.

Platform – means the portion of an aerial work platform, such as a bucket, basket, stand, cage, or the equivalent, that is designed to be occupied by personnel and is a component of an aerial device.

Qualified Person – means a person who possesses a recognized degree, certificate, professional standing, or skill and who, by knowledge, training, and experience, has demonstrated the ability to deal with problems relating to the subject matter, the work, or the project.

Qualified Line Clearance Tree Trimmer – means an employee trained to work in proximity of energized power transmission and distribution lines. An employee in a training program is included in this definition.

Qualified Lineman – means an employee trained and authorized to work on or near energized lines. An employee in a training program is included in this definition.

Qualified Telecommunications Employee – means an employee trained to work on communication lines in the proximity of energized power transmission and distribution lines.

Rated Work Load – The safe design live load carrying capacity of the work platform.

Safety Factor – means the ratio of the breaking strength of a piece of material or object to maximum designed load or stress applied when in use.

Stability – A condition of a work platform in which the sum of the moments, which tends to overturn the unit is less than the sum of the moments tending to resist overturning.

Vehicle – means any carrier that is not manually propelled.

Vehicle Mounted Elevating and Rotating Work Platform – means an aerial device.

Vertical Tower – means an aerial device designed to elevate a platform in a substantially vertical axis on a level surface

Yield Point – means the point where material begins to take a permanent deformation.

AERIAL LIFT EQUIPMENT DAILY INSPECTION/CHECKLIST

Use only equipment which is in safe working condition. DO NOT operate equipment if any inspected items need repair.			
Company:		Location of Use:	
Operator's Name:		Time:	
Supervisor's Name:		Date:	
Inspector(s) Name:		Hour Meter Reading:	
Equipment Type:		Equipment I.D. Numbers:	
Manufacturer:			
General Site Information:			
OK REPAIR N/A		OK REPAIR N/A	
☐ ☐ ☐ Hazard assessment of work area? ☐ ☐ ☐ Controls in place for identified hazards? ☐ ☐ ☐ Work areas properly signed and barricaded? ☐ ☐ ☐ Operator's manual on lift?		☐ ☐ ☐ Ground man available for emergency descent who is knowledgeable of descent valve operation? ☐ ☐ ☐ Test controls – including emergency descent valve?	
Carrier Vehicle:			
OK REPAIR N/A		OK REPAIR N/A	
☐ ☐ ☐ Motor ☐ ☐ ☐ Crank case oil is clean and full ☐ ☐ ☐ Engine coolant is about 2" below cap ☐ ☐ ☐ Clutch /Converter ☐ ☐ ☐ Drive Line ☐ ☐ ☐ Transmission fluid at proper level ☐ ☐ ☐ Frame ☐ ☐ ☐ Brakes ☐ ☐ ☐ Differentials ☐ ☐ ☐ Outriggers		☐ ☐ ☐ Cab ☐ ☐ ☐ Steering ☐ ☐ ☐ Lights ☐ ☐ ☐ Tires properly inflated ☐ ☐ ☐ Cuts or bulges in the tires ☐ ☐ ☐ Wheels & Lug Nuts secure ☐ ☐ ☐ Fire Extinguisher ☐ ☐ ☐ Cab Glass ☐ ☐ ☐ Warning Lights and Alarm ☐ ☐ ☐ Access	
HYDRAULICS:			
OK REPAIR N/A		OK REPAIR N/A	
☐ ☐ ☐ Relief Valve(s) ☐ ☐ ☐ Restrictor Valves ☐ ☐ ☐ Pipe Lines ☐ ☐ ☐ Hose Lines ☐ ☐ ☐ Outrigger Cylinders ☐ ☐ ☐ Boom Crowd Cylinders ☐ ☐ ☐ Control Valves ☐ ☐ ☐ Swing Motor		☐ ☐ ☐ Pumps ☐ ☐ ☐ Bearings ☐ ☐ ☐ Check hydraulic oil level ☐ ☐ ☐ Mounting Bolts ☐ ☐ ☐ Swing Gear ☐ ☐ ☐ Swing Pinion ☐ ☐ ☐ Seals - Hydraulic ☐ ☐ ☐ Leaks	
BOOM:			
OK REPAIR N/A		OK REPAIR N/A	
☐ ☐ ☐ Shipper Welds ☐ ☐ ☐ Boom Welds ☐ ☐ ☐ Pins - Boom Pivot		☐ ☐ ☐ Support Roller ☐ ☐ ☐ Boom Pins ☐ ☐ ☐ Boom Main Section	
OPERATIONAL CHECKS:			
OK REPAIR N/A		OK REPAIR N/A	
☐ ☐ ☐ Operators familiar with load charts? ☐ ☐ ☐ Test emergency descent valve? ☐ ☐ ☐ Out rigger pads not cracked? ☐ ☐ ☐ Hydraulic hoses in good condition? ☐ ☐ ☐ Does boom swing break work properly? ☐ ☐ ☐ Outriggers fully extended, working properly, and swing radius barricades in place? ☐ ☐ ☐ Boom angle indicator is available and working? ☐ ☐ ☐ Swing through 360 degrees, does boom angle indicator stay the same throughout rotation? ☐ ☐ ☐ Engine is started and gauges are checked and working properly? ☐ ☐ ☐ Extend out the boom, are all sections extending evenly?		☐ ☐ ☐ Vehicle is leveled, working properly? ☐ ☐ ☐ Brakes & brake systems check out? ☐ ☐ ☐ Safety pressure relief valves check out? ☐ ☐ ☐ Back-up alarm is working? ☐ ☐ ☐ Does the horn work?	
Comments:			
Signature (person(s) performing inspection/evaluation)			Date

Items to check during the daily inspection

- Check all welds between cylinders and booms for cracks or wear.
- Inspect all pivot pins for security of their locking devices.
- Check all exposed cables, sheaves, and leveling devices for wear and secure attachment.
- Inspect hydraulic system for frayed hoses and leaks.
- Check lubrication and fluid levels.
- Inspect boom and basket for cracks or abrasions.
- Check for the load capacity posting.
- Operate boom from ground controls through one complete cycle. Check for unusual noises and uncontrolled movements.

Prestart Checks

- Ensure that there are no obstacles around the work platform and in the path of travel such as holes, drop offs, ditches, soft fill, or debris.
- Check overhead clearances.
- Make sure the batteries are fully charged. Disconnect the AC charger cord from the external power source.
- Make sure that the Free-Wheeling Valve is fully closed.
- Make sure all guardrails and lock-pins are in place and locked in position.
- Make sure both side battery and hydraulic trays are closed and locked.

What to do when using a bucket or other aerial device

- Wear a safety harness connected to the boom. Do not attach safety harness to adjacent pole or structure.
- Ensure that no one is in the area before lowering stabilizers, outriggers, or the boom.
- Ensure that each axle is horizontal when vehicle is parked on a hill. Work with the boom pointed uphill beyond the vehicle center.
- Protect a roadway job site with traffic warning signs, lights, and barricades. Determine if extended boom movements will interfere with traffic.
- Secure all tools when not in use.
- Maintain the recommended distance from electrical wires unless you and the bucket are certified for electrical work.
- Face the direction of travel.
- Operate hydraulic controls slowly for smooth platform motion.

What not to do

- Do not stand on top of a bucket or use planks or ladders to gain extra height.
- Do not enter or leave a bucket by walking on the boom.
- Do not exceed the rated load limit.
- Do not ride from one job to another in the bucket.
- Do not climb from bucket to another elevated position without being secured to new position.
- Do not work above other workers. Clear the area below.
- Do not throw tools to or from an elevated bucket.
- Do not attempt to slow any air or hydraulic leak by using your hand or body.

SCISSOR LIFT OPERATOR DAILY INSPECTION/CHECKLIST

Company Name:		Time:	Date:
Site Location:		Job Foreman/Supervisor:	
Person(s) Making Inspection:			
Equipment Type:		Equipment #s:	Manufacturer:

OK REPAIR N/A			MECHANICAL
☐	☐	☐	Structural damage or cracked welds – Visual walk-around inspection.
☐	☐	☐	Parking brake – Check operation.
☐	☐	☐	Tires/wheels & fasteners – Visually inspect, check operation & tightness.
☐	☐	☐	Guides/rollers & slider pads – Visually inspect, check operation, and ensure there is no metal to metal contact with slider, slider side, or running surface. Check for free movement of surface. Also check for free movement of the slider pin through the slider.
☐	☐	☐	Railings & railing lock pins – Visually inspect & check tightness.
☐	☐	☐	Entry chains or gates – Check operation & tightness.
☐	☐	☐	Bolts and fasteners – Check tightness.
☐	☐	☐	Safety Bar – Check operation.
☐	☐	☐	Wheel Bearings & King pins – Visually inspect, check operation & lubricate.
☐	☐	☐	Pothole Protection – Visually inspect & check operation.
☐	☐	☐	Steering cylinder & tie rod – Visually inspect, check operation & lubricate.

OK REPAIR N/A			ELECTRICAL
☐	☐	☐	Battery fluid level – Visually inspect.
☐	☐	☐	Control switches – Visually inspect & check operation.
☐	☐	☐	Cables & wiring harnesses – Visually inspect.
☐	☐	☐	Battery Terminals – Visually inspect & check tightness.
☐	☐	☐	Terminals & Plugs – Check tightness.
☐	☐	☐	Generator/receptacle – Visually inspect & check operation.
☐	☐	☐	Limit switches – Check operation.

OK REPAIR N/A			HYDRAULIC
☐	☐	☐	Hydraulic oil reservoir level – Check oil level.
☐	☐	☐	Hydraulic Hoses/Fittings – Visually inspect & check for leaks.
☐	☐	☐	Lift/lowering time – Check operation & refer to specification tables.
☐	☐	☐	Cylinders – Visually inspect & check operation.
☐	☐	☐	Emergency lowering – Check operation.
☐	☐	☐	Lift capacity – Check relief valve setting & refer to specification tables.

OK REPAIR N/A			MISCELLANEOUS
☐	☐	☐	Manual – Visually check that proper manual is in box.
☐	☐	☐	Placards, I.D. plates, warnings & control labels – Replace if missing/illegible.

OK REPAIR N/A			PRESTART CHECKS
☐	☐	☐	Ensure that there are no obstacles around the work platform and in the path of travel such as holes, drop offs, ditches, soft fill, or debris.
☐	☐	☐	Check overhead clearances.
☐	☐	☐	Make sure the batteries are fully charged. Disconnect the AC charger cord from the external power source.
☐	☐	☐	Make sure that the Free-Wheeling Valve is fully closed.
☐	☐	☐	Make sure all guardrails and lock-pins are in place and locked in position
☐	☐	☐	Make sure both side battery and hydraulic trays are closed and locked.

NOTE: At any point during this inspection there are any deficiencies, do not operate lift any further. Notify the proper personnel or repair unit as needed. Do not operate equipment without proper authorization and training.			
Signature (person(s) performing inspection/evaluation)			Date

Items to check during the daily inspection

- Tires for proper pressure and wheels for loose or missing lug nuts.
- Steer cylinder, linkage, and tie rods for loose or missing parts, damage, & leaks.
- Hydraulic oil for leaks and fluid level. Hydraulic hoses, lift cylinder(s), and connections for leaks or loose connections.
- Fuel supply – adequate fuel, filler cap in place, no damage, leaks, or spills.
- Battery for fluid level and state of charge.
- Proper connection of all quick-disconnect hoses.
- Structural components for damage, broken parts, cracks in welds, including scissor arms, outrigger arms, and pads.
- Ladder or steps for damage and debris (ladder must be firmly secured to the platform and relatively free of grease, mud and dirt).
- Beacon and warning lights for missing and defective lenses or caps.
- Ground controls (manual and powered) – including emergency stop switch and platform lower/lift switch – for proper function and damaged and missing control sticks/switches
- Decals and warning signs to make sure they are clean, legible, and conspicuous.

After mounting the platform, check:

- Platform assembly for missing or loose parts, missing or loose lock pins & bolts.
- Platform floor for structural damage, holes, or cracked welds and any dirt, grease, or oil that can create a hazard.
- Operator's manual to make sure it is in place.
- Extendable platform deck for ease of extension/retraction and proper function of locking position of platform
- Guardrails to make sure they are in place and secure.
- Access gate for ease of movement, missing parts, latch, and locking capabilities.
- All fall protection anchorage points.
- All control mechanisms for broken or missing parts.
- All emergency controls for proper function – stopping, descending, master OFF switch.
- All safety devices such as tilt and motion alarms for malfunction.
- Swivels for freedom of rotation.
- Scissors for smooth movement up and down.
- Brakes for stopping capabilities.
- Horn for proper function.

Notes:

Handwriting practice lines consisting of 20 sets of three horizontal lines (top, middle, and bottom) for letter formation.

Chapter 6

Cain's Pipeline & Industrial Services, LLC.

Assured Equipment Grounding Conductor Program (AEGCP) Ground Fault Circuit Interrupter (GFCI)

Cain's Pipeline & Industrial Services, LLC. has adopted this program for equipment grounding protection for the protection of employees from the following OSHA regulations:

§1926.404 – Wiring Design and Protection

Cain's Pipeline & Industrial Services, LLC. will use Ground Fault Circuit Interrupters on all jobsites when possible. When GFCI equipment is infeasible, the following guidelines, procedures, engineering controls, and work practices will be enforced to eliminate all injuries resulting from possible malfunctions, improper grounding and/or defective electrical tools and systems:

- *Brent Messina* is designated as the Competent Person in charge of the Grounding Conductor program for *Cain's Pipeline & Industrial Services, LLC.*
- A written description of this Grounding Conductor Program, including the following specific procedures, are available on the jobsite for inspection or copying by OSHA and any affected employee from *Brent Messina* upon request.
- This Assured Grounding Conductor Program applies to all *Cain's Pipeline & Industrial Services, LLC.* sites, covering all cord sets and receptacles that are not part of the building or structure, and equipment connected by cord and plug which are available for use or used by employees.
- *Cain's Pipeline & Industrial Services, LLC.* will not make available, or allow the use by employees, of any equipment which does not meet the requirements of this Grounding Conductor Safety Program.
- Employees are required, before each days use, to visually inspect each extension cord, or other device, and any equipment connected by cord and plug, for external defects, such as deformed or missing pins or insulation damage, and for signs of possible internal damage. Cord sets, devices, and receptacles that are fixed and not exposed to damage are exempt from this inspection. Employees are prohibited from using damaged or defective equipment. Any equipment found to be damaged or defective will be immediately tagged "DO NOT USE" and removed from service.
- Tests performed as required by this program will be recorded as to the identity of each receptacle, cord set, and cord and plug connected equipment that passed the test and will indicate the last date tested or interval for which is was tested. This record will be kept by means of logs, color coding, or other effective means and will be maintained until replaced by a more current record. These records will be made available at the jobsite for inspection by OSHA and any affected employees.

- Tests will be performed on all extension cords, other devices and receptacles that are not part of the permanent wiring of the building or structure, and cord- and plug-connected equipment required to be grounded will include:
 - Testing all equipment grounding conductors for continuity.
 - Testing each receptacle or plug to assure the equipment grounding conductor is connected to its proper terminal.
- Testing will be performed:
 - Before each use.
 - Before equipment is returned to use following any repairs.
 - Before equipment which has sustained possible damage is used.
 - At intervals not to exceed 3 months, except that cord sets & receptacles which are fixed and not exposed to damage will be tested at intervals not exceeding 6 months.
- A log will be kept on the job-site of all tests performed. These records will be kept until replaced by a newer record. The log will include:
 - Pass/Fail record of each receptacle, cord set, and cord- and plug-connected equipment that was tested.
 - Date of testing or test intervals.

§1926.404 — WIRING DESIGN AND PROTECTION.

(a) Use and identification of grounded and grounding conductors.

(1) Identification of conductors. A conductor used as a grounded conductor shall be identifiable and distinguishable from all other conductors. A conductor used as an equipment grounding conductor shall be identifiable and distinguishable from all other conductors.

(2) Polarity of connections. No grounded conductor shall be attached to any terminal or lead so as to reverse designated polarity.

(3) Use of grounding terminals and devices. A grounding terminal or grounding-type device on a receptacle, cord connector, or attachment plug shall not be used for purposes other than grounding.

(b) Branch circuits.

(1) Ground Fault Protection

(i) General. The employer shall use either ground fault circuit interrupters as specified in paragraph (b)(1)(ii) of this section or an assured equipment grounding conductor program as specified in paragraph (b)(1)(iii) of this section to protect employees on construction sites. These requirements are in addition to any other requirements for equipment grounding conductors.

(ii) Ground Fault Circuit Interrupters. All 120-volt, single-phase, 15- and 20- ampere receptacle outlets on construction sites, which are not 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. Receptacles on a two-wire, single-phase portable or vehicle mounted generator rated not more than 5kW, 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 circuit interrupters.

(iii) Assured equipment grounding conductor program. The employer shall establish and implement an assured equipment grounding conductor program on construction sites covering all cord sets, receptacles which are not part of the building or structure, and equipment connected by cord or plug which are available for use or used employees. This program shall comply with the following minimum requirements:

(A) A written description of the program, including the employer's specific procedures. The program must be at the job site for inspection and copying by the Assistant Secretary and any affected employee.

(B) The employer must designate one or more competent persons (defined in §1926.32(f)) to implement the program.

(C) Before each day's use, visually inspect each extension cord, or other device, and any equipment connected by cord and plug, for external defects, such as deformed or missing

pins or insulation damage, and for signs of possible internal damage. Extension cords, devices and receptacles not exposed to damage are exempt from this inspection. Do not use damaged or defective equipment.

(D) Do these tests on all extension cords, other devices and receptacles that are not part of the permanent wiring of the building or structure, and cord- and plug-connected equipment required to be grounded:

(1) Test all equipment grounding conductors for continuity.

(2) Test each receptacle or plug to assure the equipment grounding conductor is connected to its proper terminal.

(E) Do all required tests:

(1) Before first use;

(2) Before first use after repair;

(3) Before use after any incident that reasonably could cause damage (for example, when a cord set is run over); and

(4) At intervals not longer than 3 months. Inspect fixed extension cords, other devices and receptacles not exposed to damage at least every 6 months.

(F) The employer shall not make available or permit the use by employees of any equipment which has not met the requirements of this paragraph(b)(1)(iii) of this section.

(G) Record all tests required in this paragraph. This test record must identify each receptacle, cord set, and cord- and plug-connected equipment that passed the test and indicate the last date of testing or the test interval. Keep this record by means of logs, color coding, or other effective means. Keep the record until replaced by a newer record. The record must be available on the job site for inspection by the Administrator and any affected employee.

(2) **Outlet devices.** Outlet devices shall have an ampere rating not less than the load to be served and shall comply with the following:

(i) **Single receptacles.** A single receptacle installed on an individual branch circuit shall have an ampere rating of not less than that of the branch circuit.

(ii) **Two or more receptacles.** Where connected to a branch circuit supplying two or more receptacles or outlets, receptacle ratings shall conform to the values listed in Table K-4.

(iii) **Receptacles used for the connection of motors.** The rating of an attachment plug or receptacle used for cord- and plug-connection of a motor to a branch circuit shall not exceed 15 amperes at 125 volts or 10 amperes at 250 volts if individual overload protection is omitted.

TABLE K-4

RECEPTACLE RATINGS FOR VARIOUS SIZE CIRCUITS

Circuit rating amperes		Receptacle rating amperes	
15		Not over 15	
20		15 or 20	
30		30	
40		40 or 50	
50		50	

(c) **Outside conductors and lamps.**

(1) **600 volts, nominal, or less.** Paragraphs (c)(1)(i) through (c)(1)(iv) of this section apply to branch circuit, feeder, and service conductors rated 600 volts, nominal, or less and run outdoors as open conductors.

(i) **Conductors on poles.** Conductors supported on poles shall provide a horizontal climbing space not less than the following:

(A) Power conductors below communication conductors . 30 inches (762 mm).

(B) Power conductors alone or above communication conductors: 300 volts or less . 24 inches (610 mm); more than 300 volts . 30 inches (762 mm).

(C) Communication conductors below power conductors: with power conductors 300 volts or less - 24 inches (610 mm); more than 300 volts - 30 inches (762 mm).

(ii) **Clearance from ground.** Open conductors shall conform to the following minimum clearances:

(A) 10 feet (3.05 m) . above finished grade, sidewalks, or from any platform or projection from which they might be reached.

(B) 12 feet (3.66 m) . over areas subject to vehicular traffic other than truck traffic.

(C) 15 feet (4.57 m) . over areas other than those specified in paragraph (c)(1)(ii)(D) of this section that are subject to truck traffic.

(D) 18 feet (5.49 m) . over public streets, alleys, roads, and driveways.

(iii) **Clearance from building openings.** Conductors shall have a clearance of at least 3 feet (914 mm) from windows, doors, fire escapes, or similar locations. Conductors run above the top level of a window are considered to be out of reach from that window and, therefore, do not have to be 3 feet (914 mm) away.

(iv) **Clearance over roofs.** Conductors above roof space accessible to employees on foot shall have a clearance from the highest point of the roof surface of not less than 8 feet (2.44 m) vertical clearance for insulated conductors, not less than 10 feet (3.05 m) vertical or diagonal clearance for covered conductors, and not less than 15 feet (4.57 m) for bare conductors, except that:

(A) Where the roof space is also accessible to vehicular traffic, the vertical clearance shall not be less than 18 feet (5.49 m), or

(B) Where the roof space is not normally accessible to employees on foot, fully insulated conductors shall have a vertical or diagonal clearance of not less than 3 feet (914 mm), or

(C) Where the voltage between conductors is 300 volts or less and the roof has a slope of not less than 4 inches (102 mm) in 12 inches (305 mm), the clearance from roofs shall be at least 3 feet (914 mm), or

(D) Where the voltage between conductors is 300 volts or less and the conductors do not pass over more than 4 feet (1.22 m) of the overhang portion of the roof and they are terminated at a through-the-roof raceway or support, the clearance from roofs shall be at least 18 inches (457 mm).

(2) **Location of outdoor lamps.** Lamps for outdoor lighting shall be located below all live conductors, transformers, or other electric equipment, unless such equipment is controlled by a disconnecting means that can be locked in the open position or unless adequate clearances or other safeguards are provided for relamping operations.

(d) Services.

(1) Disconnecting means.

(i) **General.** Means shall be provided to disconnect all conductors in a building or other structure from the service-entrance conductors. The disconnecting means shall plainly indicate whether it is in the open or closed position and shall be installed at a readily accessible location nearest the point of entrance of the service-entrance conductors.

(ii) **Simultaneous opening of poles.** Each service disconnecting means shall simultaneously disconnect all ungrounded conductors.

(2) **Services over 600 volts, nominal.** The following additional requirements apply to services over 600 volts, nominal.

(i) **Guarding.** Service-entrance conductors installed as open wires shall be guarded to make them accessible only to qualified persons.

(ii) **Warning signs.** Signs warning of high voltage shall be posted where unauthorized employees might come in contact with live parts.

(e) Overcurrent protection.

(1) **600 volts, nominal, or less.** The following requirements apply to overcurrent protection of circuits rated 600 volts, nominal, or less.

(i) **Protection of conductors and equipment.** Conductors and equipment shall be protected from overcurrent in accordance with their ability to safely conduct current. Conductors shall have sufficient amp capacity to carry the load.

(ii) **Grounded conductors.** Except for motor-running overload protection, overcurrent devices shall not interrupt the continuity of the grounded conductor unless all conductors of the circuit are opened simultaneously.

(iii) Disconnection of fuses and thermal cutouts. Except for devices provided for current-limiting on the supply side of the service disconnecting means, all cartridge fuses which are accessible to other than qualified persons and all fuses and thermal cutouts on circuits over 150 volts to ground shall be provided with disconnecting means. This disconnecting means shall be installed so that the fuse or thermal cutout can be disconnected from its supply without disrupting service to equipment and circuits unrelated to those protected by the overcurrent device.

(iv) Location in or on premises. Overcurrent devices shall be readily accessible. Overcurrent devices shall not be located where they could create an employee safety hazard by being exposed to physical damage or located in the vicinity of easily ignitable material.

(v) Arcing or suddenly moving parts. Fuses and circuit breakers shall be so located or shielded that employees will not be burned or otherwise injured by their operation.

(vi) Circuit breakers.

(A) Circuit breakers shall clearly indicate whether they are in the open (off) or closed (on) position.

(B) Where circuit breaker handles on switchboards are operated vertically rather than horizontally or rotationally, the up position of the handle shall be the closed (on) position.

(C) If used as switches in 120-volt, fluorescent lighting circuits, circuit breakers shall be marked "SWD."

(2) Over 600 volts, nominal. Feeders and branch circuits over 600 volts, nominal, shall have short-circuit protection.

(f) Grounding. Paragraphs (f)(1) through (f)(11) of this section contain grounding requirements for systems, circuits, and equipment.

(1) Systems to be grounded. The following systems which supply premises wiring shall be grounded:

(i) Three-wire DC systems. All 3-wire DC systems shall have their neutral conductor grounded.

(ii) Two-wire DC systems. Two-wire DC systems operating at over 50 volts through 300 volts between conductors shall be grounded unless they are rectifier-derived from an AC system complying with paragraphs (f)(1)(iii), (f)(1)(iv), and (f)(1)(v) of this section.

(iii) AC circuits, less than 50 volts. AC circuits of less than 50 volts shall be grounded if they are installed as overhead conductors outside of buildings or if they are supplied by transformers and the transformer primary supply system is ungrounded or exceeds 150 volts to ground.

(iv) AC systems, 50 volts to 1000 volts. AC systems of 50 volts to 1000 volts shall be grounded under any of the following conditions, unless exempted by paragraph (f)(1)(v) of this section:

(A) If the system can be so grounded that the maximum voltage to ground on the ungrounded conductors does not exceed 150 volts;

(B) If the system is nominally rated 480Y/277 volt, 3-phase, 4-wire in which the neutral is used as a circuit conductor;

(C) If the system is nominally rated 240/120 volt, 3-phase, 4-wire in which the midpoint of one phase is used as a circuit conductor; or

(D) If a service conductor is uninsulated.

(v) Exceptions. AC systems of 50 volts to 1000 volts are not required to be grounded if the system is separately derived and is supplied by a transformer that has a primary voltage rating less than 1000 volts, provided all of the following conditions are met:

(A) The system is used exclusively for control circuits,

(B) The conditions of maintenance and supervision assure that only qualified persons will service the installation,

(C) Continuity of control power is required, and

(D) Ground detectors are installed on the control system.

(2) Separately derived systems. Where paragraph (f)(1) of this section requires grounding of wiring systems whose power is derived from generator, transformer, or converter windings and has no direct electrical connection, including a solidly connected grounded circuit conductor, to supply conductors originating in another system, paragraph (f)(5) of this section shall also apply.

(3) Portable and vehicle-mounted generators.

(i) Portable generators. Under the following conditions, the frame of a portable generator need not be grounded and may serve as the grounding electrode for a system supplied by the generator:

(A) The generator supplies only equipment mounted on the generator and/or cord- and plug-connected equipment through receptacles mounted on the generator, and

(B) The noncurrent-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are bonded to the generator frame.

(ii) **Vehicle-mounted generators.** Under the following conditions the frame of a vehicle may serve as the grounding electrode for a system supplied by a generator located on the vehicle:

(A) The frame of the generator is bonded to the vehicle frame, and

(B) The generator supplies only equipment located on the vehicle and/or cord- and plug-connected equipment through receptacles mounted on the vehicle or on the generator, and

(C) The noncurrent-carrying metal parts of equipment and the equipment grounding conductor terminals of the receptacles are bonded to the generator frame, and

(D) The system complies with all other provisions of this section.

(iii) **Neutral conductor bonding.** A neutral conductor shall be bonded to the generator frame if the generator is a component of a separately derived system. No other conductor need be bonded to the generator frame.

(4) **Conductors to be grounded.** For AC premises wiring systems the identified conductor shall be grounded.

(5) **Grounding connections.**

(i) **Grounded system.** For a grounded system, a grounding electrode conductor shall be used to connect both the equipment grounding conductor and the grounded circuit conductor to the grounding electrode. Both the equipment grounding conductor and the grounding electrode conductor shall be connected to the grounded circuit conductor on the supply side of the service disconnecting means, or on the supply side of the system disconnecting means or over-current devices if the system is separately derived.

(ii) **Ungrounded systems.** For an ungrounded service-supplied system, the equipment grounding conductor shall be connected to the grounding electrode conductor at the service equipment. For an ungrounded separately derived system, the equipment grounding conductor shall be connected to the grounding electrode conductor at, or ahead of, the system disconnecting means or overcurrent devices.

(6) **Grounding path.** The path to ground from circuits, equipment, and enclosures shall be permanent and continuous.

(7) **Supports, enclosures, and equipment to be grounded.**

(i) **Supports and enclosures for conductors.** Metal cable trays, metal raceways, and metal enclosures for conductors shall be grounded, except that:

(A) Metal enclosures such as sleeves that are used to protect cable assemblies from physical damage need not be grounded; and

(B) Metal enclosures for conductors added to existing installations of open wire, knob-and-tube wiring, and non-metallic-sheathed cable need not be grounded if all the following conditions are met:

(1) Runs are less than 25 feet (7.62 m);

(2) Enclosures are free from probable contact with ground, grounded metal, metal laths, or other conductive materials; and

(3) Enclosures are guarded against employee contact.

(ii) **Service equipment enclosures.** Metal enclosures for service equipment shall be grounded.

(iii) **Fixed equipment.** Exposed noncurrent-carrying metal parts of fixed equipment which may become energized shall be grounded under any of the following conditions:

(A) If within 8 feet (2.44 m) vertically or 5 feet (1.52 m) horizontally of ground or grounded metal objects and subject to employee contact.

(B) If located in a wet or damp location and subject to employee contact.

(C) If in electrical contact with metal.

(D) If in a hazardous (classified) location.

(E) If supplied by a metal-clad, metal-sheathed, or grounded metal raceway wiring method.

(F) If equipment operates with any terminal at over 150 volts to ground; however, the following need not be grounded:

- (1) Enclosures for switches or circuit breakers used for other than service equipment and accessible to qualified persons only;
- (2) Metal frames of electrically heated appliances which are permanently and effectively insulated from ground; and
- (3) The cases of distribution apparatus such as transformers and capacitors mounted on wooden poles at a height exceeding 8 feet (2.44 m) above ground or grade level.

(iv) **Equipment connected by cord and plug.** Under any of the conditions described in paragraphs (f)(7)(iv)(A) through (f)(7)(iv)(C) of this section, exposed noncurrent-carrying metal parts of cord- and plug-connected equipment which may become energized shall be grounded:

- (A) If in a hazardous (classified) location (see §1926.407).
- (B) If operated at over 150 volts to ground, except for guarded motors and metal frames of electrically heated appliances if the appliance frames are permanently and effectively insulated from ground.
- (C) If the equipment is one of the types listed in paragraphs (f)(7)(iv)(C)(1) through (f)(7)(iv)(C)(5) of this section. However, even though the equipment may be one of these types, it need not be grounded if it is exempted by paragraph (f)(7)(iv)(C)(6).
 - (1) Hand held motor-operated tools;
 - (2) Cord- and plug-connected equipment used in damp or wet locations or by employees standing on the ground or on metal floors or working inside of metal tanks or boilers;
 - (3) Portable and mobile X-ray and associated equipment;
 - (4) Tools likely to be used in wet and/or conductive locations; and
 - (5) Portable hand lamps.
 - (6) Tools likely to be used in wet and/or conductive locations need not be grounded if supplied through an isolating transformer with an ungrounded secondary of not over 50 volts. Listed or labeled portable tools and appliances protected by a system of double insulation, or its equivalent, need not be grounded. If such a system is employed, the equipment shall be distinctively marked to indicate that the tool or appliance utilizes a system of double insulation.

(v) **Non-electrical equipment.** The metal parts of the following non-electrical equipment shall be grounded: Frames and tracks of electrically operated cranes; frames of nonelectrically driven elevator cars to which electric conductors are attached; hand-operated metal shifting ropes or cables of electric elevators, and metal partitions, grill work, and similar metal enclosures around equipment of over 1kV between conductors.

(8) Methods of grounding equipment.

(i) **With circuit conductors.** Noncurrent-carrying metal parts of fixed equipment, if required to be grounded by this subpart, shall be grounded by an equipment grounding conductor which is contained within the same raceway, cable, or cord, or runs with or encloses the circuit conductors. For DC circuits only, the equipment grounding conductor may be run separately from the circuit conductors.

(ii) **Grounding conductor.** A conductor used for grounding fixed or movable equipment shall have capacity to conduct safely any fault current which may be imposed on it.

(iii) **Equipment considered effectively grounded.** Electric equipment is considered to be effectively grounded if it is secured to, and in electrical contact with, a metal rack or structure that is provided for its support and the metal rack or structure is grounded by the method specified for the noncurrent-carrying metal parts of fixed equipment in paragraph (f)(8)(i) of this section. Metal car frames supported by metal hoisting cables attached to or running over metal sheaves or drums of grounded elevator machines are also considered to be effectively grounded.

(9) **Bonding.** If bonding conductors are used to assure electrical continuity, they shall have the capacity to conduct any fault current which may be imposed.

(10) **Made electrodes.** If made electrodes are used, they shall be free from nonconductive coatings, such as paint or enamel; and, if practicable, they shall be embedded below permanent moisture level. A single electrode consisting of a rod, pipe or plate which has a resistance to ground greater than 25 ohms shall be augmented by one additional electrode installed no closer than 6 feet (1.83 m) to the first electrode.

(11) Grounding of systems and circuits of 1000 volts and over (high voltage).

(i) General. If high voltage systems are grounded, they shall comply with all applicable provisions of paragraphs (f)(1) through (f)(10) of this section as supplemented and modified by this paragraph (f)(11).

(ii) Grounding of systems supplying portable or mobile equipment. Systems supplying portable or mobile high voltage equipment, other than substations installed on a temporary basis, shall comply with the following:

(A) Portable and mobile high voltage equipment shall be supplied from a system having its neutral grounded through an impedance. If a delta-connected high voltage system is used to supply the equipment, a system neutral shall be derived.

(B) Exposed noncurrent-carrying metal parts of portable and mobile equipment shall be connected by an equipment grounding conductor to the point at which the system neutral impedance is grounded.

(C) Ground-fault detection and relaying shall be provided to automatically de-energize any high voltage system component which has developed a ground fault. The continuity of the equipment grounding conductor shall be continuously monitored so as to de-energize automatically the high voltage feeder to the portable equipment upon loss of continuity of the equipment grounding conductor.

(D) The grounding electrode to which the portable or mobile equipment system neutral impedance is connected shall be isolated from and separated in the ground by at least 20 feet (6.1 m) from any other system or equipment grounding electrode, and there shall be no direct connection between the grounding electrodes, such as buried pipe, fence or like objects.

(iii) Grounding of equipment. All noncurrent-carrying metal parts of portable equipment and fixed equipment including their associated fences, housings, enclosures, and supporting structures shall be grounded. However, equipment which is guarded by location and isolated from ground need not be grounded. Additionally, pole-mounted distribution apparatus at a height exceeding 8 feet (2.44 m) above ground or grade level need not be grounded.

Chapter 7

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Toxic and Hazardous Materials

Benzene

Cain's Pipeline & Industrial Services, LLC. has adopted and initiated this policy for the prevention of hazardous employee exposure to Benzene is adopted in accordance with the following OSHA regulations:

§1910.1028 – ***Benzene, and Appendices A, B, C, and D***

§1910.1200 – ***Hazard Communication Standards for Employers***

§1910.134 – ***Respiratory Protection***

Cain's Pipeline & Industrial Services, LLC. has implemented this policy to ensure that no employee is exposed to Benzene at levels in excess of the permissible exposure limits (PELs). **Brent Messina** is the supervisor responsible for ensuring the following engineering controls and work practices are enforced:

- *Brent Messina* will provide employees with information and training at the time of their initial assignment to a work area where Benzene is present. If exposures are above the action level (PEL), employees will be provided with information and training at least annually thereafter.
- When any exposures are over the PEL, *Cain's Pipeline & Industrial Services, LLC.* will establish and implement a written program to reduce employee exposure to or below the PEL primarily by means of engineering and work practice controls, as required by OSHA.
- The written program includes a schedule for development and implementation of the engineering and work practice controls. These plans will be reviewed and revised as appropriate based on the most recent exposure monitoring data, to reflect the current status of the program.
- Written compliance programs will be furnished upon request for examination and copying to OSHA, affected employees and designated employee representatives.
- Employees will be informed of all regulated areas and are properly trained in entrance procedure, safety requirements, and practices when in regulated areas.
- Employees are required to wear the appropriate PPE as necessary, eye, face, boots, gloves, sleeves and aprons.
- *Cain's Pipeline & Industrial Services, LLC.* has implemented and will maintain a Respiratory Protection Program in accordance with §1910.134.
- The Respiratory Protection Program and respiratory protective equipment is provided for all employees with potential for exposure to Benzene.
- For employees who use respirators required by this section, *Cain's Pipeline & Industrial Services, LLC.* will provide respirators that comply with the Company Respiratory Protection Program and OSHA requirements. Respirators will be used during:
 - Periods necessary to install or implement feasible engineering and work practice controls.
 - Emergencies.

Work operations for which feasible engineering and work-practice controls are not yet sufficient to reduce employee exposure to or below the PELs.

- Work operations for which *Brent Messina* 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.
- For air-purifying respirators, *Brent Messina* will ensure the replacement of 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. 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.
- *Brent Messina* will select approved respirators according to airborne concentrations of benzene and condition of use from Table 1 below:

Table 1 – Respiratory Protection for Benzene

Airborne concentration of benzene or condition of use	Respirator type
(a) Less than or equal to 10 ppm	(1) Half-mask air-purifying respirator with organic vapor cartridge.
(b) Less than or equal to 50 ppm	(1) Full facepiece respirator with organic vapor cartridges.
	(1) Full facepiece gas mask with chin style canister ¹ .
(c) Less than or equal to 100 ppm	(1) Full facepiece powered air-purifying respirator with organic vapor canister ¹ .
(d) Less than or equal to 1,000 ppm	(1) Supplied air respirator with full facepiece in positive-pressure mode.
(e) Greater than 1,000 ppm or unknown concentration	(1) Self-contained breathing apparatus with full facepiece in positive pressure mode.
	(2) Full facepiece positive-pressure supplied-air respirator with auxiliary self-contained air supply.
(f) Escape	(1) Any organic vapor gas mask; or
	(2) Any self-contained breathing apparatus with full facepiece.
(g) Firefighting	(1) Full facepiece self-contained breathing apparatus in positive pressure mode.
¹ Canisters must have a minimum service life of four (4) hours when tested at 150 ppm benzene, at a flow rate of 64 LPM, 25 °C, and 85% relative humidity for non-powered air purifying respirators. The flow rate shall be 115 LPM and 170 LPM respectively for tight fitting and loose fitting powered air-purifying respirators	

- Any employees who cannot use a negative-pressure respirator will be allowed to use a respirator with less breathing resistance, such as a powered air-purifying respirator or supplied-air respirator.
- Employees will wear appropriate PPE at all times when working in the proximity of Benzene. This PPE will include proper eye and face protection, boots, gloves, sleeves, aprons, etc. in accordance with 29 CFR 1910.133 where appropriate.
- Personal protective clothing and equipment will be worn where appropriate to prevent eye contact and limit dermal exposure to liquid benzene. Protective clothing and equipment will be provided by *Cain's Pipeline & Industrial Services, LLC.* at no cost to the employee and *Cain's Pipeline & Industrial Services, LLC.* will assure its use where appropriate.
- Adequate ventilation will be ensured in all enclosed work areas.
- Regular monitoring of air quality in work areas will be provided to ensure that PELs are not being exceeded. Records of all monitoring tests will be kept available at the Company office.

- *Cain's Pipeline & Industrial Services, LLC.* will make available a medical surveillance program for employees who potentially may be exposed to Benzene at or above the action level or PEL. This service will be provided at no cost to employees under the supervision of a licensed physician.
- *Cain's Pipeline & Industrial Services, LLC.* will make available a medical surveillance program for employees who are or may be exposed to benzene at or above the action level 30 or more days per year; for employees who are or may be exposed to benzene at or above the PELs 10 or more days per year; for employees who have been exposed to more than 10 ppm of benzene for 30 or more days in a year prior to the effective date of the standard when employed by their current employer.
- All appropriate signs and labels will be posted in areas of potential exposure to Benzene.
- All containers or vessels containing Benzene will be appropriately labeled to indicate the contents and the hazards of the contents.
- Employees will be instructed as to potential locations where they may be exposed to Benzene including:
 - Petroleum refining sites.
 - Tank Gauging (tanks at producing, pipeline, and refining operations).
 - Field maintenance.
- Employees will be instructed as to the characteristics of Benzene including:

■ Toxicity	■ Solubility
■ Color	■ Flammability
■ Odor	■ Toxic by-products

 (See Appendix A – Benzene Substance Safety Data Sheet.)
- Employees will be instructed as to the health effects of overexposure to Benzene including:
 - Short-term (acute) overexposure: If you are overexposed to high concentrations of Benzene, well above the levels where its odor is first recognizable, you may feel breathless, irritable, euphoric, or giddy; you may experience irritation in eyes, nose, and respiratory tract. You may develop a headache, feel dizzy, nauseated, or intoxicated. Severe exposures may lead to convulsions and loss of consciousness.
 - Long-term (chronic) exposure: Repeated or prolonged exposure to Benzene, even at relatively low concentrations, may result in various blood disorders, ranging from anemia to leukemia, an irreversible, fatal disease. Many blood disorders associated with Benzene exposure may occur without symptoms
 (See Appendix C – Medical Surveillance Guidelines for Benzene.)
- Fire extinguishers of the carbon dioxide, dry chemical, or foam type will be readily available. Employees will know where they are located and how to operate them. Benzene is classified as a 1 B flammable liquid and is highly flammable and vapors may form explosive mixtures in air. Locations where Benzene may be present in quantities sufficient to produce explosive or ignitable mixtures are considered Class I Group D locations.
- Smoking is prohibited in areas where Benzene is used or stored.

- *Brent Messina* will meet with the Facility Owner's managers in order to acquire provisions for a Site-specific Contingency Plan that apply to mishaps involving Benzene.
- Employees will be informed where Benzene is used at the host facility and be made aware of additional plant safety rules.
- MSDS for Benzene and all other hazardous materials *Cain's Pipeline & Industrial Services, LLC*. uses are available to employees for review upon request.

§1910.1028 – BENZENE.

(a) Scope and application:

(1) This chapter applies to all occupational exposures to benzene. Chemical Abstracts Service Registry No. 71-43-2, except as provided in paragraphs (a)(2) and (a)(3) below.

(2) This section does not apply to:

(i) The storage, transportation, distribution, dispensing, sale or use of gasoline, motor fuels, or other fuels containing benzene subsequent to its final discharge from bulk wholesale storage facilities, except that operations where gasoline or motor fuels are dispensed for more than 4 hours per day in an indoor location are covered by this section.

(ii) Loading and unloading operations at bulk wholesale storage facilities which use vapor control systems for all loading and unloading operations, except for the provisions of 29 CFR 1910.1200 as incorporated into this section and the emergency provisions of paragraphs (g) and (i)(4) of this section.

(iii) The storage, transportation, distribution or sale of benzene or liquid mixtures containing more than 0.1 percent benzene in intact containers or in transportation pipelines while sealed in such a manner as to contain benzene vapors or liquid, except for the provisions of 29 CFR 1910.1200 as incorporated into this section and the emergency provisions of paragraphs (g) and (i)(4) of this section.

(iv) Containers and pipelines carrying mixtures with less than 0.1 percent benzene and natural gas processing plants processing gas with less than 0.1 percent benzene.

(v) Work operations where the only exposure to benzene is from liquid mixtures containing 0.5 percent or less of benzene by volume, or the vapors released from such liquids until September 12, 1988; work operations where the only exposure to benzene is from liquid mixtures containing 0.3 percent or less of benzene by volume or the vapors released from such liquids from September 12, 1988, to September 12, 1989; and work operations where the only exposure to benzene is from liquid mixtures containing 0.1 percent or less of benzene by volume or the vapors released from such liquids after September 12, 1989; except that tire building machine operators using solvents with more than 0.1 percent benzene are covered by paragraph (i) of this section.

(vi) Oil and gas drilling, production and servicing operations.

(vii) Coke oven batteries.

(3) The cleaning and repair of barges and tankers which have contained benzene are excluded from paragraph (f) methods of compliance, paragraph (e)(1) exposure monitoring – general, and paragraph (e)(6) accuracy of monitoring. Engineering and work practice controls shall be used to keep exposures below 10 ppm unless it is proven to be not feasible.

(c) Permissible exposure limits (PEL)s:

(1) **Time-weighted average limit (TWA).** The employer shall assure that no employee is exposed to an airborne concentration of benzene in excess of one part of benzene per million parts of air (1 ppm) as an 8-hour time-weighted average.

(2) **Short-term exposure limit (STEL).** The employer shall assure that no employee is exposed to an airborne concentration of benzene in excess of five (5) ppm as averaged over any 15 minute period.

(d) Regulated areas:

(1) The employer shall establish a regulated area wherever the airborne concentration of benzene exceeds 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.

(2) Access to regulated areas shall be limited to authorized persons.

(3) Regulated areas shall be determined from the rest of the workplace in any manner that minimizes the number of employees exposed to benzene within the regulated area.

(e) Exposure monitoring:

(1) General.

- (i) Determinations of employee exposure shall be made from breathing zone air samples that are representative of each employee's average exposure to airborne benzene.
- (ii) Representative 8-hour TWA employee exposures shall be determined on the basis of one sample or samples representing the full shift exposure for each job classification in each work area.
- (iii) Determinations of compliance with the STEL shall be made from 15 minute employee breathing zone samples measured at operations where there is reason to believe exposures are high, such as where tanks are opened, filled, unloaded or gauged; where containers or process equipment are opened and where benzene is used for cleaning or as a solvent in an uncontrolled situation. The employer may use objective data, such as measurements from brief period measuring devices, to determine where STEL monitoring is needed.
- (iv) Except for initial monitoring as required under paragraph (e)(2) of this section, where the employer can document that one shift will consistently have higher employee exposures for an operation, the employer shall only be required to determine representative employee exposure for that operation during the shift on which the highest exposure is expected.

(2) Initial monitoring.

- (i) Each employer who has a place of employment covered under paragraph (a)(1) of this section shall monitor each of these workplaces and work operations to determine accurately the airborne concentrations of benzene to which employees may be exposed.
- (ii) The initial monitoring required under paragraph (e)(2)(i) of this section shall be completed within 30 days of the introduction of benzene into the workplace. Where the employer has monitored within one year prior to the effective date of this standard and the monitoring satisfies all other requirements of this section, the employer may rely on such earlier monitoring results to satisfy the requirements of paragraph (e)(2)(i) of this section.

(3) Periodic monitoring and monitoring frequency.

- (i) If the monitoring required by paragraph (e)(2)(i) of this section reveals employee exposure at or above the action level but at or below the TWA, the employer shall repeat such monitoring for each such employee at least every year.
- (ii) If the monitoring required by paragraph (e)(2)(i) of this section reveals employee exposure above the TWA, the employer shall repeat such monitoring for each such employee at least every six (6) months.
- (iii) The employer may alter the monitoring schedule from every six months to annually for any employee for whom two consecutive measurements taken at least 7 days apart indicate that the employee exposure has decreased to the TWA or below, but is at or above the action level.
- (iv) Monitoring for the STEL shall be repeated as necessary to evaluate exposures of employees subject to short term exposures.

(4) Termination of monitoring.

- (i) If the initial monitoring required by paragraph (e)(2)(i) of this section reveals employee exposure to be below the action level the employer may discontinue the monitoring for that employee, except as otherwise required by paragraph (e)(5) of this section.
- (ii) If the periodic monitoring required by paragraph (e)(3) of this section reveals that employee exposures, as indicated by at least two consecutive measurements taken at least 7 days apart, are below the action level the employer may discontinue the monitoring for that employee, except as otherwise required by paragraph (e)(5).

(5) Additional monitoring.

- (i) The employer shall institute the exposure monitoring required under paragraphs (e)(2) and (e)(3) of this section when there has been a change in the production, process, control equipment, personnel or work practices which may result in new or additional exposures to benzene, or when the employer has any reason to suspect a change which may result in new or additional exposures.
- (ii) Whenever spills, leaks, ruptures or other breakdowns occur that may lead to employee exposure, the employer shall monitor (using area or personal sampling) after the cleanup of the spill or repair of the leak, rupture or other breakdown to ensure that exposures have returned to the level that existed prior to the incident.

(6) Accuracy of monitoring.

Monitoring shall be accurate, to a confidence level of 95 percent, to within plus or minus 25 percent for airborne concentrations of benzene.

(7) Employee notification of monitoring results.

(i) The employer shall, within 15 working days after the receipt of the results of any monitoring performed under this standard, notify each employee of these results in writing either individually or by posting of results in an appropriate location that is accessible to affected employees.

(ii) Whenever the PELs are exceeded, the written notification required by paragraph (e)(7)(i) of this section shall contain the corrective action being taken by the employer to reduce the employee exposure to or below the PEL, or shall refer to a document available to the employee which states the corrective actions to be taken.

(f) Methods of compliance:

(1) Engineering controls and work practices.

(i) The employer shall institute engineering controls and work practices to reduce and maintain employee exposure to benzene at or below the permissible exposure limits, except to the extent that the employer can establish that these controls are not feasible or where the provisions of paragraph (f)(1)(iii) or (g)(1) of this section apply.

(ii) Wherever the feasible engineering controls and work practices which can be instituted are not sufficient to reduce employee exposure to or below the PELs, the employer shall use them to reduce employee exposure to the lowest levels achievable by these controls and shall supplement them by the use of respiratory protection which complies with the requirements of paragraph (g) of this section.

(iii) Where the employer can document that benzene is used in a workplace less than a total of 30 days per year, the employer shall use engineering controls, work practice controls or respiratory protection or any combination of these controls to reduce employee exposure to benzene to or below the PELs, except that employers shall use engineering and work practice controls, if feasible, to reduce exposure to or below 10 ppm as an 8-hour TWA.

(2) Compliance program.

(i) When any exposures are over the PEL, the employer shall establish and implement a written program to reduce employee exposure to or below the PEL primarily by means of engineering and work practice controls, as required by paragraph (f)(1) of this section.

(ii) The written program shall include a schedule for development and implementation of the engineering and work practice controls. These plans shall be reviewed and revised as appropriate based on the most recent exposure monitoring data, to reflect the current status of the program.

(iii) Written compliance programs shall be furnished upon request for examination and copying to the Assistant Secretary, the Director, affected employees and designated employee representatives.

(g) Respiratory protection:

(1) General. For employees who use respirators required by this section, the employer must provide respirators that comply with the requirements of this paragraph. Respirators must be used during:

(i) Periods necessary to install or implement feasible engineering and work practice controls.

(ii) Work operations for which the employer 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.

(iii) Work operations for which feasible engineering and work-practice controls are not yet sufficient, or are not required under paragraph (f)(1)(iii) of this section, to reduce employee exposure to or below the PELs.

(iv) Emergencies.

(2) Respirator program.

(i) The employer must implement a respiratory protection program in accordance with 29 CFR 1910.134(b) through (d) (except (d)(1)(iii), (d)(3)(iii)(B)(1), and (2)), and (f) through (m).

(ii) For air-purifying respirators, the employer must 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.

(iii) 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.

(3) Respirator selection.

- (i) The employer must select the appropriate respirator from Table 1 of this section.**
- (ii) Any employees who cannot use a negative-pressure respirator must be allowed to use a respirator with less breathing resistance, such as a powered air-purifying respirator or supplied-air respirator.**

Table 1. Respiratory Protection for Benzene

Airborne concentration of Benzene or condition of use	Respirator type
(a) Less than or equal to 10 ppm	(1) Half-mask air-purifying respirator with organic vapor cartridge.
(b) Less than or equal to 50 ppm	(1) Full facepiece respirator with organic vapor cartridges. (2) Full facepiece gas mask with chin style canister. ¹
(c) Less than or equal to 100 ppm	(1) Full facepiece powered air-purifying respirator with organic vapor canister. ¹
(d) Less than or equal to 1,000 ppm	(1) Supplied air respirator with full facepiece in positive-pressure mode.
(e) Greater than 1,000 ppm or unknown concentration	(1) Self-contained breathing apparatus with full facepiece in positive pressure mode. (2) Full facepiece positive-pressure supplied-air respirator with auxiliary self-contained air supply.
(f) Escape	(1) Any organic vapor gas mask; or (2) Any self-contained breathing apparatus with full facepiece.
(g) Firefighting	(1) Full facepiece self-contained breathing apparatus in positive pressure mode.

¹ Canisters must have a minimum service life of four (4) hours when tested at 150 ppm benzene, at a flow rate of 64 LPM, 25° C, and 85% relative humidity for non-powered air purifying respirators. The flow rate shall be 115 LPM and 170 LPM respectively for tight fitting and loose fitting powered air-purifying respirators.

(h) Protective clothing and equipment:

Personal protective clothing and equipment shall be worn where appropriate to prevent eye contact and limit dermal exposure to liquid benzene. Protective clothing and equipment shall be provided by the employer at no cost to the employee and the employer shall assure its use where appropriate. Eye and face protection shall meet the requirements of 29 CFR 1910.133.

(i) Medical surveillance:

(1) General.

- (i) The employer shall make available a medical surveillance program for employees who are or may be exposed to benzene at or above the action level 30 or more days per year; for employees who are or may be exposed to benzene at or above the PELs 10 or more days per year; for employees who have been exposed to more than 10 ppm of benzene for 30 or more days in a year prior to the effective date of the standard when employed by their current employer; and for employees involved in the tire building operations called tire building machine operators, who use solvents containing greater than 0.1 percent benzene.**
- (ii) The employer shall assure that all medical examinations and procedures are performed by or under the supervision of a licensed physician and that all laboratory tests are conducted by an accredited laboratory.**
- (iii) The employer shall assure that persons other than licensed physicians who administer the pulmonary function testing required by this section shall complete a training course in spirometry sponsored by an appropriate governmental, academic or professional institution.**
- (iv) The employer shall assure that all examinations and procedures are provided without cost to the employee and at a reasonable time and place.**

(2) Initial examination.

(i) Within 60 days of the effective date of this standard, or before the time of initial assignment, the employer shall provide each employee covered by paragraph (i)(1)(i) of this section with a medical examination including the following elements:

(A) A detailed occupational history which includes:

- (1) Past work exposure to benzene or any other hematological toxins,
- (2) A family history of blood dyscrasias including hematological neoplasms;
- (3) A history of blood dyscrasias including genetic hemoglobin abnormalities, bleeding abnormalities, abnormal function of formed blood elements;
- (4) A history of renal or liver dysfunction;
- (5) A history of medicinal drugs routinely taken;
- (6) A history of previous exposure to ionizing radiation and
- (7) Exposure to marrow toxins outside of the current work situation.

(B) A complete physical examination.

(C) Laboratory tests. A complete blood count including a leukocyte count with differential, a quantitative thrombocyte count, hematocrit, hemoglobin, erythrocyte count and erythrocyte indices (MCV, MCH, MCHC). The results of these tests shall be reviewed by the examining physician.

(D) Additional tests as necessary in the opinion of the examining physician, based on alterations to the components of the blood or other signs which may be related to benzene exposure; and

(E) For all workers required to wear respirators for at least 30 days a year, the physical examination shall pay special attention to the cardiopulmonary system and shall include a pulmonary function test.

(ii) No initial medical examination is required to satisfy the requirements of paragraph (i)(2)(i) of this section if adequate records show that the employee has been examined in accordance with the procedures of paragraph (i)(2)(i) of this section within the twelve months prior to the effective date of this standard.

(3) Periodic examinations.

(i) The employer shall provide each employee covered under paragraph (i)(1)(i) of this section with a medical examination annually following the previous examination. These periodic examinations shall include at least the following elements:

(A) A brief history regarding any new exposure to potential marrow toxins, changes in medicinal drug use, and the appearance of physical signs relating to blood disorders:

(B) A complete blood count including a leukocyte count with differential, quantitative thrombocyte count, hemoglobin, hematocrit, erythrocyte count and erythrocyte indices (MCV, MCH, MCHC); and

(C) Appropriate additional tests as necessary, in the opinion of the examining physician, in consequence of alterations in the components of the blood or other signs which may be related to benzene exposure.

(ii) Where the employee develops signs and symptoms commonly associated with toxic exposure to benzene, the employer shall provide the employee with an additional medical examination which shall include those elements considered appropriate by the examining physician.

(iii) For persons required to use respirators for at least 30 days a year, a pulmonary function test shall be performed every three (3) years. A specific evaluation of the cardiopulmonary system shall be made at the time of the pulmonary function test.

(4) Emergency examinations.

(i) In addition to the surveillance required by (i)(1)(i), if an employee is exposed to benzene in an emergency situation, the employer shall have the employee provide a urine sample at the end of the employee's shift and have a urinary phenol test performed on the sample within 72 hours. The urine specific gravity shall be corrected to 1.024.

(ii) If the result of the urinary phenol test is below 75 mg phenol/L of urine, no further testing is required.

(iii) If the result of the urinary phenol test is equal to or greater than 75 mg phenol/L of urine, the employer shall provide the employee with a complete blood count including an erythrocyte count, leukocyte count with differential and thrombocyte count at monthly intervals for a duration of three (3) months following the emergency exposure.

(iv) If any of the conditions specified in paragraph (i)(5)(i) of this section exists, then the further requirements of paragraph (i)(5) of this section shall be met and the employer shall, in addition, provide the employees with periodic examinations if directed by the physician.

(5) 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.

(A) 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.

(B) The thrombocyte (platelet) count varies more than 20 percent below the employee's most recent values or falls outside the normal limit (95% C.I.) as determined by the laboratory.

(C) The leukocyte count is below 4,000 per mm³ or there is an abnormal differential count.

(ii) 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. (See Appendix C for examples of conditions where a referral may be unnecessary.)

(iii) The employer shall provide the hematologist or internist with the information required to be provided to the physician under paragraph (i)(6) of this section and the medical record required to be maintained by paragraph (k)(2)(ii) of this section.

(iv) 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.

(6) Information provided to the physician. The employer shall provide the following information to the examining physician:

(i) A copy of this regulation and its appendices;

(ii) A description of the affected employee's duties as they relate to the employee's exposure;

(iii) The employee's actual or representative exposure level;

(iv) A description of any personal protective equipment used or to be used; and

(v) Information from previous employment-related medical examinations of the affected employee which is not otherwise available to the examining physician.

(7) Physician's written opinions.

(i) For each examination under this section, the employer 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:

(A) The occupationally pertinent results of the medical examination and tests;

(B) The physician's opinion concerning 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;

(C) 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.

(D) 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.

(ii) The written opinion obtained by the employer shall not reveal specific records, findings and diagnoses that have no bearing on the employee's ability to work in a benzene-exposed workplace.

(8) Medical removal plan.

(i) When a physician makes a referral to a hematologist/internist as required under paragraph (i)(5)(ii) of 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 under paragraph (i)(8)(ii) of this section.

(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 paragraph (i)(8)(ii) of this section, the employer 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 paragraph (i)(8)(i) or (i)(8)(ii) of this section, the employer 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. The employer shall maintain the employee's current wage rate, seniority and other benefits. If there is no such job available, the employer shall 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 paragraph (i)(8)(iii) of 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.

(j) Communication of benzene hazards to employees:

(1) Signs and labels.

(i) The employer shall post signs at entrances to regulated areas. The signs shall bear the following legend:



(ii) The employer shall ensure that labels or other appropriate forms of warning are provided for containers of benzene within the workplace. There is no requirement to label pipes. The labels shall comply with the requirements of CFR 1910.1200(f) and in addition shall include the following legend:



(2) Material safety data sheets.

(i) Employers shall obtain or develop, and shall provide access to their employees, to a material safety data sheet (MSDS) which addresses benzene and complies with 29 CFR 1910.1200.

(ii) Employers who are manufacturers or importers shall:

(A) Comply with paragraph (a) of this section, and

(B) Comply with the requirement in OSHA's Hazard Communication Standard, 29 CFR 1910.1200, that they deliver to downstream employers an MSDS which addresses benzene.

(3) Information and training.

(i) The employer shall provide employees with information and training at the time of their initial assignment to a work area where benzene is present. If exposures are above the action level, employees shall be provided with information and training at least annually thereafter.

(ii) The training program shall be in accordance with the requirements of 29 CFR 1910.1200(h)(1) and (2), and shall include specific information on benzene for each category of information included in that section.

(iii) In addition to the information required under 29 CFR 1910.1200, the employer shall:

(A) Provide employees with an explanation of the contents of this section, including Appendices A and B, and indicate to them where the standard is available; and

(B) Describe the medical surveillance program required under paragraph (i) of this section, and explain the information contained in Appendix C.

(k) Recordkeeping:

(1) Exposure measurements.

(i) The employer shall establish and maintain an accurate record of all measurements required by paragraph (e) of this section, in accordance with 29 CFR 1910.1020.

(ii) This record shall include:

(A) The dates, number, duration, and results of each of the samples taken, including a description of the procedure used to determine representative employee exposures;

(B) A description of the sampling and analytical methods used;

(C) A description of the type of respiratory protective devices worn, if any; and

(D) The name, social security number, job classification and exposure levels of the employee monitored and all other employees whose exposure the measurement is intended to represent.

(iii) The employer shall maintain this record for at least 30 years, in accordance with 29 CFR 1910.1020.

(2) Medical surveillance.

(i) The employer shall establish and maintain an accurate record for each employee subject to medical surveillance required by paragraph (i) of this section, in accordance with 29 CFR 1910.1020.

(ii) This record shall include:

(A) The name and social security number of the employee;

(B) The employer's copy of the physician's written opinion on the initial, periodic and special examinations, including results of medical examinations and all tests, opinions and recommendations;

(C) Any employee medical complaints related to exposure to benzene;

(D) A copy of the information provided to the physician as required by paragraphs (i)(6)(ii) through (v) of this section; and

(E) A copy of the employee's medical and work history related to exposure to benzene or any other hematologic toxins.

(iii) The employer shall maintain this record for at least the duration of employment plus 30 years, in accordance with 29 CFR 1910.1020.

(3) Availability.

(i) The employer shall assure that all records required to be maintained by this section shall be made available upon request to the Assistant Secretary and the Director for examination and copying.

(ii) Employee exposure monitoring records required by this paragraph shall be provided upon request for examination and copying to employees, employee representatives, and the Assistant Secretary in accordance with 29 CFR 1910.1020(a) through (e) and (g) through (i).

(iii) Employee medical records required by this paragraph shall be provided upon request for examination and copying, to the subject employee, to anyone having the specific written consent of the subject employee, and to the Assistant Secretary in accordance with 29 CFR 1910.1020.

(4) Transfer of records.

(i) The employer shall comply with the requirements involving transfer of records set forth in 29 CFR 1910.1020(h).

(ii) If the employer ceases to do business and there is no successor employer to receive and retain the records for the prescribed period, the employer shall notify the Director, at least three (3) months prior to disposal, and transmit them to the Director if required by the Director within that period.

(l) Observation of monitoring:

(1) Employee observation. The employer shall provide affected employees, or their designated representatives, an opportunity to observe the measuring or monitoring of employee exposure to benzene conducted pursuant to paragraph (e) of this section.

(2) Observation procedures. When observation of the measuring or monitoring of employee exposure to benzene requires entry into areas where the use of protective clothing and equipment or respirators is required, the employer shall provide the observer with personal protective clothing and equipment or respirators required to be worn by employees working in the area, assure the use of such clothing and equipment or respirators, and require the observer to comply with all other applicable safety and health procedures.

(m) Dates:

(1) Effective date. The standard became effective December 10, 1987.

(2) Start-up dates.

(i) The requirements of paragraph (a) through (m) of this section, except the engineering control requirements of paragraph (f)(1) of this section shall be completed within sixty (60) days after the effective date of the standard.

(ii) Engineering and work practice controls required by paragraph (f)(1) of this section shall be implemented no later than 2 years after the effective date of the standard.

(iii) Coke and coal chemical operations may comply with paragraph (m)(2)(ii) of this section or alternately include within the compliance program required by paragraph (f)(2) of this section, a requirement to phase in engineering controls as equipment is repaired and replaced. For coke and coal chemical operations choosing the latter alternative, compliance with the engineering controls requirements of paragraph (f)(1) of this section shall be achieved no later than 5 years after the effective date of this standard and substantial compliance with the engineering control requirements shall be achieved within 3 years of the effective date of this standard.

(n) Appendices:

The information contained in Appendices A, B, C, and D is not intended, by itself, to create any additional obligations not otherwise imposed or to detract from any existing obligations. The protocols on respiratory fit testing in Appendix E are mandatory.

APPENDIX A – SUBSTANCE SAFETY DATA SHEET, BENZENE

I. SUBSTANCE IDENTIFICATION

A. Substance: Benzene.

B. Permissible Exposure: Except as to the use of gasoline, motor fuels and other fuels subsequent to discharge from bulk terminals and other exemptions specified in §1910.1028(a)(2):

1. Airborne: The maximum time-weighted average (TWA) exposure limit is 1 part of benzene vapor per million parts of air (1 ppm) for an 8-hour workday and the maximum short-term exposure limit (STEL) is 5 ppm for any 15 -minute period.

2. Dermal: Eye contact shall be prevented and skin contact with liquid benzene shall be limited.

C. Appearance and odor: Benzene is a clear, colorless liquid with a pleasant, sweet odor. The odor of benzene does not provide adequate warning of its hazard.

II. HEALTH HAZARD DATA

A. Ways in which benzene affects your health. Benzene can affect your health if you inhale it, or if it comes in contact with your skin or eyes. Benzene is also harmful if you happen to swallow it.

B. Effects of overexposure.

1. Short-term (acute) overexposure: If you are overexposed to high concentrations of benzene, well above the levels where its odor is first recognizable, you may feel breathless, irritable, euphoric, or giddy; you may experience irritation in eyes, nose, and respiratory tract. You may develop a headache, feel dizzy, nauseated, or intoxicated. Severe exposures may lead to convulsions and loss of consciousness.

2. Long-term (chronic) exposure. Repeated or prolonged exposure to benzene, even at relatively low concentrations, may result in various blood disorders, ranging from anemia to leukemia, an irreversible, fatal disease. Many blood disorders associated with benzene exposure may occur without symptoms.

III. PROTECTIVE CLOTHING AND EQUIPMENT

A. Respirators. Respirators are required for those operations in which engineering controls or work practice controls are not feasible to reduce exposure to the permissible level. However, where employers can document that benzene is present in the workplace less than 30 days a year, respirators may be used in lieu of engineering controls.

If respirators are worn, they must have joint Mine Safety and Health Administration and the National Institute for Occupational Safety and Health (NIOSH) seal of approval, and cartridge or canisters must be replaced before the end of their service life, or the end of the shift, whichever occurs first. If you experience difficulty

breathing while wearing a respirator, you may request a positive pressure respirator from your employer. You must be thoroughly trained to use the assigned respirator, and the training will be provided by your employer.

B. Protective Clothing. You must wear appropriate protective clothing (such as boots, gloves, sleeves, aprons, etc.) over any parts of your body that could be exposed to liquid benzene.

C. Eye and Face Protection. You must wear splash-proof safety goggles if it is possible that benzene may get into your eyes. In addition, you must wear a face shield if your face could be splashed with benzene liquid.

IV. EMERGENCY AND FIRST AID PROCEDURES

A. Eye and face exposure. If benzene is splashed in your eyes, wash it out immediately with large amounts of water. If irritation persists or vision appears to be affected see a doctor as soon as possible.

B. Skin exposure. If benzene is spilled on your clothing or skin, remove the contaminated clothing and wash the exposed skin with large amounts of water and soap immediately. Wash contaminated clothing before you wear it again.

C. Breathing. If you or any other person breathes in large amounts of benzene, get the exposed person to fresh air at once. Apply artificial respiration if breathing has stopped. Call for medical assistance or a doctor as soon as possible. Never enter any vessel or confined space where the benzene concentration might be high without proper safety equipment and at least one other person present who will stay outside. A life line should be used.

D. Swallowing. If benzene has been swallowed and the patient is conscious, do not induce vomiting. Call for medical assistance or a doctor immediately.

V. MEDICAL REQUIREMENTS

If you are exposed to benzene at a concentration at or above 0.5 ppm as an 8-hour time-weighted average, or have been exposed at or above 10 ppm in the past while employed by your current employer, your employer is required to provide a medical examination and history and laboratory tests within 60 days of the effective date of this standard and annually thereafter. These tests shall be provided without cost to you. In addition, if you are accidentally exposed to benzene (either by ingestion, inhalation, or skin/eye contact) under emergency conditions known or suspected to constitute toxic exposure to benzene, your employer is required to make special laboratory tests available to you.

VI. OBSERVATION OF MONITORING

Cain's Pipeline & Industrial Services, LLC. will perform measurements that are representative of your exposure to benzene, and employees or their designated representative are entitled to observe the monitoring procedure. Employees are entitled to observe the steps taken in the measurement procedure, and to record the results obtained. When the monitoring procedure is taking place in an area where respirators or personal protective clothing and equipment are required to be worn, employees or their representative must also be provided with, and must wear the protective clothing and equipment.

VII. ACCESS TO RECORDS

Employees or their representative are entitled to see the records of measurements of your exposure to benzene upon written request. Your medical examination records can be furnished to yourself, your physician, or designated representative upon request by you to your employer.

VIII. PRECAUTIONS FOR SAFE USE, HANDLING AND STORAGE

Benzene liquid is highly flammable. It should be stored in tightly closed containers in a cool, well ventilated area. Benzene vapor may form explosive mixtures in air. All sources of ignition must be controlled. Use non-sparking tools when opening or closing benzene containers. Fire extinguishers, where provided, must be readily available. Know where they are located and how to operate them. Smoking is prohibited in areas where benzene is used or stored. Ask your supervisor where benzene is used in your area and for additional plant safety rules.

APPENDIX B – SUBSTANCE TECHNICAL GUIDELINES, BENZENE

I. PHYSICAL AND CHEMICAL DATA

A. Substance identification.

1. **Synonyms:** Benzol, benzole, coal naphtha, cyclohexatriene, phene, phenyl hydride, pyrobenzol. (Benzin, petroleum benzin and Benzine do not contain benzene).
2. **Formula:** C₆H₆ (CAS Registry Number: 71-43-2)

B. Physical data.

1. **Boiling Point (760 mm Hg):** 80.1° C (176° F)
2. **Specific Gravity (water = 1):** 0.879
3. **Vapor Density (air = 1):** 2.7
4. **Melting Point:** 5.5° C (42° F)
5. **Vapor Pressure at 20° C (68° F):** 75 mm Hg
6. **Solubility in Water:** .06%
7. **Evaporation Rate (ether = 1):** 2.8
8. **Appearance and Odor:** Clear, colorless liquid with a distinctive sweet odor.

II. FIRE, EXPLOSION, AND REACTIVITY HAZARD DATA

A. Fire.

1. **Flash Point (closed cup):** -11° C (12° F)
2. **Autoignition Temperature:** 580° C (1076° F)
3. **Flammable limits in Air, % by Volume:** Lower: 1.3%, Upper: 7.5%
4. **Extinguishing Media:** Carbon dioxide, dry chemical, or foam.
5. **Special Fire-Fighting procedures:** Do not use solid stream of water, since stream will scatter and spread fire. Fine water spray can be used to keep fire-exposed containers cool.
6. **Unusual fire and explosion hazards:** Benzene is a flammable liquid. Its vapors can form explosive mixtures. All ignition sources must be controlled when benzene is used, handled, or stored. Where liquid or vapor may be released, such areas shall be considered as hazardous locations. Benzene vapors are heavier than air; thus the vapors may travel along the ground and be ignited by open flames or sparks at locations remote from the site at which benzene is handled.
7. Benzene is classified as a 1 B flammable liquid for the purpose of conforming to the requirements of 29 CFR 1910.106. A concentration exceeding 3,250 ppm is considered a potential fire explosion hazard. Locations where benzene may be present in quantities sufficient to produce explosive or ignitable mixtures are considered Class I Group D for the purposes of conforming to the requirements of 29 CFR 1910.309.

B. Reactivity.

1. **Conditions contributing to instability:** Heat.
2. **Incompatibility:** Heat and oxidizing materials.
3. **Hazardous decomposition products:** Toxic gases and vapors (such as carbon monoxide).

III. SPILL AND LEAK PROCEDURES

A. Steps to be taken if the material is released or spilled. As much benzene as possible should be absorbed with suitable materials, such as dry sand or earth. That remaining must be flushed with large amounts of water. Do not flush benzene into a confined space, such as a sewer, because of explosion danger. all ignition sources. Ventilate enclosed places.

B. Waste disposal method. Disposal methods must conform to other jurisdictional regulations. If allowed, benzene may be disposed of:

- (a) By absorbing it in dry sand or earth and disposing in a sanitary landfill;
- (b) if small quantities, by removing it to a safe location from buildings or other combustible sources, pouring it in dry sand or earth and cautiously igniting it; and
- (c) if large quantities, by atomizing it in a suitable combustion chamber.

IV. MISCELLANEOUS PRECAUTIONS

A. High exposure to benzene can occur when transferring the liquid from one container to another. Such operations should be well ventilated and good work practices must be established to avoid spills.

B. Use non-sparking tools to open benzene containers which are effectively grounded and bonded prior to opening and pouring.

C. Employers must advise employees of all plant areas and operations where exposure to benzene could occur. Common operations in which high exposures to benzene may be encountered are: the primary production and utilization of benzene, and transfer of benzene.

APPENDIX C – MEDICAL SURVEILLANCE GUIDELINES FOR BENZENE

(This Material Should Be Made Available to Your Monitoring Physician)

I. ROUTE OF ENTRY: Inhalation; skin absorption.

II. TOXICOLOGY: Benzene is primarily an inhalation hazard. Systemic absorption may cause depression of the hematopoietic system, pancytopenia, aplastic anemia, and leukemia. Inhalation of high concentrations can affect central nervous system function. Aspiration of small amounts of liquid benzene immediately causes pulmonary edema and hemorrhage of pulmonary tissue. There is some absorption through the skin. Absorption may be more rapid in the case of abraded skin, and benzene may be more readily absorbed if it is present in a mixture or as a contaminant in solvents which are readily absorbed. The defatting action of benzene may produce primary irritation due to repeated or prolonged contact with the skin. High concentration are irritating to the eyes and the mucous membranes of the nose, and respiratory tract.

III. SIGNS AND SYMPTOMS: Direct skin contact with benzene may cause erythema. Repeated or prolonged contact may result in drying, scaling dermatitis, or development of secondary skin infections. In addition, there is benzene absorption through the skin. Local effects of benzene vapor or liquid on the eye are slight. Only at very high concentrations is there any smarting sensation in the eye.

Inhalation of high concentrations of benzene may have an initial stimulatory effect on the central nervous system characterized by exhilaration, nervous excitation, and/or giddiness, followed by a period of depression, rowsiness, or fatigue. A sensation of tightness in the chest accompanied by breathlessness may occur and ultimately the victim may lose consciousness. Tremors, convulsions and death may follow from respiratory paralysis or circulatory collapse in a few minutes to several hours following severe exposures. The detrimental effect on the blood-forming system of prolonged exposure to small quantities of benzene vapor is of extreme importance. The hematopoietic system is the chief target for benzene's toxic effects which are manifested by alterations in the levels of formed elements in the peripheral blood. These effects have occurred at concentrations of benzene which may not cause irritation of mucous membranes, or any unpleasant sensory effects. Early signs and symptoms of benzene morbidity are varied, often not readily noticed and non-specific. Subjective complaints of headache, dizziness, and loss of appetite may precede or follow clinical signs. Rapid pulse and low blood pressure, in addition to a physical appearance of anemia, may accompany a subjective complaint of shortness of breath and excessive tiredness. Bleeding from the nose, gums, or mucous membranes, and the development of purpuric spots (small bruises) may occur as the condition progresses. Clinical evidence of leukopenia, anemia, and thrombocytopenia, singly or in combination, has been frequently reported among the first signs. Bone marrow may appear normal, aplastic, or hyperplastic, and may not, in all situations, correlate with peripheral blood forming tissues. Because of variations in the susceptibility to benzene morbidity, there is no "typical" blood picture. The onset of effects of prolonged benzene exposure may be delayed for many months or years after the actual exposure has ceased and identification or correlation with benzene exposure must be sought out in the occupational history.

IV. TREATMENT OF ACUTE TOXIC EFFECTS: Remove from exposure immediately. Make sure you are adequately protected and do not risk being overcome by fumes. Give oxygen or artificial resuscitation if indicated. Flush eyes, wash skin if contaminated and remove all contaminated clothing. Symptoms of intoxication may persist following severe exposures. Recovery from mild exposures is usually rapid and complete.

V. SURVEILLANCE AND PREVENTIVE CONSIDERATIONS

A. General: The principal effects of benzene exposure which form the basis for this regulation are pathological changes in the hematopoietic system, reflected by changes in the peripheral blood and manifesting clinically as pancytopenia, aplastic anemia, and leukemia. Consequently, the medical surveillance program is designed to observe, on a regular basis, blood indices for early signs of these effects, and although early signs of leukemia are not usually available, emerging diagnostic technology and innovative regimes make consistent surveillance for leukemia, as well as other hematopoietic effects, essential. Initial examinations are to be provided within 60 days of the effective date of this standard, or at the time of initial assignment, and periodic examinations annually thereafter. There are special provisions for medical tests in the event of hematologic abnormalities or for emergency situations. The blood values which require referral to a hematologist or internist are noted in the standard in paragraph (i)(5). The standard specifies that blood abnormalities that persist must be referred "unless the physician has good reason to believe such referral is unnecessary" (paragraph (i)(5)). Examples of conditions that could make a referral unnecessary despite abnormal blood limits are iron or folate deficiency, menorrhagia, or blood loss due to some unrelated medical abnormality. Symptoms and signs of benzene toxicity can be non-specific. Only a detailed history and appropriate investigative procedures will enable a physician to rule out or confirm conditions that place the employee at increased risk.

To assist the examining physician with regard to which laboratory tests are necessary and when to refer an employee to the specialist, OSHA has established the following guidelines.

B. Hematology Guidelines: A minimum battery of tests is to be performed by strictly standardized methods.

1. Red cell, white cell, platelet counts, white blood cell differential, hematacrit and red cell indices must be performed by an accredited laboratory. The normal ranges for the red cell and white cell counts are influenced by altitude, race, and sex, and therefore should be determined by the accredited laboratory in the specific area where the tests are performed.

Either a decline from an absolute normal or an individual's base line to a subnormal value or a rise to a supranormal value, are indicative of potential toxicity, particularly if all blood parameters decline. The normal total white blood count is approximately 7,200/mm³ plus or minus 3,000. For cigarette smokers the white count may be higher and the upper range may be 2,000 cells higher than normal for the laboratory. In addition, infection, allergies and some drugs may raise the white cell count. The normal platelet count is approximately 250,000 with a range of 140,000 to 400,000. Counts outside this range should be regarded as possible evidence of benzene toxicity. Certain abnormalities found through routine screening are of greater significance in the benzene-exposed worker and require prompt consultation with a specialist, namely:

a. Thrombocytopenia.

b. A trend of decreasing white cell, red cell, or platelet indices in an individual over time is more worrisome than an isolated abnormal finding at one test time. The importance of trend highlights the need to compare an individual's test results to baseline and/or previous periodic tests.

c. A constellation or pattern of abnormalities in the different blood indices is of more significance than a single abnormality. A low white count not associated with any abnormalities in other cell indices may be a normal statistical variation, whereas if the low white count is accompanied by decreases in the platelet and/or red cell indices, such a pattern is more likely to be associated with benzene toxicity and merits thorough investigation.

Anemia, leukopenia, macrocytosis or an abnormal differential white blood cell count should alert the physician to further investigate and/or refer the patient if repeat tests confirm the abnormalities. If routine screening detects an abnormality, follow-up tests which may be helpful in establishing the etiology of the abnormality are the peripheral blood smear and the reticulocyte count.

The extreme range of normal for reticulocytes is 0.4 to 2.5 percent of the red cells, the usual range being 0.5 to 1.2 percent of the red cells, but the typical value is in the range of 0.8 to 1.0 percent. A decline in reticulocytes to levels of less than 0.4 percent is to be regarded as possible evidence (unless another specific cause is found) of benzene toxicity requiring accelerated surveillance. An increase in reticulocyte levels to above 2.5 percent may also be consistent with (but is not as characteristic of) benzene toxicity.

2. An important diagnostic test is a careful examination of the peripheral blood smear. As with the reticulocyte count the smear should be with fresh uncoagulated blood obtained from a needle tip following venipuncture or from a drop of earlobe blood (capillary blood). If necessary, the smear may, under certain limited conditions, be made from a blood sample anticoagulated with EDTA (but never with oxalate or heparin). When the smear is to be prepared from a specimen of venous blood which has been collected by a commercial Vacutainer® type tube containing neutral EDTA, the smear should be made as soon as possible after the venesection. A delay of up to 12 hours is permissible between the drawing of the blood specimen into EDTA and the preparation of the smear if the blood is stored at refrigerator (not freezing) temperature.

3. The minimum mandatory observations to be made from the smear are:

a. The differential white blood cell count.

b. Description of abnormalities in the appearance of red cells.

c. Description of any abnormalities in the platelets.

d. A careful search must be made throughout of every blood smear for immature white cells such as band forms (in more than normal proportion, i.e., over 10 percent of the total differential count), any number of metamyelocytes, myelocytes or myeloblasts. Any nucleate or multinucleated red blood cells should be reported. Large "giant" platelets or fragments of megakaryocytes must be recognized.

An increase in the proportion of band forms among the neutrophilic granulocytes is an abnormality deserving special mention, for it may represent a change which should be considered as an early warning of benzene toxicity in the absence of other causative factors (most commonly infection). Likewise, the appearance of metamyelocytes, in the absence of another probable cause, is to be considered a possible indication of benzene-induced toxicity.

An upward trend in the number of basophils, which normally do not exceed about 2.0 percent of the total white cells, is to be regarded as possible evidence of benzene toxicity. A rise in the eosinophil count is less specific but also may be suspicious of toxicity if it rises above 6.0 percent of the total white count.

The normal range of monocytes is from 2.0 to 8.0 percent of the total white count with an average of about 5.0 percent. About 20 percent of individuals reported to have mild but persisting abnormalities caused by exposure to benzene show a persistent monocytosis. The findings of a monocyte count which persists at more than 10 to 12 percent of the normal white cell count (when the total count is normal) or persistence of an absolute monocyte count in excess of 800/mm³ should be regarded as a possible sign of benzene-induced toxicity.

A less frequent but more serious indication of benzene toxicity is the finding in the peripheral blood of the so-called "pseudo" (or acquired) Pelger-Huet anomaly. In this anomaly many, or sometimes the majority, of the neutrophilic granulocytes possess two round nuclear segments – less often one or three round segments – rather than three normally elongated segments. When this anomaly is not hereditary, it is often but not invariably predictive of subsequent leukemia. However, only about two percent of patients who ultimately develop acute myelogenous leukemia show the acquired Pelger-Huet anomaly.

Other tests that can be administered to investigate blood abnormalities are discussed below; however, such procedures should be undertaken by the hematologist.

An uncommon sign, which cannot be detected from the smear, but can be elicited by a "sucrose water test" of peripheral blood, is transient paroxysmal nocturnal hemoglobinuria (PNH), which may first occur insidiously during a period of established aplastic anemia, and may be followed within one to a few years by the appearance of rapidly fatal acute myelogenous leukemia. Clinical detection of PNH, which occurs in only one or two percent of those destined to have acute myelogenous leukemia, may be difficult; if the "sucrose water test" is positive, the somewhat more definitive Ham test, also known as the acid-serum hemolysis test, may provide confirmation.

e. Individuals documented to have developed acute myelogenous leukemia years after initial exposure to benzene may have progressed through a preliminary phase of hematologic abnormality. In some instances pancytopenia (i.e., a lowering in the counts of all circulating blood cells of bone marrow origin, but not to the extent implied by the term "aplastic anemia") preceded leukemia for many years. Depression of a single blood cell type or platelets may represent a harbinger of aplasia or leukemia. The finding of two or more cytopenias, or pancytopenia in a benzene-exposed individual, must be regarded as highly suspicious of more advanced although still reversible, toxicity. "Pancytopenia" coupled with the appearance of immature cells (myelocytes, myeloblasts, erythroblasts, etc.), with abnormal cells (pseudo Pelger-Huet anomaly, atypical nuclear heterochromatin, etc.), or unexplained elevations of white blood cells must be regarded as evidence of benzene overexposure unless proved otherwise. Many severely aplastic patients manifested the ominous finding of 5-10 percent myeloblasts in the marrow, occasional myeloblasts and myelocytes in the blood and 20-30% monocytes. It is evident that isolated cytopenias, pancytopenias, and even aplastic anemias induced by benzene may be reversible and complete recovery has been reported on cessation of exposure. However, since any of these abnormalities is serious, the employee must immediately be removed from any possible exposure to benzene vapor.

Certain tests may substantiate the employee's prospects for progression or regression. One such test would be an examination of the bone marrow, but the decision to perform a bone marrow aspiration or needle biopsy is made by the hematologist.

The findings of basophilic stippling in circulating red blood cells (usually found in 1 to 5% of red cells following marrow injury), and detection in the bone marrow of what are termed "ringed sideroblasts" must be taken seriously, as they have been noted in recent years to be premonitory signs of subsequent leukemia.

Recently peroxidase-staining of circulating or marrow neutrophil granulocytes, employing benzidine dihydrochloride, have revealed the disappearance of, or diminution in, peroxidase in a sizable proportion of the granulocytes, and this has been reported as an early sign of leukemia. However, relatively few patients have been studied to date. Granulocyte granules are normally strongly peroxidase positive. A steady decline in leukocyte alkaline phosphatase has also been reported as suggestive of early acute leukemia. Exposure to benzene may cause an early rise in serum iron, often but not always associated with a fall in the reticulocyte count. Thus, serial measurements of serum iron levels may provide a means of determining whether or not there is a trend representing sustained suppression of erythropoiesis.

Measurement of serum iron, determination of peroxidase and of alkaline phosphatase activity in peripheral granulocytes can be performed in most pathology laboratories. Peroxidase and alkaline phosphatase staining are usually undertaken when the index of suspicion for leukemia is high.

APPENDIX D – SAMPLING AND ANALYTICAL METHODS FOR BENZENE

MONITORING AND MEASUREMENT PROCEDURES

Measurements taken for the purpose of determining employee exposure to benzene are best taken so that the representative average 8-hour exposure may be determined from a single 8-hour sample or two (2) 4-hour samples. Short-time interval samples (or grab samples) may also be used to determine average exposure level if a minimum of five measurements are taken in a random manner over the 8-hour work shift. Random sampling means that any portion of the work shift has the same chance of being sampled as any other. The arithmetic average of all such random samples taken on one work shift is an estimate of an employee's average level of exposure for that work shift. Air samples should be taken in the employee's breathing zone (air that would most nearly represent that inhaled by the employee). Sampling and analysis must be performed with procedures meeting the requirements of the standard.

There are a number of methods available for monitoring employee exposures to benzene. The sampling and analysis may be performed by collection of the benzene vapor on charcoal adsorption tubes, with subsequent chemical analysis by gas chromatography. Sampling and analysis may also be performed by portable direct reading instruments, real-time continuous monitoring systems, passive dosimeters or other suitable methods.

The employer has the obligation of selecting a monitoring method which meets the accuracy and precision requirements of the standard under his unique field conditions. The standard requires that the method of monitoring must have an accuracy, to a 95 percent confidence level, of not less than plus or minus 25 percent for concentrations of benzene greater than or equal to 0.5 ppm.

The OSHA Laboratory modified NIOSH Method S311 and evaluated it at a benzene air concentration of 1 ppm. A procedure for determining the benzene concentration in bulk material samples was also evaluated. This work, reported in OSHA Laboratory Method No. 12, includes the following two analytical procedures:

I. OSHA METHOD 12 FOR AIR SAMPLES

Analyte: Benzene

Matrix: Air

Procedure: Adsorption on charcoal, desorption with carbon disulfide, analysis by GC.

Detection limit: 0.04 ppm

Recommended air volume and sampling rate: 10L at 0.2 L/min.

1. Principle of the Method.

- 1.1 A known volume of air is drawn through a charcoal tube to trap the organic vapors present.
- 1.2 The charcoal in the tube is transferred to a small, stoppered vial, and the analyte is desorbed with carbon disulfide.
- 1.3 An aliquot of the desorbed sample is injected into a gas chromatograph.
- 1.4 The area of the resulting peak is determined and compared with areas obtained from standards.

2. Advantages and disadvantages of the method.

- 2.1 The sampling device is small, portable, and involved no liquids. Interferences are minimal, and most of those which do occur can be eliminated by altering chromatographic conditions. The samples are analyzed by means of a quick, instrumental method.
- 2.2 The amount of sample which can be taken is limited by the number of milligrams that the tube will hold before overloading. When the sample value obtained for the backup section of the charcoal tube exceeds 25 percent of that found on the front section, the possibility of sample loss exists.

3. Apparatus.

- 3.1 A calibrated personal sampling pump whose flow can be determined within ± 5 percent at the recommended flow rate.
- 3.2 **Charcoal tubes:** Glass with both ends flame sealed, 7 cm long with a 6-mm O.D. and a 4-mm I.D., containing 2 sections of 20/40 mesh activated charcoal separated by a 2-mm portion of urethane foam. The activated charcoal is prepared from coconut shells and is fired at 600° C prior to packing. The adsorbing section contains 100 mg of charcoal, the back-up section 50 mg. A 3-mm portion of urethane foam is placed between the outlet end of the tube and the back-up section. A plug of silanized glass wool is placed in front of the adsorbing section. The pressure drop across the tube must be less than one inch of mercury at a flow rate of 1 liter per minute.
- 3.3 Gas chromatograph equipped with a flame ionization detector.
- 3.4 Column (10-ft x 1/8-in stainless steel) packed with 80/100 Supelcoport coated with 20 percent SP 2100, 0.1 percent CW 1500.

- 3.5 An electronic integrator or some other suitable method for measuring peak area.
- 3.6 Two-milliliter sample vials with Teflon-lined caps.
- 3.7 **Microliter syringes:** 10-microliter (10- μ L syringe, and other convenient sizes for making standards. 1- μ L syringe for sample injections.
- 3.8 **Pipets:** 1.0 mL delivery pipets
- 3.9 **Volumetric flasks:** convenient sizes for making standard solutions.

4. Reagents.

- 4.1 **Chromatographic quality carbon disulfide (CS₂).** Most commercially available carbon disulfide contains a trace of benzene which must be removed. It can be removed with the following procedure: Heat under reflux for 2 to 3 hours, 500 mL of carbon disulfide, 10 mL concentrated sulfuric acid, and 5 drops of concentrated nitric acid. The benzene is converted to nitrobenzene. The carbon disulfide layer is removed, dried with anhydrous sodium sulfate, and distilled. The recovered carbon disulfide should be benzene free. (It has recently been determined that benzene can also be removed by passing the carbon disulfide through 13x molecular sieve).
- 4.2 Benzene, reagent grade.
- 4.3 p-Cymene, reagent grade, (internal standard).
- 4.4 **Desorbing reagent.** The desorbing reagent is prepared by adding 0.05 mL of p-cymene per milliliter of carbon disulfide. (The internal standard offers a convenient means correcting analytical response for slight inconsistencies in the size of sample injections. If the external standard technique is preferred, the internal standard can be eliminated).
- 4.5 Purified GC grade helium, hydrogen and air.

5. Procedure.

- 5.1 **Cleaning of equipment.** All glassware used for the laboratory analysis should be properly cleaned and free of organics which could interfere in the analysis.
- 5.2 **Calibration of personal pumps.** Each pump must be calibrated with a representative charcoal tube in the line.
- 5.3 Collection and shipping of samples.
 - 5.3.1 Immediately before sampling, break the ends of the tube to provide an opening at least one-half the internal diameter of the tube (2 mm).
 - 5.3.2 The smaller section of the charcoal is used as the backup and should be placed nearest the sampling pump.
 - 5.3.3 The charcoal tube should be placed in a vertical position during sampling to minimize channeling through the charcoal.
 - 5.3.4 Air being sampled should not be passed through any hose or tubing before entering the charcoal tube.
 - 5.3.5 A sample size of 10 liters is recommended. Sample at a flow rate of approximately 0.2 liters per minute. The flow rate should be known with an accuracy of at least ± 5 percent.
 - 5.3.6 The charcoal tubes should be capped with the supplied plastic caps immediately after sampling.
 - 5.3.7 Submit at least one blank tube (a charcoal tube subjected to the same handling procedures, without having any air drawn through it with each set of samples).
 - 5.3.8 Take necessary shipping and packing precautions to minimize breakage of samples.
- 5.4 **Analysis of samples.**
 - 5.4.1 **Preparation of samples.** In preparation for analysis, each charcoal tube is scored with a file in front of the first section of charcoal and broken open. The glass wool is removed and discarded. The charcoal in the first (larger) section is transferred to a 2-mL vial. The separating section of foam is removed and discarded; the second section is transferred to another capped vial. These two sections are analyzed separately.
 - 5.4.2 **Desorption of samples.** Prior to analysis, 1.0 mL of desorbing solution is pipetted into each sample container. The desorbing solution consists of 0.05 μ L internal standard per mL of carbon disulfide. The sample vials are capped as soon as the solvent is added. Desorption should be done for 30 minutes with occasional shaking.
 - 5.4.3 **GC conditions.** Typical operating conditions for the gas chromatograph are:
 - 1. 30 mL/min (60 psig) helium carrier gas flow.
 - 2. 30 mL/min (40 psig) hydrogen gas flow to detector.
 - 3. 240 mL/min (40 psig) air flow to detector.
 - 4. 150° C injector temperature.

5. 250° C detector temperature.

6. 100° C column temperature.

5.4.4 Injection size. 1 µL.

5.4.5 **Measurement of area.** The peak areas are measured by an electronic integrator or some other suitable form of area measurement.

5.4.6 An internal standard procedure is used. The integrator is calibrated to report results in ppm for a 10 liter air sample after correction for desorption efficiency.

5.5 Determination of desorption efficiency.

5.5.1 **Importance of determination.** The desorption efficiency of a particular compound can vary from one laboratory to another and from one lot of chemical to another. Thus, it is necessary to determine, at least once, the percentage of the specific compound that is removed in the desorption process, provided the same batch of charcoal is used.

5.5.2 **Procedure for determining desorption efficiency.** The reference portion of the charcoal tube is removed. To the remaining portion, amounts representing 0.5X, 1X, and 2X and (X represents target concentration) based on a 10 L air sample are injected into several tubes at each level. Dilutions of benzene with carbon disulfide are made to allow injection of measurable quantities. These tubes are then allowed to equilibrate at least overnight. Following equilibration they are analyzed following the same procedure as the samples. Desorption efficiency is determined by dividing the amount of benzene found by amount spiked on the tube.

6. **Calibration and standards.** A series of standards varying in concentration over the range of interest is prepared and analyzed under the same GC conditions that will be used on the samples. A calibration curve is prepared by plotting concentration (µg/mL) versus peak area.

7. **Calculations.** Benzene air concentration can be calculated from the following equation:

$$\text{mg/m}^3 = (A)(B)/(C)(D)$$

Where:

A = µg/mL benzene, obtained from the calibration curve

B = desorption volume (1 mL)

C = Liters of air sampled

D = desorption efficiency

The concentration in mg/m³ can be converted to ppm (at 25° and 760 mm) with following equation:

$$\text{ppm} = (\text{mg/m}^3)(24.46)/(78.11)$$

Where: 24.46 = molar volume of an ideal gas

25° C and 760 mm

78.11 = molecular weight of benzene

8. Backup Data

8.1 **Detection limit – Air Samples.** The detection limit for the analytical procedure is 1.28 ng with a coefficient of variation of 0.023 at this level. This would be equivalent to an air concentration of 0.04 ppm for a 10 L air sample. This amount provided a chromatographic peak that could be identifiable in the presence of possible interferences. The detection limit data were obtained by making 1 µL injections of a 1.283 µg/mL standard.

Injection	Area Count	
1	655.4	X = 640.2 SD = 14.9 CV = 0.023
2	617.5	
3	662.0	
4	641.1	
5	636.4	
6	629.2	

8.2 **Pooled coefficient of variation – Air Samples.** The pooled coefficient of variation for the analytical procedure was determined by 1 µL replicate injections of analytical standards. The standards were 16.04, 32.08, and 64.16 µg/mL, which are equivalent to 0.5, 1.0, and 2.0 ppm for a 10 L air sample respectively.

Injection	Area Counts		
	0.5 ppm	1.0 ppm	2.0 ppm
1	3996.5	8130.2	16481
2	4059.4	8235.6	16493
3	4052.0	8307.9	16535
4	4027.2	8263.2	16609
5	4046.8	8291.1	16552
6	4137.9	8288.8	16618
X=	4053.3	8254.0	16548.3
SD=	47.2	62.5	57.1
CV=	0.0116	0.0076	0.0034
CV=	0.008		

8.3 Storage data – Air Samples. Samples were generated at 1.03 ppm benzene at 80% relative humidity, 22° C, and 643 mm. All samples were taken for 50 minutes at 0.2 L/min. Six samples were analyzed immediately and the rest of the samples were divided into two groups by fifteen samples each. One group was stored at refrigerated temperature of -25° C, and the other group was stored at ambient temperature (approximately 23° C). These samples were analyzed over a period of fifteen days. The results are tabulated below.

Percent Recovery						
Day Analyzed		Refrigerated		Ambient		
0	97.4	98.7	98.9	97.4	98.7	98.9
0	97.1	100.6	100.9	97.1	100.6	100.9
2	95.8	96.4	95.4	95.4	96.6	96.9
5	93.9	93.7	92.4	92.4	94.3	94.1
9	93.6	95.5	94.6	95.2	95.6	96.6
13	94.3	95.3	93.7	91.0	95.0	94.6
15	96.8	95.8	94.2	92.9	96.3	95.9

8.4 Desorption data. Samples were prepared by injecting liquid benzene onto the A section of charcoal tubes. Samples were prepared that would be equivalent to 0.5, 1.0, and 2.0 ppm for a 10 L air sample.

Percent Recovery			
1	99.4	98.8	99.5
2	99.5	98.7	99.7
3	99.2	98.6	99.8
4	99.4	99.1	100.0
5	99.2	99.0	99.7
6	99.8	99.1	99.9
X =	99.4	98.9	99.8
SC =	0.22	0.21	0.18
CV =	0.0022	0.0021	0.0018
X =	99.4		

8.5 Carbon disulfide.

Carbon disulfide from a number of sources was analyzed for benzene contamination. The results are given in the following table. The benzene contaminant can be removed with the procedures given in section 4.1.

Sample	µg Benzene/mL	ppm equivalent (for 10 L air sample)
Aldrich Lot 83017	4.20	0.13
Baker Lot 720364	1.01	0.03
Baker Lot 822351	1.01	0.03
Malinkrodt Lot WEMP	1.74	0.05
Malinkrodt Lot WDSJ	5.65	0.18
Malinkrodt Lot WHGA	2.90	0.09
Treated CS ₂	—	—

II. OSHA LABORATORY METHOD NO. 12 FOR BULK SAMPLES

Analyte: Benzene

Matrix: Bulk Samples

Procedure: Bulk samples are analyzed directly by high performance liquid chromatography (HPLC).

Detection limit: 0.01% by volume.

1. Principle of the method.

- 1.1 An aliquot of the bulk sample to be analyzed is injected into a liquid chromatograph.
- 1.2 The peak area for benzene is determined and compared to areas obtained from standards.

2. Advantages and disadvantages of the method.

- 2.1 The analytical procedure is quick, sensitive, and reproducible.
- 2.2 Reanalysis of samples is possible.
- 2.3 Interferences can be circumvented by proper selection of HPLC parameters.
- 2.4 Samples must be free of any particulates that may clog the capillary tubing in the liquid chromatograph. This may require distilling the sample or clarifying with a clarification kit.

3. Apparatus.

- 3.1 Liquid chromatograph equipped with a UV detector.
- 3.2 HPLC Column that will separate benzene from other components in the bulk sample being analyzed. The column used for validation studies was a Waters uBondapack C18, 30 cm x 3.9 mm.
- 3.3 A clarification kit to remove any particulates in the bulk if necessary.
- 3.4 A micro-distillation apparatus to distill any samples if necessary.
- 3.5 An electronic integrator or some other suitable method of measuring peak areas.
- 3.6 Microliter syringes - 10 µL syringe and other convenient sizes for making standards. 10 µL syringe for sample injections.
- 3.7 Volumetric flasks, 5 mL and other convenient sizes for preparing standards and making dilutions.

4. Reagents.

- 4.1 Benzene, reagent grade.
- 4.2 HPLC grade water, methyl alcohol, and isopropyl alcohol.

5. Collection and shipment of samples.

- 5.1 Samples should be transported in glass containers with Teflon-lined caps.
- 5.2 Samples should not be put in the same container used for air samples.

6. Analysis of samples.

6.1 Sample preparation. If necessary, the samples are distilled or clarified. Samples are analyzed undiluted. If the benzene concentration is out of the working range, suitable dilutions are made with isopropyl alcohol.

6.2 HPLC conditions. The typical operating conditions for the high performance liquid chromatograph are:

1. Mobile phase - Methyl alcohol/water, 50/50
2. Analytical wavelength - 254 nm
3. Injection size - 10 µL

6.3 Measurement of peak area and calibration. Peak areas are measured by an integrator or other suitable means. The integrator is calibrated to report results in % benzene by volume.

7. Calculations.

Since the integrator is programmed to report results in % benzene by volume in an undiluted sample, the following equation is used:

$$\% \text{ Benzene by Volume} = A \times B$$

Where:

- A = % by volume on report
B = Dilution Factor
(B = 1 for undiluted sample)

8. Backup Data.

8.1 Detection limit – Bulk Samples.

The detection limit for the analytical procedure for bulk samples is 0.88 µg, with a coefficient of variation of 0.019 at this level. This amount provided a chromatographic peak that could be identifiable in the presence of possible interferences.

The detection limit data were obtained by making 10 µL injections of a 0.10% by volume standard.

Inspection	Area Count	
1	45396	X = 44040.1 SD = 852.5 CV = 0.019
2	44214	
3	43822	
4	44062	
6	42724	

8.2 Pooled coefficient of variation – Bulk Samples.

The pooled coefficient of variation for analytical procedure was determined by 50 µL replicate injections of analytical standards. The standards were 0.01, 0.02, 0.04, 0.10, 1.0, and 2.0% benzene by volume.

OSHA CFR 1910.28 (b)

Definitions.

"Action level" means an airborne concentration of benzene of 0.5 ppm calculated as an 8-hour time-weighted average.

"Assistant Secretary" means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

"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 (I) of this section, or any other person authorized by the Act or regulations issued under the Act.

"Benzene" (C₆H₆) (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.

"Director" means the Director of the National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

"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.

"Vapor control system" means any equipment used for containing the total vapors displaced during the loading of gasoline, motor fuel or other fuel tank trucks and the displacing of these vapors through a vapor processing system or balancing the vapor with the storage tank. This equipment also includes systems containing the vapors displaced from the storage tank during the unloading of the tank truck which balance the vapors back to the tank truck.

Notes:

Handwriting practice lines consisting of 20 sets of three horizontal lines (top, middle, and bottom) for letter formation.

Chapter 8

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Toxic and Hazardous Materials

Bloodborne Pathogens

Cain's Pipeline & Industrial Services, LLC. is committed to the safety and health of our employees and prohibiting the spread of Bloodborne Pathogens. Therefore, the following Bloodborne Pathogens Safety Programs has been adopted. In the event an employee is exposed to Bloodborne Pathogens, all measures within this program shall be provided to eliminate the spread of disease.

This policy for the prevention of hazardous employee exposure to Bloodborne Pathogens is adopted in accordance with the following OSHA regulations:

§1910.1030 – Bloodborne Pathogens

§1910.1028 – Hazard Communication Standards for Employers.

Cain's Pipeline & Industrial Services, LLC. has implemented this plan to ensure that no employee is exposed to hazardous Bloodborne Pathogens in the workplace. ***Brent Messina*** is the Company administrator who has the overall supervisory responsibility for the effectiveness of this program and for maintaining medical and training records.

Cain's Pipeline & Industrial Services, LLC. will ensure that a copy of the Exposure Control Plan is kept at the Company office, and in the workplace, available to employees at all times in accordance with 29 CFR §1910.1020(e).

- Upon initial hiring, all employees will be trained in exposure awareness and prevention techniques for bloodborne pathogens. Employees will receive refresher training annually, or if observed to commit unsafe acts regarding potentially infectious material, or when changing job conditions or assignments warrants it. Training records will include date of training, training content, attendance records including job title, and will be kept on file at the office for a minimum of 3 years.
- ***Cain's Pipeline & Industrial Services, LLC.*** will establish and maintain an accurate record for each employee with occupational exposure, in accordance with §1910.1020. Training records will include the dates and contents of training, and the names and job titles of persons attending. Training records will be maintained for 3 years from the date of training and medical records will be maintained for at least the duration of employment plus 30 years.
- ***Cain's Pipeline & Industrial Services, LLC.*** will ensure that all records required by this section will be made available upon request of employees, Assistant Secretary, and the Director for examination and copying. Medical records will have the written consent of the employee before being released. ***Cain's Pipeline & Industrial Services, LLC.*** will comply with the requirements involving transfer of records set forth in §1910.1020 (h). ***Cain's Pipeline & Industrial Services, LLC.*** will make available the Hepatitis B vaccine to all employees that have occupational exposure at no cost to the employee(s).

Exposure Control Plan

- Employees with occupational exposure for the construction industry is limited to job duties that require workers to administer first aid and/or CPR when necessary. Employees trained in first aid and CPR and designated as First Aid Responders are considered at risk of occupational exposure due to the nature of these duties (e.g., assisting bleeding victims, resuscitation). Occupational exposure is defined as reasonably anticipated contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.
- The exposure determination will be made without regard to the use of personal protective equipment. All employees who, as a result of performing their job duties, must engage in activities where exposure to blood or other potentially infectious materials is reasonably anticipated are considered to have occupational exposure to bloodborne pathogen. Employees will take necessary precautions to avoid direct contact with body fluids.
- Personal Protective equipment will be available at all times to prevent exposure to infectious material for employees required to handle potentially hazardous material, perform first aid procedures, or to perform routine duties which may bring an employee into contact with potentially infectious material.
- Employees in job classifications in which they may possibly have occupational exposure to bloodborne pathogens, or material possibly containing bloodborne pathogens, will be given the opportunity to participate in the hepatitis B vaccine program.
- Universal precautions will be observed. Under circumstances in which differentiation between body fluids is difficult or impossible, all body fluids will be considered potentially infectious. The term "universal precautions" refers to a method of bloodborne disease control that requires all human blood and other potentially infectious materials to be treated as if known to be infectious HIV, HBV or other bloodborne pathogens.
- If provision of handwashing facilities is not feasible, *Cain's Pipeline & Industrial Services, LLC.* will provide either an appropriate antiseptic hand cleanser in conjunction with cloth/paper towels or antiseptic towelettes. All employees are allowed access to proper restroom and sanitary facilities. Hand washing and disinfecting supplies are always available to employees either at restroom facilities or upon request.
- Blood-soaked bandages or other potentially infectious materials from the accident site will be put in properly marked, leak-proof bags for handling.
- Proper disposal containers for potentially infectious material are available as needed. Any such containers will be properly marked for biohazards and disposed of properly.
- All equipment or environmental surfaces will be cleaned and decontaminated after contact with blood or other infectious materials.
- Any injury to personnel must be reported immediately to a supervisor, and unauthorized personnel will be restricted from the area where the injury occurred until it is determined that no threat of infection is present, or until properly trained personnel can dispose of any infectious material.



Regulation Label to be Used

- Any exposed sharp edges or devices which may cause laceration or puncture on machines, tools, or equipment will be eliminated or protected to prevent injury to personnel. All machine guards will be inspected daily to ensure that they are in place and secure to prevent injury to personnel and the spread of bloodborne pathogens.
- Engineering and work practice controls will be used to eliminate or minimize employee exposure. Company assigned first aid responders will be trained in universal precautions and proper PPE use when giving first aid. Engineering controls will be examined and maintained or replaced on a regular schedule to ensure their effectiveness.
- PPE, such as gloves and gowns, is provided to our employees at no cost to them when the possibility of occupational exposure is present. Appropriate PPE in the proper sizes will be readily accessible. PPE will be cleaned laundered, and properly disposed. PPE will be repaired or replaced as needed to maintain its effectiveness. PPE will be used unless, under rare circumstances, the employee(s) temporarily declined to use PPE.

Training in the use of the appropriate PPE for specific tasks or procedures is provided by *Cain's Pipeline & Industrial Services, LLC.* PPE may be obtained by contacting *Brent Messina*, who is responsible for ensuring that PPE is available.

All employees using PPE must observe the following precautions:

- Wash hands as soon as feasible after removing gloves or other PPE.
- Remove PPE after it becomes contaminated and before leaving the work area.
- Contaminated PPE must be properly handled or disposed of in properly marked, leak-proof bags. When PPE is to be decontaminated, proper handling precautions and procedures will be observed during this process.
- Wear appropriate gloves when it is reasonably anticipated that there may be hand contact with blood or OPIM, and when handling or touching contaminated items or surfaces; replace gloves if torn, punctured or contaminated, or if their ability to function as a barrier is compromised.
- Wear appropriate face and eye protection when splashes, sprays, spatters, or droplets of blood or OPIM pose a hazard to the eye, nose, or mouth.
- Remove immediately or as soon as feasible any garment contaminated by blood or OPIM, in such a way as to avoid contact with the outer surface.

Cain's Pipeline & Industrial Services, LLC. will ensure that a copy of this Exposure Control Plan is accessible to employees in accordance with §1910.1020 (e).

§1910.1030 Bloodborne Pathogens

(a) Scope and Application.

This section applies to all occupational exposure to blood or other potentially infectious materials (OPIM) as defined by paragraph (b) of this section.

(b) Definitions. *See definitions at the end of this section (not included here)*

(c) Exposure Control.

(1) Exposure Control Plan.

(i) Each employer having an employee(s) with occupational exposure as defined by paragraph (b) of this section shall establish a written Exposure Control Plan designed to eliminate or minimize employee exposure.

(ii) The Exposure Control Plan shall contain at least the following elements:

(A) The exposure determination required by paragraph (c)(2),

(B) The schedule and method of implementation for paragraphs (d) Methods of Compliance, (e) HIV and HBV Research Laboratories and Production Facilities, (f) Hepatitis B Vaccination and Post-Exposure Evaluation and Follow-up, (g) Communication of Hazards to Employees, and (h) Recordkeeping, of this standard, and

(C) The procedure for the evaluation of circumstances surrounding exposure incidents as required by paragraph (f)(3)(i) of this standard.

(iii) Each employer shall ensure that a copy of the Exposure Control Plan is accessible to employees in accordance with 29 CFR 1910.1020(e).

(iv) The Exposure Control Plan shall be reviewed and updated at least annually and whenever necessary to reflect new or modified tasks and procedures which affect occupational exposure and to reflect new or revised employee positions with occupational exposure. The review and update of such plans shall also:

(A) Reflect changes in technology that eliminate or reduce exposure to bloodborne pathogens; and

(B) Document annually consideration and implementation of appropriate commercially available and effective safer medical devices designed to eliminate or minimize exposure.

(v) An employer, who is required to establish an Exposure Control Plan shall solicit input from non-managerial employees responsible for the direct patient care who are potentially exposed to injuries from contaminated sharps in the identification, evaluation, and selection of effective engineering and work practice controls and shall document the solicitation in the Exposure Control Plan.

(vi) The Exposure Control Plan shall be made available to the Assistant Secretary and the Director upon request for examination and copying.

(2) Exposure Determination.

(i) Each employer who has an employee(s) with occupational exposure as defined by paragraph (b) of this section shall prepare an exposure determination. This exposure determination shall contain the following:

(A) A list of all job classifications in which all employees in those job classifications have occupational exposure;

(B) A list of job classifications in which some employees have occupational exposure, and

(C) A list of all tasks and procedures or groups of closely related task and procedures in which occupational exposure occurs and that are performed by employees in job classifications listed in accordance with the provisions of paragraph (c)(2)(i)(B) of standard.

(ii) This exposure determination shall be made without regard to the use of personal protective equipment.

(d) Methods of Compliance.

(1) General. Universal precautions shall be observed to prevent contact with blood or other potentially infectious materials. Under circumstances in which differentiation between body fluid types is difficult or impossible, all body fluids shall be considered potentially infectious materials.

(2) Engineering and Work Practice Controls.

(i) Engineering and work practice controls shall be used to eliminate or minimize employee exposure. Where occupational exposure remains after institution of these controls, personal protective equipment shall also be used.

(ii) Engineering controls shall be examined and maintained or replaced on a regular schedule to ensure their effectiveness.

(iii) Employers shall provide hand washing facilities which are readily accessible to employees.

(iv) When provision of hand washing facilities is not feasible, the employer shall provide either an appropriate antiseptic hand cleanser in conjunction with clean cloth/paper towels or antiseptic towelettes. When antiseptic hand cleansers or towelettes are used, hands shall be washed with soap and running water as soon as feasible.

(v) Employers shall ensure that employees wash their hands immediately or as soon as feasible after removal of gloves or other personal protective equipment.

(vi) Employers shall ensure that employees wash hands and any other skin with soap and water, or flush mucous membranes with water immediately or as soon as feasible following contact of such body areas with blood or other potentially infectious materials.

(vii) Contaminated needles and other contaminated sharps shall not be bent, recapped, or removed except as noted in paragraphs (d)(2)(vii)(A) and (d)(2)(vii)(B) below. Shearing or breaking of contaminated needles is prohibited.

(A) Contaminated needles and other contaminated sharps shall not be bent, recapped or removed unless the employer can demonstrate that no alternative is feasible or that such action is required by a specific medical or dental procedure.

(B) Such bending, recapping or needle removal must be accomplished through the use of a mechanical device or a one-handed technique.

(viii) Immediately or as soon as possible after use, contaminated reusable sharps shall be placed in appropriate containers until properly reprocessed. These containers shall be:

(A) puncture resistant;

(B) labeled or color-coded in accordance with this standard;

(C) leakproof on the sides and bottom; and

(D) in accordance with the requirements set forth in paragraph (d)(4)(ii)(E) for reusable sharps.

(ix) Eating, drinking, smoking, applying cosmetics or lip balm, and handling contact lenses are prohibited in work areas where there is a reasonable likelihood of occupational exposure.

(x) Food and drink shall not be kept in refrigerators, freezers, shelves, cabinets or on countertops or benchtops where blood or other potentially infectious materials are present.

(xi) All procedures involving blood or other potentially infectious materials shall be performed in such a manner as to minimize splashing, spraying, spattering, and generation of droplets of these substances.

(xii) Mouth pipetting/suctioning of blood or other potentially infectious materials is prohibited.

(xiii) Specimens of blood or other potentially infectious materials shall be placed in a container which prevents leakage during collection, handling, processing, storage, transport, or shipping.

(A) The container for storage, transport, or shipping shall be labeled or color-coded according to paragraph (g)(1)(i) and closed prior to being stored, transported, or shipped. When a facility utilizes Universal Precautions in the handling of all specimens, the labeling/ color-coding of specimens is not necessary provided containers are recognizable as containing specimens. This exemption only applies while such specimens/containers remain within the facility. Labeling or color-coding in accordance with paragraph (g)(1)(i) is required when such specimens/ containers leave the facility.

(B) If outside contamination of the primary container occurs, the primary container shall be placed within a second container which prevents leakage during handling, processing, storage, transport, or shipping and is labeled or color-coded according to the requirements of this standard.

(C) If the specimen could puncture the primary container, the primary container shall be placed within a secondary container which is puncture resistant in addition to the above characteristics.

(xiv) Equipment which may become contaminated with blood or other potentially infectious materials shall be examined prior to servicing or shipping and shall be decontaminated as necessary, unless the employer can demonstrate that decontamination of such equipment or portions of such equipment is not feasible.

(A) A readily observable label in accordance with paragraph (g)(1)(i)(H) shall be attached to the equipment stating which portions remain contaminated.

(B) The employer shall ensure that this information is conveyed to all affected employees, the servicing representative, and/or the manufacturer, as appropriate, prior to handling, servicing, or shipping so that appropriate precautions will be taken.

(3) Personal Protective Equipment.

(i) **Provision.** When there is occupational exposure, the employer shall provide, at no cost to the employee, appropriate personal protective equipment such as, but not limited to, gloves, gowns, laboratory coats, face shields or masks and eye protection, and mouthpieces, resuscitation bags, pocket masks, or other ventilation devices. Personal protective equipment will be considered “appropriate” only if it does not permit blood or other potentially infectious materials to pass through to or reach the employee’s work clothes, street clothes, undergarments, skin, eyes, mouth, or other mucous membranes under normal conditions of use and for the duration of time which the protective equipment will be used.

(ii) **Use.** The employer shall ensure that the employee uses appropriate personal protective equipment unless the employer shows that the employee temporarily and briefly declined to use personal protective equipment when, under rare and extraordinary circumstances, it was the employee’s professional judgment that in the specific instance its use would have prevented the delivery of health care or public safety services or would have posed an increased hazard to the safety of the worker or co-worker. When the employee makes this judgment, the circumstances shall be investigated and documented in order to determine whether changes can be instituted to prevent such occurrences in the future.

(iii) **Accessibility.** The employer shall ensure that appropriate personal protective equipment in the appropriate sizes is readily accessible at the worksite or is issued to employees. Hypoallergenic gloves, glove liners, powderless gloves, or other similar alternatives shall be readily accessible to those employees who are allergic to the gloves normally provided.

(iv) **Cleaning, Laundering, and Disposal.** The employer shall clean, launder, and dispose of personal protective equipment required by paragraphs (d) and (e) of this standard, at no cost to the employee.

(v) **Repair and Replacement.** The employer shall repair or replace personal protective equipment as needed to maintain its effectiveness, at no cost to the employee.

(vi) If a garment(s) is penetrated by blood or other potentially infectious materials, the garment(s) shall be removed immediately or as soon as feasible.

(vii) All personal protective equipment shall be removed prior to leaving the work area.

(viii) When personal protective equipment is removed it shall be placed in an appropriately designated area or container for storage, washing, decontamination or disposal.

(ix) **Gloves.** Gloves shall be worn when it can be reasonably anticipated that the employee may have hand contact with blood, other potentially infectious materials, mucous membranes, and non-intact skin; when performing vascular access procedures except as specified in paragraph (d)(3)(ix)(D); and when handling or touching contaminated items or surfaces.

(A) Disposable (single use) gloves such as surgical or examination gloves, shall be replaced as soon as practical when contaminated or as soon as feasible if they are torn, punctured, or when their ability to function as a barrier is compromised.

(B) Disposable (single use) gloves shall not be washed or decontaminated for re-use.

(C) Utility gloves may be decontaminated for re-use if the integrity of the glove is not compromised. However, they must be discarded if they are cracked, peeling, torn, punctured, or exhibit other signs of deterioration or when their ability to function as a barrier is compromised.

(D) If an employer in a volunteer blood donation center judges that routine gloving for all phlebotomies is not necessary then the employer shall:

(1) Periodically reevaluate this policy;

(2) Make gloves available to all employees who wish to use them for phlebotomy;

(3) Not discourage the use of gloves for phlebotomy; and

(4) Require that gloves be used for phlebotomy in the following circumstances:

- (i) When the employee has cuts, scratches, or other breaks in his or her skin;
- (ii) When the employee judges that hand contamination with blood may occur, for example, when performing phlebotomy on an uncooperative source individual; and
- (iii) When the employee is receiving training in phlebotomy.

(x) Masks, Eye Protection, and Face Shields. Masks in combination with eye protection devices, such as goggles or glasses with solid side shields, or chin-length face shields, shall be worn whenever splashes, spray, spatter, or droplets of blood or other potentially infectious materials may be generated and eye, nose, or mouth contamination can be reasonably anticipated.

(xi) Gowns, Aprons, and Other Protective Body Clothing. Appropriate protective clothing such as, but not limited to, gowns, aprons, lab coats, clinic jackets, or similar outer garments shall be worn in occupational exposure situations. The type and characteristics will depend upon the task and degree of exposure anticipated.

(xii) Surgical caps or hoods and/or shoe covers or boots shall be worn in instances when gross contamination can reasonably be anticipated (e.g., autopsies, orthopedic surgery).

(4) Housekeeping.

(i) General. Employers shall ensure that the worksite is maintained in a clean and sanitary condition. The employer shall determine and implement an appropriate written schedule for cleaning and method of decontamination based upon the location within the facility, type of surface to be cleaned, type of soil present, and tasks or procedures being performed in the area.

(ii) All equipment and environmental and working surfaces shall be cleaned and decontaminated after contact with blood or other potentially infectious materials.

(A) Contaminated work surfaces shall be decontaminated with an appropriate disinfectant after completion of procedures; immediately or as soon as feasible when surfaces are overtly contaminated or after any spill of blood or other potentially infectious materials; and at the end of the work shift if the surface may have become contaminated since the last cleaning.

(B) Protective coverings, such as plastic wrap, aluminum foil, or imperviously-backed absorbent paper used to cover equipment and environmental surfaces, shall be removed and replaced as soon as feasible when they become overtly contaminated or at the end of the workshift if they may have become contaminated during the shift.

(C) All bins, pails, cans, and similar receptacles intended for reuse which have a reasonable likelihood for becoming contaminated with blood or other potentially infectious materials shall be inspected and decontaminated on a regularly scheduled basis and cleaned and decontaminated immediately or as soon as feasible upon visible contamination.

(D) Broken glassware which may be contaminated shall not be picked up directly with the hands. It shall be cleaned up using mechanical means, such as a brush and dust pan, tongs, or forceps.

(E) Reusable sharps that are contaminated with blood or other potentially infectious materials shall not be stored or processed in a manner that requires employees to reach by hand into the containers where these sharps have been placed.

(iii) Regulated Waste.

(A) Contaminated Sharps Discarding and Containment.

(1) Contaminated sharps shall be discarded immediately or as soon as feasible in containers that are:

- (i) Closable;
- (ii) Puncture resistant;
- (iii) Leak proof on sides and bottom; and
- (iv) Labeled or color-coded in accordance with paragraph (g)(1)(i) of this standard.

(2) During use, containers for contaminated sharps shall be:

- (i) Easily accessible to personnel and located as close as is feasible to the immediate area where sharps are used or can be reasonably anticipated to be found (e.g., laundries);
- (ii) Maintained upright throughout use; and
- (iii) Replaced routinely and not be allowed to overfill.

(3) When moving containers of contaminated sharps from the area of use, the containers shall be:

- (i) Closed immediately prior to removal or replacement to prevent spillage or protrusion of contents during handling, storage, transport, or shipping;**
- (ii) Placed in a secondary container if leakage is possible. The second container shall be:**

(A) Closable;

(B) Constructed to contain all contents and prevent leakage during handling, storage, transport, or shipping; and

(C) Labeled or color-coded according to paragraph (g)(1)(i) of this standard.

(4) Reusable containers shall not be opened, emptied, or cleaned manually or in any other manner which would expose employees to the risk of percutaneous injury.

(B) Other Regulated Waste Containment.

(1) Regulated waste shall be placed in containers which are:

(i) Closable;

(ii) Constructed to contain all contents and prevent leakage of fluids during handling, storage, transport or shipping;

(iii) Labeled or color-coded in accordance with paragraph (g)(1)(i) this standard; and

(iv) Closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping.

(2) If outside contamination of the regulated waste container occurs, it shall be placed in a second container. The second container shall be:

(i) Closable;

(ii) Constructed to contain all contents and prevent leakage of fluids during handling, storage, transport or shipping;

(iii) Labeled or color-coded in accordance with paragraph (g)(1)(i) of this standard; and

(iv) Closed prior to removal to prevent spillage or protrusion of contents during handling, storage, transport, or shipping.

(C) Disposal of all regulated waste shall be in accordance with applicable regulations of the United States, States and Territories, and political subdivisions of States and Territories.

(iv) Laundry.

(A) Contaminated laundry shall be handled as little as possible with a minimum of agitation.

(1) Contaminated laundry shall be bagged or containerized at the location where it was used and shall not be sorted or rinsed in the location of use.

(2) Contaminated laundry shall be placed and transported in bags or containers labeled or color-coded in accordance with paragraph (g)(1)(i) of this standard. When a facility utilizes Universal Precautions in the handling of all soiled laundry, alternative labeling or color-coding is sufficient if it permits all employees to recognize the containers as requiring compliance with Universal Precautions.

(3) Whenever contaminated laundry is wet and presents a reasonable likelihood of soak-through or leakage from the bag or container, the laundry shall be placed and transported in bags or containers which prevent soak-through and/or leakage of fluids to the exterior.

(B) The employer shall ensure that employees who have contact with contaminated laundry wear protective gloves and other appropriate personal protective equipment.

(C) When a facility ships contaminated laundry off-site to a second facility which does not utilize Universal Precautions in the handling of all laundry, the facility generating the contaminated laundry must place such laundry in bags or containers which are labeled or color-coded in accordance with paragraph (g)(1)(i).

(f) Hepatitis B Vaccination and Post-exposure Evaluation and Follow-up.

(1) General.

(i) The employer shall make available the hepatitis B vaccine and vaccination series to all employees who have occupational exposure, and post-exposure evaluation and follow-up to all employees who have had an exposure incident.

(ii) The employer shall ensure that all medical evaluations and procedures including the hepatitis B vaccine and vaccination series and post-exposure evaluation and follow-up, including prophylaxis, are:

(A) Made available at no cost to the employee;

(B) Made available to the employee at a reasonable time and place;

(C) Performed by or under the supervision of a licensed physician or by or under the supervision of another licensed healthcare professional; and

(D) Provided according to recommendations of the U.S. Public Health Service current at the time these evaluations and procedures take place, except as specified by this paragraph (f).

(iii) The employer shall ensure that all laboratory tests are conducted by an accredited laboratory at no cost to the employee.

(2) Hepatitis B Vaccination.

(i) Hepatitis B vaccination shall be made available after the employee has received the training required in paragraph (g)(2)(vii)(I) and within 10 working days of initial assignment to all employees who have occupational exposure unless the employee has previously received the complete hepatitis B vaccination series, antibody testing has revealed that the employee is immune, or the vaccine is contraindicated for medical reasons.

(ii) The employer shall not make participation in a prescreening program a prerequisite for receiving hepatitis B vaccination.

(iii) If the employee initially declines hepatitis B vaccination but at a later date while still covered under the standard decides to accept the vaccination, the employer shall make available hepatitis B vaccination at that time.

(iv) The employer shall assure that employees who decline to accept hepatitis B vaccination offered by the employer sign the statement in Appendix A.

(v) If a routine booster dose(s) of hepatitis B vaccine is recommended by the U.S. Public Health Service at a future date, such booster dose(s) shall be made available in accordance with section (f)(1)(ii).

(g) Communication of Hazards to Employees.

(1) Labels and Signs.

(i) Labels.

(A) Warning labels shall be affixed to containers of regulated waste, refrigerators and freezers containing blood or other potentially infectious material; and other containers used to store, transport or ship blood or other potentially infectious materials, except as provided in paragraph (g)(1)(i)(E), (F) and (G).

(B) Labels required by this section shall include the following legend:

(C) These labels shall be fluorescent orange or orange-red or predominantly so, with lettering and symbols in a contrasting color.

(D) Labels shall be affixed as close as feasible to the container by string, wire, adhesive, or other method that prevents their loss or unintentional removal.

(E) Red bags or red containers may be substituted for labels.

(F) Containers of blood, blood components, or blood products that are labeled as to their contents and have been released for transfusion or other clinical use are exempted from the labeling requirements of paragraph (g).

(G) Individual containers of blood or other potentially infectious materials that are placed in a labeled container during storage, transport, shipment or disposal are exempted from the labeling requirement.

(H) Labels required for contaminated equipment shall be in accordance with this paragraph and shall also state which portions of the equipment remain contaminated.

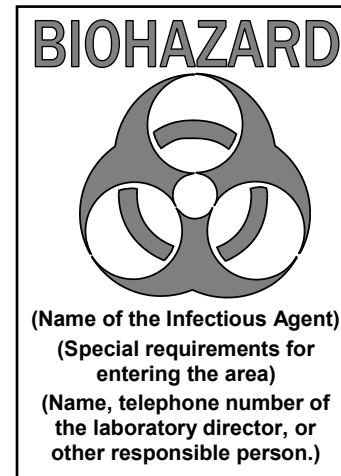


(I) Regulated waste that has been decontaminated need not be labeled or color-coded.

(ii) Signs.

(A) The employer shall post signs at the entrance to work areas specified in paragraph (e), HIV and HBV Research Laboratory and Production Facilities, which shall bear the following legend:

(B) These signs shall be fluorescent orange-red or predominantly so, with lettering and symbols in a contrasting color.



(2) Information and Training.

(i) Employers shall ensure that all employees with occupational exposure participate in a training program which must be provided at no cost to the employee and during working hours.

(ii) Training shall be provided as follows:

(A) At the time of initial assignment to tasks where occupational exposure may take place;

(B) Within 90 days after the effective date of the standard; and

(C) At least annually thereafter.

(h) Recordkeeping.

(1) Medical Records.

(i) The employer shall establish and maintain an accurate record for each employee with occupational exposure, in accordance with 29 CFR 1910.1020.

(ii) This record shall include:

(A) The name and social security number of the employee;

(B) A copy of the employee's hepatitis B vaccination status including the dates of all the hepatitis B vaccinations and any medical records relative to the employee's ability to receive vaccination as required by paragraph (f)(2);

(C) A copy of all results of examinations, medical testing, and follow-up procedures as required by paragraph (f)(3);

(D) The employer's copy of the health-care professional's written opinion as required by paragraph (f)(5); and

(E) A copy of the information provided to the healthcare professional as required by paragraphs (f)(4)(ii)(B), (C) and (D).

(iii) **Confidentiality.** The employer shall ensure that employee medical records required by paragraph (h)(1) are:

(A) Kept confidential; and

(B) Not disclosed or reported without the employee's express written consent to any person within or outside the workplace except as required by this section or as may be required by law.

(iv) The employer shall maintain the records required by paragraph (h) for at least the duration of employment plus 30 years in accordance with 29 CFR 1910.1020.

(2) Training Records.

(i) Training records shall include the following information:

(A) The dates of the training sessions;

(B) The contents or a summary of the training sessions;

(C) The names and qualifications of persons conducting the training; and

(D) The names and job titles of all persons attending the training sessions.

(ii) Training records shall be maintained for 3 years from the date on which the training occurred.

(3) Availability.

(i) The employer shall ensure that all records required to be maintained by this section shall be made available upon request to the Assistant Secretary and the Director for examination and copying.

(ii) Employee training records required by this paragraph shall be provided upon request for examination and copying to employees, to employee representatives, to the Director, and to the Assistant Secretary.

(iii) Employee medical records required by this paragraph shall be provided upon request for examination and copying to the subject employee, to anyone having written consent of the subject employee, to the Director, and to the Assistant Secretary in accordance with 29 CFR 1910.1020.

(4) Transfer of Records.

(i) The employer shall comply with the requirements involving transfer of records set forth in 29 CFR 1910.1020(h).

(ii) If the employer ceases to do business and there is no successor employer to receive and retain the records for the prescribed period, the employer shall notify the Director, at least three months prior to their disposal and transmit them to the Director, if required by the Director to do so, within that three month period.

(5) Sharps Injury Log.

(i) The employer shall establish and maintain a sharps injury log for the recording of percutaneous injuries from contaminated sharps. The information in the sharps injury log shall be recorded and maintained in such manner as to protect the confidentiality of the injured employee. The sharps injury log shall contain, at a minimum:

(A) The type and brand of device involved in the incident,

(B) The department or work area where the exposure incident occurred, and

(C) An explanation of how the incident occurred.

(ii) The requirement to establish and maintain a sharps injury log shall apply to any employer who is required to maintain a log of occupational injuries and illnesses under 29 CFR 1904.

(iii) The sharps injury log shall be maintained for the period required by 29 CFR 1904.6.

HEPATITIS B VACCINE DECLINATION (MANDATORY)

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

Employee Name

Employee's Occupation/Assigned Work Station

Employee Signature

Date

Chapter 9

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Toxic and Hazardous Materials

Cadmium

Cain's Pipeline & Industrial Services, LLC. has adopted this policy for the prevention of employee exposure to hazardous levels of Cadmium in accordance with the following OSHA regulations:

§1910.1027 – Cadmium

Cain's Pipeline & Industrial Services, LLC. has implemented this written compliance program to ensure that no employee is exposed to Cadmium in excess of the "Action Level" of 2.5 micrograms per cubic meter of air calculated as an 8-hour time weighted average. This policy is available to all employees upon request. ***Brent Messina*** is the supervisor responsible for ensuring the following engineering controls and work practices are enforced:

Cain's Pipeline & Industrial Services, LLC. will provide employees with information and training at the time of their initial assignment to a work area who are potentially exposed to Cadmium. If exposures are above the action level, employees will be provided with information and training at least annually thereafter. This training program assures employee participation and maintains a record of contents.

- Brent Messina will certify that the necessary employee training has been conducted by preparing a record that includes:
 - Identity of employee trained.
 - The signature and title of the person who conducted the training.
 - The date of the training. Records will be kept a minimum of 1 year.
- Employees shall be informed of all regulated areas and will be properly trained in entrance procedures, safety requirements, emergency procedures and practices while in regulated areas.
- Employees will follow procedures for the use of appropriate respirators and personal protective equipment in the event of emergency situations involving substantial releases of airborne cadmium. Employees not essential to correcting the emergency situation shall be restricted from the area and normal operations halted in that area until the emergency is abated.
- The Respiratory Protection Program, in compliance with OSHA §1910.134, and respiratory protective equipment is provided at no cost to all employees with potential for exposure to Cadmium. (See Respiratory Section)
- Adequate ventilation will be ensured in all enclosed work areas.
- Employees engaged in maintenance of ventilation systems, including filter changes, are required to use proper PPE for the task. Established procedures will be followed to minimize employee exposure to cadmium when performing maintenance of ventilation systems and changing of filters.

- Regular monitoring of air quality in work areas will be provided to ensure that the PEL of 5 micrograms per cubic meter for an 8 hour TWA are not being exceeded. Records of all monitoring tests will be available at the main office.
- In the event that PEL of Cadmium are exceeded within any facility where employees are contracted to work, all work will be stopped and employees evacuated until the facility's management can ensure that airborne Cadmium levels are brought down to an acceptable level for safe work.
- The facility management of any facility where *Cain's Pipeline & Industrial Services, LLC.* contracts to work must provide a list of all operations in the facility where cadmium is emitted.
- The medical surveillance program is provided to ensure employees are not exposed to hazardous levels of cadmium in accordance with §1910.1027(l)(1)(i)(A)(B). All employees with potential exposure to Cadmium are required to complete the medical history questionnaire in appendix D.
- The medical surveillance program for employees who potentially may be exposed to Cadmium at or above the action level or PEL will be provided under the supervision of a licensed physician at no cost to the employee.
- Employees must wear proper personal protective equipment (PPE) at all times while in work areas where cadmium is present. This PPE will include proper eye/face protection in accordance with §1910.133 where appropriate.
- All appropriate signs and labels will be posted in areas of potential exposure to Cadmium.
- All containers or materials containing Cadmium will be appropriately labeled to indicate the contents and the hazards of the contents.
- A description of each operation in which cadmium is emitted will be maintained to include:
 - Machinery used
 - Material processed
 - Controls in place
 - Crew size
 - Employee job responsibilities
 - Operating procedures
 - Maintenance practices
- Specific means that will be employed to achieve compliance include:
 - Engineering plans and studies used to determine methods selected for controlling exposure to cadmium.
 - The use, where necessary, of appropriate respiratory protection to achieve PEL.
- MSDS for Cadmium and all hazardous materials at *Cain's Pipeline & Industrial Services, LLC.* are available to employees at the company office.
- This Program will be provided for examination and copying upon request of affected employees, their representatives, and OSHA.
- The written program will be reviewed and updated annually or more often to reflect significant changes in workplace conditions.

§1910.1027 CADMIUM.

(a) Scope. This standard applies to all occupational exposures to cadmium and cadmium compounds, in all forms, and in all industries covered by the Occupational Safety and Health Act, except the construction-related industries, which are covered under 29 CFR 1926.63.

(b) See Definitions at the end of this section

(c) Permissible Exposure Limit (PEL). The employer shall assure that no employee is exposed to an airborne concentration of cadmium in excess of five micrograms per cubic meter of air (5 µg/m³), calculated as an eight-hour time-weighted average exposure (TWA).

(d) Exposure monitoring.

(1) General.

(i) Each employer who has a workplace or work operation covered by this section shall determine if any employee may be exposed to cadmium at or above the action level.

(ii) Determinations of employee exposure shall be made from breathing zone air samples that reflect the monitored employee's regular, daily 8-hour TWA exposure to cadmium.

(iii) Eight-hour TWA exposures shall be determined for each employee on the basis of one or more personal breathing zone air samples reflecting full shift exposure on each shift, for each job classification, in each work area. Where several employees perform the same job tasks, in the same job classification, on the same shift, in the same work area, and the length, duration, and level of cadmium exposures are similar, an employer may sample a representative fraction of the employees instead of all employees in order to meet this requirement. In representative sampling, the employer shall sample the employee(s) expected to have the highest cadmium exposures.

(2) Specific.

(i) Initial monitoring. Except as provided for in paragraphs (d)(2)(ii) and (d)(2)(iii) of this section, the employer shall monitor employee exposures and shall base initial determinations on the monitoring results.

(ii) Where the employer has monitored after September 14, 1991, under conditions that in all important aspects closely resemble those currently prevailing and where that monitoring satisfies all other requirements of this

section, including the accuracy and confidence levels of paragraph (d)(6) of this section, the employer may rely on such earlier monitoring results to satisfy the requirements of paragraph (d)(2)(i) of this section.

(iii) Where the employer has objective data, as defined in paragraph (n)(2) of this section, demonstrating that employee exposure to cadmium will not exceed the action level under the expected conditions of processing, use, or handling, the employer may rely upon such data instead of implementing initial monitoring.

(3) Monitoring Frequency (periodic monitoring).

(i) If the initial monitoring or periodic monitoring reveals employee exposures to be at or above the action level, the employer shall monitor at a frequency and pattern needed to represent the levels of exposure of employees and where exposures are above the PEL to assure the adequacy of respiratory selection and the effectiveness of engineering and work practice controls. However, such exposure monitoring shall be performed at least every six months. The employer, at a minimum, shall continue these semi-annual measurements unless and until the conditions set out in paragraph (d)(3)(ii) of this section are met.

(ii) If the initial monitoring or the periodic monitoring indicates that employee exposures are below the action level and that result is confirmed by the results of another monitoring taken at least seven days later, the employer may discontinue the monitoring for those employees whose exposures are represented by such monitoring.

(4) Additional Monitoring. The employer also shall institute the exposure monitoring required under paragraphs (d)(2)(i) and (d)(3) of this section whenever there has been a change in the raw materials, equipment, personnel, work practices, or finished products that may result in additional employees being exposed to cadmium at or above the action level or in employees already exposed to cadmium at or above the action level being exposed above the PEL, or whenever the employer has any reason to suspect that any other change might result in such further exposure.

(5) Employee Notification of Monitoring Results.

(i) Within 15 working days after the receipt of the results of any monitoring performed under this section, the employer shall notify each affected employee individually in writing of the results. In addition, within the same time period the employer shall post the results of the exposure monitoring in an appropriate location that is accessible to all affected employees.

(ii) Wherever monitoring results indicate that employee exposure exceeds the PEL, the employer shall include in the written notice a statement that the PEL has been exceeded and a description of the corrective action being taken by the employer to reduce employee exposure to or below the PEL.

(6) Accuracy of measurement. The employer shall use a method of monitoring and analysis that has an accuracy of not less than plus or minus 25 percent ($\pm 25\%$), with a confidence level of 95 percent, for airborne concentrations of cadmium at or above the action level, the permissible exposure limit (PEL), and the separate engineering control air limit (SECAL).

(e) Regulated areas.

(1) Establishment. The employer shall establish a regulated area wherever an employee's exposure to airborne concentrations of cadmium is, or can reasonably be expected to be in excess of the permissible exposure limit (PEL).

(2) Demarcation. Regulated areas shall be demarcated from the rest of the workplace in any manner that adequately establishes and alerts employees of the boundaries of the regulated area.

(3) Access. Access to regulated areas shall be limited to authorized persons.

(4) Provision of respirators. Each person entering a regulated area shall be supplied with and required to use a respirator, selected in accordance with paragraph (g)(2) of this section.

(5) Prohibited activities. The employer shall assure that employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas, carry the products associated with these activities into regulated areas, or store such products in those areas.

(f) Methods of compliance.

(1) Compliance hierarchy.

(i) Except as specified in paragraphs (f)(1)(ii), (iii) and (iv) of this section the employer shall implement engineering and work practice controls to reduce and maintain employee exposure to cadmium at or below the PEL, except to the extent that the employer can demonstrate that such controls are not feasible.

(ii) Except as specified in paragraphs (f)(1)(iii) and (iv) of this section, in industries where a separate engineering control air limit (SECAL) has been specified for particular processes (See Table 1 in this paragraph (f)(1)(ii)), the employer shall implement engineering and work practice controls to reduce and maintain employee exposure at or below the SECAL, except to the extent that the employer can demonstrate that such controls are not feasible.

**TABLE I—SEPARATE ENGINEERING CONTROL AIRBORNE LIMITS (SECALs)
FOR PROCESSES IN SELECTED INDUSTRIES**

Industry	Process	SECAL ($\mu\text{g}/\text{m}^3$)
Nickel cadmium battery	Plate making, plate preparation	50
	All other processes	15
Zinc/Cadmium refining*	Cadmium refining, casting, melting, oxide production, sinter plant	50
Pigment manufacture	Calcine, crushing, milling, blending	50
	All other processes	15
Stabilizers*	Cadmium oxide charging, crushing, drying, blending	50
Lead smelting*	Sinter plant, blast furnace, baghouse, yard area	50
Plating*	Mechanical plating	15

**Processes in these industries that are not specified in this table must achieve the PEL using engineering controls and work practices as required in f(1)(i).*

(iii) The requirement to implement engineering and work practice controls to achieve the PEL or, where applicable, the SECAL does not apply where the employer demonstrates the following:

(A) The employee is only intermittently exposed; and

(B) The employee is not exposed above the PEL on 30 or more days per year (12 consecutive months).

(iv) Wherever engineering and work practice controls are required and are not sufficient to reduce employee exposure to or below the PEL or, where applicable, the SECAL, the employer nonetheless shall implement such controls to reduce exposures to the lowest levels achievable. The employer shall supplement such controls with respiratory protection that complies with the requirements of paragraph (g) of this section and the PEL.

(v) The employer shall not use employee rotation as a method of compliance.

(2) Compliance program.

(i) Where the PEL is exceeded, the employer shall establish and implement a written compliance program to reduce employee exposure to or below the PEL by means of engineering and work practice controls, as required by paragraph (f)(1) of this section. To the extent that engineering and work practice controls cannot reduce exposures to or below the PEL, the employer shall include in the written compliance program the use of appropriate respiratory protection to achieve compliance with the PEL.

(ii) Written compliance programs shall include at least the following:

(A) A description of each operation in which cadmium is emitted; e.g., machinery used, material processed, controls in place, crew size, employee job responsibilities, operating procedures, and maintenance practices;

(B) A description of the specific means that will be employed to achieve compliance, including engineering plans and studies used to determine methods selected for controlling exposure to cadmium, as well as, where necessary, the use of appropriate respiratory protection to achieve the PEL;

(C) A report of the technology considered in meeting the PEL;

(D) Air monitoring data that document the sources of cadmium emissions;

(E) A detailed schedule for implementation of the program, including documentation such as copies of purchase orders for equipment, construction contracts, etc.;

(F) A work practice program that includes items required under paragraphs (h), (i), and (j) of this section;

(G) A written plan for emergency situations, as specified in paragraph (h) of this section; and

(H) Other relevant information.

(iii) The written compliance programs shall be reviewed and updated at least annually, or more often if necessary, to reflect significant changes in the employer's compliance status.

(iv) Written compliance programs shall be provided upon request for examination and copying to affected employees, designated employee representatives as well as to the Assistant Secretary, and the Director.

(3) Mechanical ventilation.

(i) When ventilation is used to control exposure, measurements that demonstrate the effectiveness of the system in controlling exposure, such as capture velocity, duct velocity, or static pressure shall be made as necessary to maintain its effectiveness.

(ii) Measurements of the system's effectiveness in controlling exposure shall be made as necessary within five working days of any change in production, process, or control that might result in a significant increase in employee exposure to cadmium.

(iii) Recirculation of air. If air from exhaust ventilation is recirculated into the workplace, the system shall have a high efficiency filter and be monitored to assure effectiveness.

(iv) Procedures shall be developed and implemented to minimize employee exposure to cadmium when maintenance of ventilation systems and changing of filters is being conducted.

(g) Respiratory protection.

(1) **General.** For employees who use respirators required by this section, the employer must provide respirators that comply with the requirements of this paragraph. Respirators must be used during:

(i) Periods necessary to install or implement feasible engineering and work practice controls when employee exposure levels exceed the PEL. (ii) Maintenance and repair activities, and brief or intermittent operations, for which employee exposures exceed the PEL and engineering and work-practice controls are not feasible or are not required.

(iii) Activities in regulated areas specified in paragraph (e) of this section.

(iv) Work operations for which the employer has implemented all feasible engineering and work-practice controls and such controls are not sufficient to reduce employee exposures to or below the PEL.

(v) Work operations for which an employee is exposed to cadmium at or above the action level, and the employee requests a respirator.

(vi) Work operations for which an employee is exposed to cadmium above the PEL and engineering controls are not required by paragraph (f)(1)(ii) of this section.

(vii) Emergencies.

(2) Respirator program.

(i) The employer must implement a respiratory protection program in accordance with 29 CFR 1910.134(b) through (d) (except (d)(1)(iii)), and (f) through (m).

(ii) No employees must use a respirator if, based on their most recent medical examination, the examining physician determines that they will be unable to continue to function normally while using a respirator. If the physician determines that the employee must be limited in, or removed from, their current job because of their inability to use a respirator, the limitation or removal must be in accordance with paragraphs (l)(11) and (12) of this section.

(iii) If an employee has breathing difficulty during fit testing or respirator use, the employer must provide the employee with a medical examination in accordance with paragraph (l)(6)(ii) of this section to determine if the employee can use a respirator while performing the required duties.

(3) Respirator selection.

(i) The employer must select the appropriate respirator from Table 2 of this section.

(ii) The employer must provide an employee with a powered air-purifying respirator instead of a negative-pressure respirator when an employee who is entitled to a respirator chooses to use this type of respirator and such a respirator provides adequate protection to the employee.

TABLE 2—RESPIRATORY PROTECTION FOR CADMIUM

Airborne concentration or condition of use ^a	Required respirator type ^b
10 X or less	A half mask, air-purifying equipped with a HEPA ^c filter ^d
25 X or less	A powered air-purifying respirator ("PAPR") with a loose-fitting hood or helmet equipped with a HEPA filter, or a supplied-air respirator with a loose-fitting hood or helmet facepiece operated in the continuous flow mode.
50 X or less	A full facepiece air-purifying respirator equipped with a HEPA filter, or a powered air-purifying respirator with a tight-fitting half mask equipped with a HEPA filter, or a supplied-air respirator with a tight-fitting half mask operated in the continuous flow mode.
250 X or less	A powered air-purifying respirator with a tight fitting full facepiece equipped with a HEPA filter, or a supplied-air respirator with a tight-fitting full facepiece operated in the continuous flow mode.
1000 X or less	A supplied air respirator with half mask or full facepiece operated in the pressure demand or other positive pressure mode.
1000 X or unknown concentrations	A self-contained breathing apparatus with a full facepiece operated in the pressure demand or other positive pressure mode, or a supplied-air respirator with a full facepiece operated in the pressure demand or other positive pressure mode and equipped with an auxiliary escape type self-contained breathing apparatus operated in the pressure demand mode.
Fire fighting	A self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

^a Concentrations expressed as multiple of the PEL.

^b Respirators assigned for higher environmental concentrations may be used at lower exposure levels. Quantitative fit testing is required for all tight-fitting air purifying respirators where airborne concentration of cadmium exceeds 10 times the TWA PEL (10 X 5 ug/m(3) = 50 ug/m(3)). A full facepiece respirator is required when eye irritation is experienced.

^c HEPA means High-efficiency Particulate Air.

^d Fit testing, qualitative or quantitative, is required. **SOURCE:** Respiratory Decision Logic, NIOSH

(h) **Emergency situations.** The employer shall develop and implement a written plan for dealing with emergency situations involving substantial releases of airborne cadmium. The plan shall include provisions for the use of appropriate respirators and personal protective equipment. In addition, employees not essential to correcting the emergency situation shall be restricted from the area and normal operations halted in that area until the emergency is abated.

(i) Protective work clothing and equipment.

(1) **Provision and use.** If an employee is exposed to airborne cadmium above the PEL or where skin or eye irritation is associated with cadmium exposure at any level, the employer shall provide at no cost to the employee, and assure that the employee uses, appropriate protective work clothing and equipment that prevents contamination of the employee and the employee's garments. Protective work clothing and equipment includes, but is not limited to:

(i) Coveralls or similar full-body work clothing;

(ii) Gloves, head coverings, and boots or foot coverings; and

(iii) Face shields, vented goggles, or other appropriate protective equipment that complies with 1910.133.

(2) Removal and storage.

(i) The employer shall assure that employees remove all protective clothing and equipment contaminated with cadmium at the completion of the work shift and do so only in change rooms provided in accordance with paragraph (j)(1) of this section.

(ii) The employer shall assure that no employee takes cadmium-contaminated protective clothing or equipment from the workplace, except for employees authorized to do so for purposes of laundering, cleaning, maintaining, or disposing of cadmium contaminated protective clothing and equipment at an appropriate location or facility away from the workplace.

(iii) The employer shall assure that contaminated protective clothing and equipment, when removed for laundering, cleaning, maintenance, or disposal, is placed and stored in sealed, impermeable bags or other closed, impermeable containers that are designed to prevent dispersion of cadmium dust.

(iv) The employer shall assure that bags or containers of contaminated protective clothing and equipment that are to be taken out of the change rooms or the workplace for laundering, cleaning, maintenance or disposal shall bear labels in accordance with paragraph (m)(3) of this section.

(3) Cleaning, replacement, and disposal.

(i) The employer shall provide the protective clothing and equipment required by paragraph (i)(1) of this section in a clean and dry condition as often as necessary to maintain its effectiveness, but in any event at least weekly. The employer is responsible for cleaning and laundering the protective clothing and equipment required by this paragraph to maintain its effectiveness and is also responsible for disposing of such clothing and equipment.

(ii) The employer also is responsible for repairing or replacing required protective clothing and equipment as needed to maintain its effectiveness. When rips or tears are detected while an employee is working they shall be immediately mended, or the worksuit shall be immediately replaced.

(iii) The employer shall prohibit the removal of cadmium from protective clothing and equipment by blowing, shaking, or any other means that disperses cadmium into the air.

(iv) The employer shall assure that any laundering of contaminated clothing or cleaning of contaminated equipment in the workplace is done in a manner that prevents the release of airborne cadmium in excess of the permissible exposure limit prescribed in paragraph (c) of this section.

(v) The employer shall inform any person who launders or cleans protective clothing or equipment contaminated with cadmium of the potentially harmful effects of exposure to cadmium and that the clothing and equipment should be laundered or cleaned in a manner to effectively prevent the release of airborne cadmium in excess of the PEL.

(I) Medical surveillance. (This section (I)(1)-(16) is adopted in its entirety as part of the *Cain's Pipeline & Industrial Services, LLC* company safety program for Cadmium)

(1) General.

(i) Scope.

(A) Currently exposed – The employer shall institute a medical surveillance program for all employees who are or may be exposed to cadmium at or above the action level unless the employer demonstrates that the employee is not, and will not be, exposed at or above the action level on 30 or more days per year (twelve consecutive months); and,

(B) Previously exposed – The employer shall also institute a medical surveillance program for all employees who prior to the effective date of this section might previously have been exposed to cadmium at or above the action level by the employer, unless the employer demonstrates that the employee did not prior to the effective date of this section work for the employer in jobs with exposure to cadmium for an aggregated total of more than 60 months.

(ii) To determine an employee's fitness for using a respirator, the employer shall provide the limited medical examination specified in paragraph (I)(6) of this section.

(iii) The employer shall assure that all medical examinations and procedures required by this standard are performed by or under the supervision of a licensed physician, who has read and is familiar with the health effects section of Appendix A to this section, the regulatory text of this section, the protocol for sample handling and laboratory selection in Appendix F to this section, and the questionnaire of Appendix D to this section. These examinations and procedures shall be provided without cost to the employee and at a time and place that is reasonable and convenient to employees.

(iv) The employer shall assure that the collecting and handling of biological samples of cadmium in urine (CdU), cadmium in blood (CdB), and beta-2 microglobulin in urine (b2-M) taken from employees under this section is done in a manner that assures their reliability and that analysis of biological samples of cadmium in urine (CdU), cadmium in blood (CdB), and beta-2 microglobulin in urine (b2-M) taken from employees under this section is performed in laboratories with demonstrated proficiency for that particular analyte. (See Appendix F to this section.)

(2) Initial examination.

(i) The employer shall provide an initial (pre-placement) examination to all employees covered by the medical surveillance program required in paragraph (I)(1)(i) of this section. The examination shall be provided to those employees within 30 days after initial assignment to a job with exposure to cadmium or no later than 90 days after the effective date of this section, whichever date is later.

(ii) The initial (pre-placement) medical examination shall include:

(A) A detailed medical and work history, with emphasis on: Past, present, and anticipated future exposure to cadmium; any history of renal, cardiovascular, respiratory, hematopoietic, reproductive, and/or musculoskeletal system dysfunction; current usage of medication with potential nephrotoxic side-effects; and smoking history and current status; and

(B) Biological monitoring that includes the following tests:

(1) Cadmium in urine (CdU), standardized to grams of creatinine (g/Cr);

(2) Beta-2 microglobulin in urine (b2-M), standardized to grams of creatinine (g/Cr), with pH specified, as described in Appendix F to this section; and

(3) Cadmium in blood (CdB), standardized to liters of whole blood (lwb).

(iii) **Recent Examination:** An initial examination is not required to be provided if adequate records show that the employee has been examined in accordance with the requirements of paragraph (I)(2)(ii) of this section within the past 12 months. In that case, such records shall be maintained as part of the employee's medical record and the prior exam shall be treated as if it were an initial examination for the purposes of paragraphs (I)(3) and (4) of this section.

(3) Actions triggered by initial biological monitoring:

(i) If the results of the initial biological monitoring tests show the employee's CdU level to be at or below 3 µg/g Cr, b2-M level to be at or below 300 µg/g Cr and CdB level to be at or below 5 µg/lwb, then:

(A) For currently exposed employees, who are subject to medical surveillance under paragraph (I)(1)(i)(A) of this section, the employer shall provide the minimum level of periodic medical surveillance in accordance with the requirements in paragraph (I)(4)(i) of this section; and

(B) For previously exposed employees, who are subject to medical surveillance under paragraph (I)(1)(i)(B) of this section, the employer shall provide biological monitoring for CdU, b2-M, and CdB one year after the initial biological monitoring and then the employer shall comply with the requirements of paragraph (I)(4)(v) of this section.

(ii) For all employees who are subject to medical surveillance under paragraph (I)(1)(i) of this section, if the results of the initial biological monitoring tests show the level of CdU to exceed 3 µg/g Cr, the level of b2-M to exceed 300 µg/g Cr, or the level of CdB to exceed 5 µg/lwb, the employer shall:

(A) Within two weeks after receipt of biological monitoring results, reassess the employee's occupational exposure to cadmium as follows:

(1) Reassess the employee's work practices and personal hygiene;

(2) Reevaluate the employee's respirator use, if any, and the respirator program;

(3) Review the hygiene facilities;

(4) Reevaluate the maintenance and effectiveness of the relevant engineering controls;

(5) Assess the employee's smoking history and status;

(B) Within 30 days after the exposure reassessment, specified in paragraph (I)(3)(ii)(A) of this section, take reasonable steps to correct any deficiencies found in the reassessment that may be responsible for the employee's excess exposure to cadmium; and,

(C) Within 90 days after receipt of biological monitoring results, provide a full medical examination to the employee in accordance with the requirements of paragraph (I)(4)(ii) of this section. After completing the medical examination, the examining physician shall determine in a written medical opinion whether to medically remove the employee. If the physician determines that medical removal is not necessary, then until the employee's CdU level falls to or below 3 µg/g Cr, b2-M level falls to or below 300 µg/g Cr and CdB level falls to or below 5 µg/lwb, the employer shall:

(1) Provide biological monitoring in accordance with paragraph (I)(2)(ii)(B) of this section on a semi-annual basis; and

(2) Provide annual medical examinations in accordance with paragraph (I)(4)(ii) of this section.

(iii) For all employees who are subject to medical surveillance under paragraph (I)(1)(i) of this section, if the results of the initial biological monitoring tests show the level of CdU to be in excess of 15 µg/g Cr, or the level of CdB to be in excess of 15 µg/lwb, or the level of b2-M to be in excess of 1,500 µg/g Cr, the employer shall comply with the requirements of paragraphs (I)(3)(ii)(A)-(B) of this section. Within 90 days after receipt of biological monitoring results, the employer shall provide a full medical examination to the employee in accordance with the requirements of paragraph (I)(4)(ii) of this section. After completing the medical examination, the examining physician shall determine in a written medical opinion whether to medically remove the employee. However, if the initial biological monitoring results and the biological monitoring results obtained during the medical examination both show that: CdU exceeds 15 µg/g Cr; or CdB exceeds 15 µg/lwb; or b2-M exceeds 1500 µg/g Cr, and in addition CdU exceeds 3 µg/g Cr or CdB exceeds 5 µg/liter of whole blood, then the physician shall medically remove the employee from exposure to cadmium at or above the action level. If the second set of biological monitoring results obtained during the medical examination does not show that a mandatory removal trigger level has been exceeded, then the employee is not required to be removed by the mandatory provisions of this paragraph. If the employee is not required to be removed by the mandatory provisions of this paragraph or by the physician's determination, then until the employee's CdU level falls to or below 3 µg/g Cr, b2-M level falls to or below 300 µg/g Cr and CdB level falls to or below 5 µg/lwb, the employer shall:

(A) Periodically reassess the employee's occupational exposure to cadmium;

(B) Provide biological monitoring in accordance with paragraph (I)(2)(ii)(B) of this section on a quarterly basis; and

(C) Provide semiannual medical examinations in accordance with paragraph (I)(4)(ii) of this section.

(iv) For all employees to whom medical surveillance is provided, beginning on January 1, 1999, and in lieu of paragraphs (I)(3)(i)-(iii) of this section:

(A) If the results of the initial biological monitoring tests show the employee's CdU level to be at or below 3 µg/g Cr, b2-M level to be at or below 300 µg/g Cr and CdB level to be at or below 5 µg/lwb, then for currently exposed employees, the employer shall comply with the requirements of paragraph (I)(3)(i)(A) of this section, and for previously exposed employees, the employer shall comply with the requirements of paragraph (I)(3)(i)(B) of this section;

(B) If the results of the initial biological monitoring tests show the level of CdU to exceed 3 µg/g Cr, the level of b2-M to exceed 300 µg/g Cr, or the level of CdB to exceed 5 µg/lwb, the employer shall comply with the requirements of paragraphs (I)(3)(ii)(A)-(C) of this section; and, **(C)** If the results of the initial biological monitoring tests show the level of CdU to be in excess of 7 µg/g Cr, or the level of CdB to be in excess of 10 µg/lwb, or the level of b2-M to be in excess of 750 µg/g Cr, the employer shall: Comply with the requirements of paragraphs (I)(3)(ii)(A)-(B) of this section; and, within 90 days after receipt of biological monitoring results, provide a full medical examination to the employee in accordance with the requirements of paragraph (I)(4)(ii) of this section.

After completing the medical examination, the examining physician shall determine in a written medical opinion whether to medically remove the employee. However, if the initial biological monitoring results and the biological monitoring results obtained during the medical examination both show that: CdU exceeds 7 µg/g Cr; or CdB exceeds 10 µg/lwb; or b2-M exceeds 750 µg/g Cr, and in addition CdU exceeds 3 µg/g Cr or CdB exceeds 5 µg/liter of whole blood, then the physician shall medically remove the employee from exposure to cadmium at or above the action level.

If the second set of biological monitoring results obtained during the medical examination does not show that a mandatory removal trigger level has been exceeded, then the employee is not required to be removed by the mandatory provisions of this paragraph. If the employee is not required to be removed by the mandatory provisions of this paragraph or by the physician's determination, then until the employee's CdU level falls to or below 3 µg/g Cr, b2-M level falls to or below 300 µg/g Cr and CdB level falls to or below 5 µg/lwb, the employer shall: periodically reassess the employee's occupational exposure to cadmium; provide biological monitoring in accordance with paragraph (I)(2)(ii)(B) of this section on a quarterly basis; and provide semiannual medical examinations in accordance with paragraph (I)(4)(ii) of this section.

(4) Periodic medical surveillance.

(i) For each employee who is covered under paragraph (I)(1)(i)(A) of this section, the employer shall provide at least the minimum level of periodic medical surveillance, which consists of periodic medical examinations and periodic biological monitoring. A periodic medical examination shall be provided within one year after the initial examination required by paragraph (I)(2) of this section and thereafter at least biennially. Biological sampling shall be provided at least annually, either as part of a periodic medical examination or separately as periodic biological monitoring.

(ii) The periodic medical examination shall include:

(A) A detailed medical and work history, or update thereof, with emphasis on: Past, present and anticipated future exposure to cadmium; smoking history and current status; reproductive history; current use of medications with potential nephrotoxic side-effects; any history of renal, cardiovascular, respiratory, hematopoietic, and/or musculoskeletal system dysfunction; and as part of the medical and work history, for employees who wear respirators, questions 3-11 and 25-32 in Appendix D to this section;

(B) A complete physical examination with emphasis on: Blood pressure, the respiratory system, and the urinary system; (C) A 14 inch by 17 inch, or a reasonably standard sized posterior-anterior chest X-ray (after the initial X-ray, the frequency of chest X-rays is to be determined by the examining physician);

(D) Pulmonary function tests, including forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV1);

(E) Biological monitoring, as required in paragraph (I)(2)(ii)(B) of this section;

(F) Blood analysis, in addition to the analysis required under paragraph (I)(2)(ii)(B) of this section, including blood urea nitrogen, complete blood count, and serum creatinine;

(G) Urinalysis, in addition to the analysis required under paragraph (I)(2)(ii)(B) of this section, including the determination of albumin, glucose, and total and low molecular weight proteins;

(H) For males over 40 years old, prostate palpation, or other at least as effective diagnostic test(s);

(I) Any additional tests deemed appropriate by the examining physician.

(iii) Periodic biological monitoring shall be provided in accordance with paragraph (I)(2)(ii)(B) of this section.

(iv) If the results of periodic biological monitoring or the results of biological monitoring performed as part of the periodic medical examination show the level of the employee's CdU, b2-M, or CdB to be in excess of the levels specified in paragraphs (I)(3)(ii) or (iii); or, beginning on January 1, 1999, in excess of the levels specified in paragraphs (I)(3)(ii) or (iv) of this section, the employer shall take the appropriate actions specified in paragraphs (I)(3)(ii)-(iv) of this section.

(v) For previously exposed employees under paragraph (I)(1)(i)(B) of this section:

(A) If the employee's levels of CdU did not exceed 3 µg/g Cr, CdB did not exceed 5 µg/lwb, and b2-M did not exceed 300 µg/g Cr in the initial biological monitoring tests, and if the results of the followup biological monitoring required by paragraph (I)(3)(i)(B) of this section one year after the initial examination confirm the previous results, the employer may discontinue all periodic medical surveillance for that employee.

(B) If the initial biological monitoring results for CdU, CdB, or b2-M were in excess of the levels specified in paragraph (I)(3)(i) of this section, but subsequent biological monitoring results required by paragraph (I)(3)(ii)(iv) of this section show that the employee's CdU levels no longer exceed 3 µg/g Cr, CdB levels no longer exceed 5 µg/lwb, and b2-M levels no longer exceed 300 µg/g Cr, the employer shall provide biological monitoring for CdU, CdB, and b2-M one year after these most recent biological monitoring results. If the results of the followup biological monitoring, specified in this paragraph, confirm the previous results, the employer may discontinue all periodic medical surveillance for that employee.

(C) However, if the results of the follow-up tests specified in paragraph (I)(4)(v)(A) or (B) of this section indicate that the level of the employee's CdU, b2-M, or CdB exceeds these same levels, the employer is required to provide annual medical examinations in accordance with the provisions of paragraph (I)(4)(ii) of this section until the results of biological monitoring are consistently below these levels or the examining physician determines in a written medical opinion that further medical surveillance is not required to protect the employee's health.

(vi) A routine, biennial medical examination is not required to be provided in accordance with paragraphs (I)(3)(i) and (I)(4) of this section if adequate medical records show that the employee has been examined in accordance with the requirements of paragraph (I)(4)(ii) of this section within the past 12 months. In that case, such records shall be maintained by the employer as part of the employee's medical record, and the next routine, periodic medical examination shall be made available to the employee within two years of the previous examination.

(5) Actions triggered by medical examinations.

(i) If the results of a medical examination carried out in accordance with this section indicate any laboratory or clinical finding consistent with cadmium toxicity that does not require employer action under paragraph (I)(2), (3) or (4) of this section, the employer, within 30 days, shall reassess the employee's occupational exposure to cadmium and take the following corrective action until the physician determines they are no longer necessary:

(A) Periodically reassess: The employee's work practices and personal hygiene; the employee's respirator use, if any; the employee's smoking history and status; the respiratory protection program; the hygiene facilities; and the maintenance and effectiveness of the relevant engineering controls;

(B) Within 30 days after the reassessment, take all reasonable steps to correct the deficiencies found in the reassessment that may be responsible for the employee's excess exposure to cadmium;

(C) Provide semiannual medical reexaminations to evaluate the abnormal clinical sign(s) of cadmium toxicity until the results are normal or the employee is medically removed; and

(D) Where the results of tests for total proteins in urine are abnormal, provide a more detailed medical evaluation of the toxic effects of cadmium on the employee's renal system.

(6) Examination for respirator use.

(i) To determine an employee's fitness for respirator use, the employer shall provide a medical examination that includes the elements specified in paragraph (I)(6)(i)(A)-(D) of this section. This examination shall be provided prior to the employee's being assigned to a job that requires the use of a respirator or no later than 90 days after this section goes into effect, whichever date is later, to any employee without a medical examination within the preceding 12 months that satisfies the requirements of this paragraph.

(A) A detailed medical and work history, or update thereof, with emphasis on: Past exposure to cadmium; smoking history and current status; any history of renal, cardiovascular, respiratory, hematopoietic, and/or musculoskeletal system dysfunction; a description of the job for which the respirator is required; and questions 3-11 and 25-32 in Appendix D to this section;

(B) A blood pressure test;

(C) Biological monitoring of the employee's levels of CdU, CdB and b2-M in accordance with the requirements of paragraph (I)(2)(ii)(B) of this section, unless such results already have been obtained within the previous 12 months; and

(D) Any other test or procedure that the examining physician deems appropriate.

(ii) After reviewing all the information obtained from the medical examination required in paragraph (I)(6)(i) of this section, the physician shall determine whether the employee is fit to wear a respirator.

(iii) Whenever an employee has exhibited difficulty in breathing during a respirator fit test or during use of a respirator, the employer, as soon as possible, shall provide the employee with a periodic medical examination in accordance with paragraph (I)(4)(ii) of this section to determine the employee's fitness to wear a respirator.

(iv) Where the results of the examination required under paragraph (I)(6)(i), (ii), or (iii) of this section are abnormal, medical limitation or prohibition of respirator use shall be considered. If the employee is allowed to wear a respirator, the employee's ability to continue to do so shall be periodically evaluated by a physician.

(7) Emergency examinations.

(i) In addition to the medical surveillance required in paragraphs (I)(2)-(6) of this section, the employer shall provide a medical examination as soon as possible to any employee who may have been acutely exposed to cadmium because of an emergency.

(ii) The examination shall include the requirements of paragraph (I)(4)(ii) of this section, with emphasis on the respiratory system, other organ systems considered appropriate by the examining physician, and symptoms of acute overexposure, as identified in paragraphs II(B)(1)-(2) and IV of Appendix A to this section.

(8) Termination of employment examination.

(i) At termination of employment, the employer shall provide a medical examination in accordance with paragraph (I)(4)(ii) of this section, including a chest X-ray, to any employee to whom at any prior time the employer was required to provide medical surveillance under paragraphs (I)(1)(i) or (I)(7) of this section. However, if the last examination satisfied the requirements of paragraph (I)(4)(ii) of this section and was less than six months prior to the date of termination, no further examination is required unless otherwise specified in paragraphs (I)(3) or (I)(5) of this section;

(ii) However, for employees covered by paragraph (I)(1)(i)(B) of this section, if the employer has discontinued all periodic medical surveillance under paragraph (I)(4)(v) of this section, no termination of employment medical examination is required.

(9) Information provided to the physician. The employer shall provide the following information to the examining physician:

(i) A copy of this standard and appendices;

(ii) A description of the affected employee's former, current, and anticipated duties as they relate to the employee's occupational exposure to cadmium;

(iii) The employee's former, current, and anticipated future levels of occupational exposure to cadmium;

(iv) A description of any personal protective equipment, including respirators, used or to be used by the employee, including when and for how long the employee has used that equipment; and

(v) Relevant results of previous biological monitoring and medical examinations.

(10) Physician's written medical opinion.

(i) The employer shall promptly obtain a written, signed medical opinion from the examining physician for each medical examination performed on each employee. This written opinion shall contain:

(A) The physician's diagnosis for the employee;

(B) The physician's opinion as to whether the employee has any detected medical condition(s) that would place the employee at increased risk of material impairment to health from further exposure to cadmium, including any indications of potential cadmium toxicity;

(C) The results of any biological or other testing or related evaluations that directly assess the employee's absorption of cadmium;

(D) Any recommended removal from, or limitation on the activities or duties of the employee or on the employee's use of personal protective equipment, such as respirators;

(E) A statement that the physician has clearly and carefully explained to the employee the results of the medical examination, including all biological monitoring results and any medical conditions related to cadmium exposure that require further evaluation or treatment, and any limitation on the employee's diet or use of medications.

(ii) The employer promptly shall obtain a copy of the results of any biological monitoring provided by an employer to an employee independently of a medical examination under paragraphs (I)(2) and (I)(4) of this section, and, in lieu of a written medical opinion, an explanation sheet explaining those results.

(iii) The employer shall instruct the physician not to reveal orally or in the written medical opinion given to the employer specific findings or diagnoses unrelated to occupational exposure to cadmium.

(11) Medical Removal Protection (MRP).

(i) General.

(A) The employer shall temporarily remove an employee from work where there is excess exposure to cadmium on each occasion that medical removal is required under paragraph (I)(3), (I)(4), or (I)(6) of this section and on each occasion that a physician determines in a written medical opinion that the employee should be removed from such exposure. The physician's determination may be based on biological monitoring results, inability to wear a respirator, evidence of illness, other signs or symptoms of cadmium-related dysfunction or disease, or any other reason deemed medically sufficient by the physician.

(B) The employer shall medically remove an employee in accordance with paragraph (I)(11) of this section regardless of whether at the time of removal a job is available into which the removed employee may be transferred.

(C) Whenever an employee is medically removed under paragraph (I)(11) of this section, the employer shall transfer the removed employee to a job where the exposure to cadmium is within the permissible levels specified in that paragraph as soon as one becomes available.

(D) For any employee who is medically removed under the provisions of paragraph (I)(11)(i) of this section, the employer shall provide follow-up biological monitoring in accordance with (I)(2)(ii)(B) of this section at least every three months and follow-up medical examinations semi-annually at least every six months until in a written medical opinion the examining physician determines that either the employee may be returned to his/her former job status as specified under paragraph (I)(11)(iv)-(v) of this section or the employee must be permanently removed from excess cadmium exposure.

(E) The employer may not return an employee who has been medically removed for any reason to his/her former job status until a physician determines in a written medical opinion that continued medical removal is no longer necessary to protect the employee's health.

(ii) Where an employee is found unfit to wear a respirator under paragraph (I)(6)(ii) of this section, the employer shall remove the employee from work where exposure to cadmium is above the PEL.

(iii) Where removal is based on any reason other than the employee's inability to wear a respirator, the employer shall remove the employee from work where exposure to cadmium is at or above the action level.

(iv) Except as specified in paragraph (I)(11)(v) of this section, no employee who was removed because his/her level of CdU, CdB and/or b2-M exceeded the medical removal trigger levels in paragraph (I)(3) or (I)(4) of this section may be returned to work with exposure to cadmium at or above the action level until the employee's levels of CdU fall to or below 3 µg/g Cr, CdB falls to or below 5 µg/lwb, and b2-M falls to or below 300 µg/g Cr.

(v) However, when in the examining physician's opinion continued exposure to cadmium will not pose an increased risk to the employee's health and there are special circumstances that make continued medical removal an inappropriate remedy, the physician shall fully discuss these matters with the employee, and then in a written determination may return a worker to his/her former job status despite what would otherwise be unacceptably high biological monitoring results. Thereafter, the returned employee shall continue to be provided with

medical surveillance as if he/she were still on medical removal until the employee's levels of CdU fall to or below 3 µg/g Cr, CdB falls to or below 5 µg/lwb, and b2-M falls to or below 300 µg/g Cr.

(vi) Where an employer, although not required by paragraph (I)(11)(i)-(iii) of this section to do so, removes an employee from exposure to cadmium or otherwise places limitations on an employee due to the effects of cadmium exposure on the employee's medical condition, the employer shall provide the same medical removal protection benefits to that employee under paragraph (I)(12) of this section as would have been provided had the removal been required under paragraph (I)(11)(i)-(iii) of this section.

(12) Medical Removal Protection Benefits (MRPB).

(i) The employer shall provide MRPB for up to a maximum of 18 months to an employee each time and while the employee is temporarily medically removed under paragraph (I)(11) of this section.

(ii) For purposes of this section, the requirement that the employer provide MRPB means that the employer shall maintain the total normal earnings, seniority, and all other employee rights and benefits of the removed employee, including the employee's right to his/her former job status, as if the employee had not been removed from the employee's job or otherwise medically limited.

(iii) Where, after 18 months on medical removal because of elevated biological monitoring results, the employee's monitoring results have not declined to a low enough level to permit the employee to be returned to his/her former job status:

(A) The employer shall make available to the employee a medical examination pursuant to this section in order to obtain a final medical determination as to whether the employee may be returned to his/her former job status or must be permanently removed from excess cadmium exposure; and

(B) The employer shall assure that the final medical determination indicates whether the employee may be returned to his/her former job status and what steps, if any, should be taken to protect the employee's health.

(iv) The employer may condition the provision of MRPB upon the employee's participation in medical surveillance provided in accordance with this section.

(13) Multiple physician review.

(i) If the employer selects the initial physician to conduct any medical examination or consultation provided to an employee under this section, the employee may designate a second physician to:

(A) Review any findings, determinations, or recommendations of the initial physician; and

(B) Conduct such examinations, consultations, and laboratory tests as the second physician deems necessary to facilitate this review.

(ii) The employer shall promptly notify an employee of the right to seek a second medical opinion after each occasion that an initial physician provided by the employer conducts a medical examination or consultation pursuant to this section. The employer may condition its participation in, and payment for,

multiple physician review upon the employee doing the following within fifteen (15) days after receipt of this notice, or receipt of the initial physician's written opinion, whichever is later:

(A) Informing the employer that he or she intends to seek a medical opinion; and

(B) Initiating steps to make an appointment with a second physician.

(iii) If the findings, determinations, or recommendations of the second physician differ from those of the initial physician, then the employer and the employee shall assure that efforts are made for the two physicians to resolve any disagreement.

(iv) If the two physicians have been unable to quickly resolve their disagreement, then the employer and the employee, through their respective physicians, shall designate a third physician to:

(A) Review any findings, determinations, or recommendations of the other two physicians; and

(B) Conduct such examinations, consultations, laboratory tests, and discussions with the other two physicians as the third physician deems necessary to resolve the disagreement among them.

(v) The employer shall act consistently with the findings, determinations, and recommendations of the third physician, unless the employer and the employee reach an agreement that is consistent with the recommendations of at least one of the other two physicians.

(14) Alternate physician determination. The employer and an employee or designated employee representative may agree upon the use of any alternate form of physician determination in lieu of the multiple physician review provided by paragraph (l)(13) of this section, so long as the alternative is expeditious and at least as protective of the employee.

(15) Information the employer must provide the employee.

(i) The employer shall provide a copy of the physician's written medical opinion to the examined employee within two weeks after receipt thereof.

(ii) The employer shall provide the employee with a copy of the employee's biological monitoring results and an explanation sheet explaining the results within two weeks after receipt thereof.

(iii) Within 30 days after a request by an employee, the employer shall provide the employee with the information required to provide the examining physician under paragraph (l)(9) of this section.

(16) Reporting. In addition to other medical events that are required to be reported on the OSHA Form No. 200, the employer shall report any abnormal condition or disorder caused by occupational exposure to cadmium associated with employment as specified in Chapter (V)(E) of the Reporting Guidelines for Occupational Injuries and Illnesses.

(m) Communication of cadmium hazards to employees.

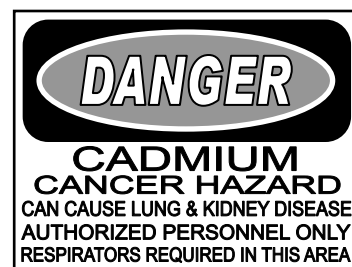
(1) General. In communications concerning cadmium hazards, employers shall comply with the requirements of OSHA's Hazard Communication Standard, 29 CFR 1910.1200, including but not limited to the requirements concerning warning signs and labels, material safety data sheets (MSDS), and employee information and training. In addition, employers shall comply with the following requirements:

(2) Warning signs.

(i) Warning signs shall be provided and displayed in regulated areas. In addition, warning signs shall be posted at all approaches to regulated areas so that an employee may read the signs and take necessary protective steps before entering the area.

(ii) Warning signs required by paragraph (m)(2)(i) of this section shall bear the following information:

(iii) The employer shall assure that signs required by this paragraph are illuminated, cleaned, and maintained as necessary so that the legend is readily visible.

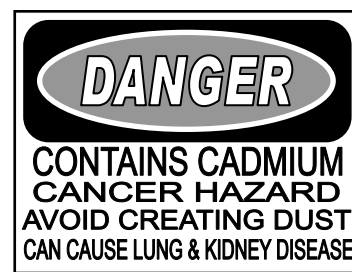


(3) Warning labels.

(i) Shipping and storage containers containing cadmium, cadmium compounds, or cadmium contaminated clothing, equipment, waste, scrap, or debris shall bear appropriate warning labels, as specified in paragraph (m)(3)(ii) of this section.

(ii) The warning labels shall include at least the following information:

(iii) Where feasible, installed cadmium products shall have a visible label or other indication that cadmium is present.



(4) Employee information and training.

(i) The employer shall institute a training program for all employees who are potentially exposed to cadmium, assure employee participation in the program, and maintain a record of the contents of such program.

(ii) Training shall be provided prior to or at the time of initial assignment to a job involving potential exposure to cadmium and at least annually thereafter.

(iii) The employer shall make the training program understandable to the employee and shall assure that each employee is informed of the following:

(A) The health hazards associated with cadmium exposure, with special attention to the information incorporated in Appendix A to this section;

(B) The quantity, location, manner of use, release, and storage of cadmium in the workplace and the specific nature of operations that could result in exposure to cadmium, especially exposures above the PEL;

(C) The engineering controls and work practices associated with the employee's job assignment;

(D) The measures employees can take to protect themselves from exposure to cadmium, including modification of such habits as smoking and personal hygiene, and specific procedures the employer has implemented to protect employees from exposure to cadmium such as appropriate work practices, emergency procedures, and the provision of personal protective equipment;

(E) The purpose, proper selection, fitting, proper use, and limitations of respirators and protective clothing;

(F) The purpose and a description of the medical surveillance program required by paragraph (I) of this section;

(G) The contents of this section and its appendices; and

(H) The employee's rights of access to records under §1910.1020(e) and (g).

(iv) Additional access to information and training program and materials.

(A) The employer shall make a copy of this section and its appendices readily available without cost to all affected employees and shall provide a copy if requested.

(B) The employer shall provide to the Assistant Secretary or the Director, upon request, all materials relating to the employee information and the training program.

(n) Recordkeeping.

(4) Training. The employer shall certify that employees have been trained by preparing a certification record which includes the identity of the person trained, the signature of the employer or the person who conducted the training, and the date the training was completed. The certification records shall be prepared at the completion of training and shall be maintained on file for one (1) year beyond the date of training of that employee.

The following appendices are listed as relevant information for this safety program, and are to be used in conjunction with the previous information and regulations:

APPENDIX A to §1910.1027 – SUBSTANCE SAFETY DATA SHEET

Cadmium

I. Substance Identification

A. Substance: Cadmium.

B. 8-Hour, Time-weighted-average, Permissible Exposure Limit (TWA PEL):

1. TWA PEL: Five micrograms of cadmium per cubic meter of air 5 µg/m³, time-weighted average (TWA) for an 8-hour workday.

C. Appearance: Cadmium metal – soft, blue-white, malleable, lustrous metal or grayish-white powder. Some cadmium compounds may also appear as a brown, yellow, or red powdery substance.

II. Health Hazard Data

A. Routes of Exposure. Cadmium can cause local skin or eye irritation. Cadmium can affect your health if you inhale it or if you swallow it.

B. Effects of Overexposure.

1. Short-term (acute) exposure: Cadmium is much more dangerous by inhalation than by ingestion. High exposures to cadmium that may be immediately dangerous to life or health occur in jobs where workers handle large quantities of cadmium dust or fume; heat cadmium-containing compounds or cadmium-coated surfaces; weld with cadmium solders or cut cadmium containing materials such as bolts.

2. Severe exposure may occur before symptoms appear. Early symptoms may include mild irritation of the upper respiratory tract, a sensation of constriction of the throat, a metallic taste and/or a cough. A period of 1-10 hours may precede the onset of rapidly progressing shortness of breath, chest pain, and flu-like symptoms with weakness, fever, headache, chills, sweating and muscular pain. Acute pulmonary edema usually develops within 24 hours and reaches a maximum by three days. If death from asphyxia does not occur, symptoms may resolve within a week.

3. Long-term (chronic) exposure. Repeated or long-term exposure to cadmium, even at relatively low concentrations, may result in kidney damage and an increased risk of cancer of the lung and of the prostate.

C. Emergency First Aid Procedures.

1. Eye exposure: Direct contact may cause redness or pain. Wash eyes immediately with large amounts of water, lifting the upper and lower eyelids. Get medical attention immediately.

2. Skin exposure: Direct contact may result in irritation. Remove contaminated clothing and shoes immediately. Wash affected area with soap or mild detergent and large amounts of water. Get medical attention immediately.

3. Ingestion: Ingestion may result in vomiting, abdominal pain, nausea, diarrhea, headache and sore throat. Treatment for symptoms must be administered by medical personnel. Under no circumstances should the employer allow any person whom he retains, employs, supervises or controls to engage in therapeutic chelation. Such treatment is likely to translocate cadmium from pulmonary or other tissue to renal tissue. Get medical attention immediately.

4. Inhalation: If large amounts of cadmium are inhaled, the exposed person must be moved to fresh air at once. If breathing has stopped, perform cardiopulmonary resuscitation. Administer oxygen if available. Keep the affected person warm and at rest. Get medical attention immediately.

5. Rescue: Move the affected person from the hazardous exposure. If the exposed person has been overcome, attempt rescue only after notifying at least one other person of the emergency and putting into effect established emergency procedures. Do not become a casualty yourself. Understand your emergency rescue procedures and know the location of the emergency equipment before the need arises.

III. Employee Information

A. Protective Clothing and Equipment.

1. Respirators: You may be required to wear a respirator for non-routine activities; in emergencies; while your employer is in the process of reducing cadmium exposures through engineering controls; and where engineering controls are not feasible. If respirators are worn in the future, they must have a joint Mine Safety and Health Administration (MSHA) and National Institute for Occupational Safety and Health (NIOSH) label of approval. Cadmium does not have a detectable odor except at levels well above the permissible exposure limits. If you can smell cadmium while wearing a respirator, proceed immediately to fresh air. If you experience difficulty breathing while wearing a respirator, tell your employer.

2. Protective Clothing: You may be required to wear impermeable clothing, gloves, foot gear, a face shield, or other appropriate protective clothing to prevent skin contact with cadmium. Where protective clothing is required, your employer must provide clean garments to you as necessary to assure that the clothing protects you adequately. The employer must replace or repair protective clothing that has become torn or otherwise damaged.

3. Eye Protection: You may be required to wear splash-proof or dust resistant goggles to prevent eye contact with cadmium.

B. Employer Requirements.

1. Medical: If you are exposed to cadmium at or above the action level, your employer is required to provide a medical examination, laboratory tests and a medical history according to the medical surveillance provisions under paragraph (1) of this standard. (See summary chart and tables in this Appendix A.) These tests shall be provided without cost to you. In addition, if you are accidentally exposed to cadmium under conditions known or suspected to constitute toxic exposure to cadmium, your employer is required to make special tests available to you.

2. Access to Records: All medical records are kept strictly confidential. You or your representative are entitled to see the records of measurements of your exposure to cadmium. Your medical examination records can be furnished to your personal physician or designated representative upon request by you to your employer.

3. Observation of Monitoring: Your employer is required to perform measurements that are representative of your exposure to cadmium and you or your designated representative are entitled to observe the monitoring procedure. You are entitled to observe the steps taken in the measurement procedure, and to record the results obtained. When the monitoring procedure is taking place in an area where respirators or personal protective clothing and equipment are required to be worn, you or your representative must also be provided with, and must wear the protective clothing and equipment.

C. Employee Requirements. You will not be able to smoke, eat, drink, chew gum or tobacco, or apply cosmetics while working with cadmium in regulated areas. You will also not be able to carry or store tobacco products, gum, food, drinks or cosmetics in regulated areas because these products easily become contaminated with cadmium from the workplace and can therefore create another source of unnecessary cadmium exposure.

Some workers will have to change out of work clothes and shower at the end of the day, as part of their workday, in order to wash cadmium from skin and hair. Hand washing and cadmium-free eating facilities shall be provided by the employer and proper hygiene should always be performed before eating. It is also recommended that you do not smoke or use tobacco products, because among other things, they naturally contain cadmium. For further information, read the labeling on such products.

IV. Physician Information

A. Introduction. The medical surveillance provisions of paragraph (1) generally are aimed at accomplishing three main interrelated purposes: First, identifying employees at higher risk of adverse health effects from excess, chronic exposure to cadmium; second, preventing cadmium-induced disease; and third, detecting and minimizing existing cadmium-induced disease. The core of medical surveillance in this standard is the early and periodic monitoring of the employee's biological indicators of:

(a) Recent exposure to cadmium;

(b) cadmium body burden; and

(c) potential and actual kidney damage associated with exposure to cadmium.

The main adverse health effects associated with cadmium overexposure are lung cancer and kidney dysfunction. It is not yet known how to adequately biologically monitor human beings to specifically prevent cadmium-induced lung cancer. By contrast, the kidney can be monitored to provide prevention and early detection of cadmium-induced kidney damage. Since, for non-carcinogenic effects, the kidney is considered the primary target organ of chronic exposure to cadmium, the medical surveillance provisions of this standard effectively focus on cadmium-induced kidney disease. Within that focus, the aim, where possible, is to prevent the onset of such disease and, where necessary, to minimize such disease as may already exist. The by-products of successful prevention of kidney disease are anticipated to be the reduction and prevention of other cadmium-induced diseases.

B. Health Effects. The major health effects associated with cadmium overexposure are described below.

1. Kidney: The most prevalent non-malignant disease observed among workers chronically exposed to cadmium is kidney dysfunction. Initially, such dysfunction is manifested as proteinuria. The proteinuria associated with cadmium exposure is most commonly characterized by excretion of low molecular weight proteins (15,000 to 40,000 MW) accompanied by loss of electrolytes, uric acid, calcium, amino acids, and phosphate. The compounds commonly excreted include: beta-2-microglobulin (b2-M), retinol binding protein (RBP), immunoglobulin light chains, and lysozyme. Excretion of low molecular weight proteins are characteristic of damage to the proximal tubules of the kidney (Iwao et al., 1980).

It has also been observed that exposure to cadmium may lead to urinary excretion of high-molecular weight proteins such as albumin, immunoglobulin G, and glycoproteins (Ex. 29). Excretion of high-molecular weight proteins is typically indicative of damage to the glomeruli of the kidney. Bernard et al., (1979) suggest that damage to the glomeruli and damage to the proximal tubules of the kidney may both be linked to cadmium exposure but they may occur independently of each other.

Several studies indicate that the onset of low-molecular weight proteinuria is a sign of irreversible kidney damage (Friberg et al., 1974; Roels et al., 1982; Piscator 1984; Elinder et al., 1985; Smith et al., 1986). Above specific levels of b2-M associated with cadmium exposure it is unlikely that b2-M levels return to normal even when cadmium exposure is eliminated by removal of the individual from the cadmium work environment (Friberg, Ex. 29, 1990).

Some studies indicate that such proteinuria may be progressive; levels of b2-M observed in the urine increase with time even after cadmium exposure has ceased. See, for example, Elinder et al., 1985. Such observations, however, are not universal, and it has been suggested that studies in which proteinuria has not been observed to progress may not have tracked patients for a sufficiently long time interval (Jarup, Ex. 8-661).

When cadmium exposure continues after the onset of proteinuria, chronic nephrotoxicity may occur (Friberg, Ex. 29). Uremia results from the inability of the glomerulus to adequately filter blood. This leads to severe disturbance of electrolyte concentrations and may lead to various clinical complications including kidney stones (L-140-50).

After prolonged exposure to cadmium, glomerular proteinuria, glucosuria, aminoaciduria, phosphaturia, and hypercalciuria may develop (Exs. 8-86, 4-28, 14-18). Phosphate, calcium, glucose, and amino acids are essential to life, and under normal conditions, their excretion should be regulated by the kidney. Once low molecular weight proteinuria has developed, these elements dissipate from the human body. Loss of glomerular function may also occur, manifested by decreased glomerular filtration rate and increased serum creatinine. Severe cadmium-induced renal damage may eventually develop into chronic renal failure and uremia (Ex. 55).

Studies in which animals are chronically exposed to cadmium confirm the real effects observed in humans (Friberg et al., 1986). Animal studies also confirm problems with calcium metabolism and related skeletal effects which have been observed among humans exposed to cadmium in addition to the renal effects. Other effects commonly reported in chronic animal studies include anemia, changes in liver morphology, immunosuppression and hypertension. Some of these effects may be associated with co-factors. Hypertension, for example, appears to be associated with diet as well as cadmium exposure. Animals injected with cadmium have also shown testicular necrosis (Ex. 8-86B).

2. Biological Markers: It is universally recognized that the best measures of cadmium exposures and its effects are measurements of cadmium in biological fluids, especially urine and blood. Of the two, CdU is conventionally used to determine body burden of cadmium in workers without kidney disease. CdB is conventionally used to monitor for recent exposure to cadmium. In addition, levels of CdU and CdB historically have been used to predict the percent of the population likely to develop kidney disease (Thun et al., Ex. L-140-50; WHO, Ex. 8-674; ACGIH, Exs. 8-667, 140-50).

The third biological parameter upon which OSHA relies for medical surveillance is Beta-2-microglobulin in urine (b2-M), a low molecular weight protein. Excess b2-M has been widely accepted by physicians and scientists as a reliable indicator of functional damage to the proximal tubule of the kidney (Exs. 8-447, 144-3-C, 4-47, L-140-45, 19-43-A). Excess b2-M is found when the proximal tubules can no longer reabsorb this protein in a normal manner. This failure of the proximal tubules is an early stage of a kind of kidney disease that commonly occurs among workers with excessive cadmium exposure. Used in conjunction with biological test results indicating abnormal levels of CdU and CdB, the finding of excess b2-M can establish for an examining physician that any existing kidney disease is probably cadmium-related (Trs. 6/6/90, pp. 82-86, 122, 134). The upper limits of normal levels for cadmium in urine and cadmium in blood are 3 µg Cd/gram creatinine in urine and 5 µgCd/liter whole blood, respectively. These levels were derived from broad-based population studies.

Three issues confront the physicians in the use of b2-M as a marker of kidney dysfunction and material impairment. First, there are a few other causes of elevated levels of b2-M not related to cadmium

exposures, some of which may be rather common diseases and some of which are serious diseases (e.g., myeloma or transient flu, Exs. 29 and 8-086). These can be medically evaluated as alternative causes (Friberg, Ex. 29). Also, there are other factors that can cause b2-M to degrade so that low levels would result in workers with tubular dysfunction. For example, regarding the degradation of b2-M, workers with acidic urine (pH<6) might have b2-M levels that are within the “normal” range when in fact kidney dysfunction has occurred (Ex. L-140-1) and the low molecular weight proteins are degraded in acid urine. Thus, it is very important that the pH of urine be measured, that urine samples be buffered as necessary (See Appendix F.), and that urine samples be handled correctly, i.e., measure the pH of freshly voided urine samples, then if necessary, buffer to pH>6 (or above for shipping purposes), measure pH again and then, perhaps, freeze the sample for storage and shipping. (See also Appendix F.) Second, there is debate over the pathological significance of proteinuria, however, most world experts believe that b2-M levels greater than 300 µg/g Cr are abnormal (Elinder, Ex. 55, Friberg, Ex. 29). Such levels signify kidney dysfunction that constitutes material impairment of health. Finally, detection of b2-M at low levels has often been considered difficult, however, many laboratories have the capability of detecting excess b2-M using simple kits, such as the Phadebas Delphia test, that are accurate to levels of 100 µg b2-M/g Cr U (Ex. L-140-1).

Specific recommendations for ways to measure b2-M and proper handling of urine samples to prevent degradation of b2-M have been addressed by OSHA in Appendix F, in the section on laboratory standardization. All biological samples must be analyzed in a laboratory that is proficient in the analysis of that particular analyte, under paragraph (I)(1)(iv). (See Appendix F.) Specifically, under paragraph (I)(1)(iv), the employer is to assure that the collecting and handling of biological samples of cadmium in urine (CdU), cadmium in blood (CdB), and beta-2 microglobulin in urine (b2-M) taken from employees is collected in a manner that assures reliability. The employer must also assure that analysis of biological samples of cadmium in urine (CdU), cadmium in blood (CdB), and beta-2 microglobulin in urine (b2-M) taken from employees is performed in laboratories with demonstrated proficiency for that particular analyte. (See Appendix F.)

3. Lung and Prostate Cancer: The primary sites for cadmium-associated cancer appear to be the lung and the prostate (L-140-50). Evidence for an association between cancer and cadmium exposure derives from both epidemiological studies and animal experiments. Mortality from prostate cancer associated with cadmium is slightly elevated in several industrial cohorts, but the number of cases is small and there is not clear dose-response relationship. More substantive evidence exists for lung cancer.

The major epidemiological study of lung cancer was conducted by Thun et al., (Ex. 4-68). Adequate data on cadmium exposures were available to allow evaluation of dose-response relationships between cadmium exposure and lung cancer. A statistically significant excess of lung cancer attributed to cadmium exposure was observed in this study even when confounding variables such as co-exposure to arsenic and smoking habits were taken into consideration (Ex. L-140-50).

The primary evidence for quantifying a link between lung cancer and cadmium exposure from animal studies derives from two rat bioassay studies; one by Takenaka et al., (1983), which is a study of cadmium chloride and a second study by Oldiges and Glaser (1990) of four cadmium compounds. Based on the above cited studies, the U.S. Environmental Protection Agency (EPA) classified cadmium as “B1”, a probable human carcinogen, in 1985 (Ex. 4-4). The International Agency for Research on Cancer (IARC) in 1987 also recommended that cadmium be listed as “2A”, a probable human carcinogen (Ex. 4-15). The American Conference of Governmental Industrial Hygienists (ACGIH) has recently recommended that cadmium be labeled as a carcinogen. Since 1984, NIOSH has concluded that cadmium is possibly a human carcinogen and has recommended that exposures be controlled to the lowest level feasible.

4. Non-carcinogenic Effects: Acute pneumonitis occurs 10 to 24 hours after initial acute inhalation of high levels of cadmium fumes with symptoms such as fever and chest pain (Exs. 30, 8-86B). In extreme exposure cases pulmonary edema may develop and cause death several days after exposure. Little actual exposure measurement data is available on the level of airborne cadmium exposure that causes such immediate adverse lung effects, nonetheless, it is reasonable to believe a cadmium concentration of approximately 1 mg/m³ over an eight hour period is “immediately dangerous” (55 FR 4052, ANSI).

In addition to acute lung effects and chronic renal effects, long term exposure to cadmium may cause other severe effects on the respiratory system. Reduced pulmonary function and chronic lung disease indicative of emphysema have been observed in workers who have had prolonged exposure to cadmium dust or fumes (Exs. 4-29, 4-22, 4-42, 4-50, 4-63).

In a study of workers conducted by Kazantzis et al., a statistically significant excess of worker deaths due to chronic bronchitis was found, which in his opinion was directly related to high cadmium exposures of 1 mg/m³ or more (Tr. 6/8/90, pp. 156-157).

Cadmium need not be respirable to constitute a hazard. Inspirable cadmium particles that are too large to be respirable but small enough to enter the tracheobronchial region of the lung can lead to bronchoconstriction, chronic pulmonary disease, and cancer of that portion of the lung.

All of these diseases have been associated with occupational exposure to cadmium (Ex. 8-86B). Particles that are constrained by their size to the extra-thoracic regions of the respiratory system such as the nose and maxillary sinuses can be swallowed through mucociliary clearance and be absorbed into the body (ACGIH, Ex. 8-692). The impaction of these particles in the upper airways can lead to anosmia, or loss of sense of smell, which is an early indication of overexposure among workers exposed to heavy metals. This condition is commonly reported among cadmium-exposed workers (Ex. 8-86-B).

C. Medical Surveillance: In general, the main provisions of the medical surveillance section of the standard, under paragraphs (I)(1)-(17) of the regulatory text, are as follows:

1. Workers exposed above the action level are covered;
2. Workers with intermittent exposures are not covered;
3. Past workers who are covered receive biological monitoring for at least one year;
4. Initial examinations include a medical questionnaire and biological monitoring of cadmium in blood (CdB), cadmium in urine (CdU), and Beta-2- microglobulin in urine (b2-M);
5. Biological monitoring of these three analytes is performed at least annually; full medical examinations are performed biennially;
6. Until five years from the effective date of the standard, medical removal is required when CdU is greater than 15 µg/gram creatinine (g Cr), or CdB is greater than 15 µg/liter whole blood (lwb), or b2-M is greater than 1500 µg/g Cr, and CdB is greater than 5 µg/lwb or CdU is greater than 3 µg/g Cr;
7. Beginning five years after the standard is in effect, medical removal triggers will be reduced;
8. Medical removal protection benefits are to be provided for up to 18 months;
9. Limited initial medical examinations are required for respirator usage;
10. Major provisions are fully described under section (I) of the regulatory text; they are outlined here as follows:

- A. Eligibility
- B. Biological monitoring
- C. Actions triggered by levels of CdU, CdB, and b2-M (See Summary Charts & Tables in Attach. 1.)
- D. Periodic medical surveillance
- E. Actions triggered by periodic medical surveillance (See Appendix A Summary Chart and Tables in Attachment 1.)
- F. Respirator usage
- G. Emergency medical examinations
- H. Termination examination
- I. Information to physician
- J. Physician's medical opinion
- K. Medical removal protection
- L. Medical removal protection benefits
- M. Multiple physician review
- N. Alternate physician review
- O. Information employer gives to employee
- P. Recordkeeping
- Q. Reporting on OSHA form 200

11. The above mentioned summary of the medical surveillance provisions, the summary chart, and tables for the actions triggered at different levels of CdU, CdB and b2-M (in Appendix A – Attachment 1) are included only for the purpose of facilitating understanding of the provisions of paragraphs (I)(3) of the final cadmium standard. The summary of the provisions, the summary chart, and the tables do not add to or reduce the requirements in paragraph (I)(3).

D. Recommendations to Physicians

1. It is strongly recommended that patients with tubular proteinuria are counseled on: The hazards of smoking; avoidance of nephrotoxins and certain prescriptions and over-the-counter medications that may exacerbate kidney symptoms; how to control diabetes and/or blood pressure; proper hydration, diet, and exercise (Ex. 19-2). A list of prominent or common nephrotoxins is attached.

(See Appendix A Attachment 2.)

2. DO NOT CHELATE; KNOW WHICH DRUGS ARE NEPHROTOXINS OR ARE ASSOCIATED WITH NEPHRITIS.

3. The gravity of cadmium-induced renal damage is compounded by the fact there is no medical treatment to prevent or reduce the accumulation of cadmium in the kidney (Ex. 8-619). Dr. Friberg, a leading world expert on cadmium toxicity, indicated in 1992, that there is no form of chelating agent that could be used without substantial risk. He stated that tubular proteinuria has to be treated in the same way as other kidney disorders (Ex. 29).

4. After the results of a workers' biological monitoring or medical examination are received the employer is required to provide an information sheet to the patient, briefly explaining the significance of the results. (See Attachment 3 of this Appendix A.)

5. For additional information the physician is referred to the following additional resources:

- The physician can always obtain a copy of the preamble, with its full discussion of the health effects, from OSHA's Computerized Information System (OCIS).
- The Docket Officer maintains a record of the rulemaking. The Cadmium Docket (H-057A), is located at 200 Constitution Ave. NW., room N-2625, Washington, DC 20210; telephone: 202-219-7894.
- The following articles and exhibits in particular from that docket (H-057A):

Exhibit number	Author and paper title
8-447	Lauwerys <i>et al.</i> , Guide for physicians, "Health Maintenance of Workers Exposed to Cadmium," published by the Cadmium Council.
4-67	Takenaka, S., H. Oldiges, H. Konig, D. Hochrainer, G. Oberdorster. "Carcinogenicity of Cadmium Chloride Aerosols in Wistar Rats". <i>JNCI</i> 70:367-373, 1983. (32)
4-68	Thun, M.J., T.M. Schnoor, A.B. Smith, W.E. Halperin, R.A. Lemen. "Mortality Among a Cohort of U.S. Cadmium Production Workers—An Update." <i>JNCI</i> 74(2):325-33, 1985. (8)
4-25	Elinder, C.G., Kjellstrom, T., Hogstedt, C., <i>et al.</i> , "Cancer Mortality of Cadmium Workers." <i>Brit. J. Ind. Med.</i> 42:651-655, 1985. (14)
4-26	Ellis, K.J. <i>et al.</i> , "Critical Concentrations of Cadmium in Human Renal Cortex: Dose Effect Studies to Cadmium Smelter Workers." <i>J. Toxicol. Environ. Health</i> 7:691-703, 1981. (76)
4-27	Ellis, K.J., S.H. Cohn and T.J. Smith. "Cadmium Inhalation Exposure Estimates: Their Significance with Respect to Kidney and Liver Cadmium Burden." <i>J. Toxicol. Environ. Health</i> 15:173-187. 1985.
4-28	Falck, F.Y., Jr., Fine, L.J., Smith, R.G., McClatchey, K.D., Annesley, T., England, B., and Schork, A.M. "Occupational Cadmium Exposure and Renal Status." <i>Am. J. Ind. Med.</i> 4:541, 1983. (64)
8-86A	Friberg, L., C.G. Elinder, <i>et al.</i> , "Cadmium and Health a Toxicological and Epidemiological Appraisal, Volume I, Exposure, Dose, and Metabolism." CRC Press, Inc., Boca Raton, FL, 1986. (Available from the OSHA Technical Data Center)
8-86B	Friberg, L., C.G. Elinder, <i>et al.</i> , "Cadmium and Health: A Toxicological and Epidemiological Appraisal, Volume II, Effects and Response." CRC Press, Inc., Boca Raton, FL, 1986. (Available from the OSHA Technical Data Center)
L-140-45	Elinder, C.G., "Cancer Mortality of Cadmium Workers", <i>Brit. J. Ind. Med.</i> , 42, 651-655, 1985.
L-140-50	Thun, M., Elinder, C.G., Friberg, L., "Scientific Basis for an Occupational Standard for Cadmium, <i>Am. J. Ind. Med.</i> , 20; 629-642, 1991.

V. Information Sheet

The information sheet (Appendix A, Attachment 3.) or an equally explanatory one should be provided to you after any biological monitoring results are reviewed by the physician, or where applicable, after any medical examination.

APPENDIX A – ATTACHMENT 1:

SUMMARY CHART AND TABLES A AND B OF ACTIONS TRIGGERED BY BIOLOGICAL MONITORING

Appendix A – Summary Chart:

Section (1)(3) Medical Surveillance Categorizing Biological Monitoring Results

(A) Biological monitoring results categories are set forth in Appendix A Table A for the periods ending December 31, 1998 and for the period beginning January 1, 1999.

(B) The results of the biological monitoring for the initial medical exam and the subsequent exams shall determine an employee's biological monitoring result category.

Actions Triggered by Biological Monitoring

(A)

(i) The actions triggered by biological monitoring for an employee are set forth in Appendix A Table B.

(ii) The biological monitoring results for each employee under section (1)(3) shall determine the actions required for that employee. That is, for any employee in biological monitoring category C, the employer will perform all of the actions for which there is an X in column C of Appendix A Table B.

(iii) An employee is assigned the alphabetical category ("A" being the lowest) depending upon the test results of the three biological markers.

(iv) An employee is assigned category A if monitoring results for all three biological markers fall at or below the levels indicated in the table listed for category A.

(v) An employee is assigned category B if any monitoring result for any of the three biological markers fall within the range of levels indicated in the table listed for category B, providing no result exceeds the levels listed for category B.

(vi) An employee is assigned category C if any monitoring result for any of the three biological markers are above the levels listed for category C.

(B) The user of Appendix A Tables A and B should know that these tables are provided only to facilitate understanding of the relevant provisions of paragraph (l)(3) of this section. Appendix A Tables A and B are not meant to add to or subtract from the requirements of those provisions.

APPENDIX A – TABLE A – CATEGORIZATION OF BIOLOGICAL MONITORING RESULTS

APPLICABLE BEGINNING JANUARY 1, 1999

Biological marker	Monitoring result categories		
	A	B	C
Cadmium in urine (CdU) (µg/g creatinine)	≤3	>3 and ≤7	>7
β ₂ -microglobulin (β ₂ -M) (µg/g creatinine)	≤300	>300 and ≤750	>750*
Cadmium in blood (CdB) (µg/liter whole blood)	≤5	>5 and ≤10	>10

* If an employee's β₂-M levels are above 750 µg/g creatinine, in order for mandatory medical removal to be required (See Appendix A Table B.), either the employee's CdU level must also be >3 µg/g creatinine or CdB level must also be >5 µg/liter whole blood.

APPENDIX A – TABLE B: ACTIONS DETERMINED BY BIOLOGICAL MONITORING

This table presents the actions required based on the monitoring result in Appendix A Table A. Each item is a separate requirement in citing noncompliance. For example, a medical examination within 90 days for an employee in category B is separate from the requirement to administer a periodic medical examination for category B employees on an annual basis. (See table on next page)

Required actions	Monitoring result category		
	A ¹	B ¹	C ¹
(1) Biological monitoring:			
(a) Annual	X		
(b) Semiannual		X	
(c) Quarterly			X
(2) Medical examination:			
(a) Biennial	X		
(b) Annual		X	
(c) Semiannual			X
(d) Within 90 days		X	X
(3) Assess within two weeks:			
(a) Excess cadmium exposure		X	X
(b) Work practices		X	X
(c) Personal hygiene		X	X
(d) Respirator usage		X	X
(e) Smoking history		X	X
(f) Hygiene facilities		X	X
(g) Engineering controls		X	X
(h) Correct within 30 days		X	X
(i) Periodically assess exposures			X
(4) Discretionary medical removal		X	X
(5) Mandatory medical removal			X ²

¹ For all employees covered by medical surveillance exclusively because of exposures prior to the effective date of this standard, if they are in Category A, the employer shall follow the requirements of paragraphs (l)(3)(i)(B) and (l)(4)(v)(A). If they are in Category B or C, the employer shall follow the requirements of paragraphs (l)(4)(v)(B)–(C).

² See footnote Appendix A Table A.

APPENDIX A – ATTACHMENT 2: LIST OF MEDICATIONS

A list of the more common medications that a physician, and the employee, may wish to review is likely to include some of the following:

- (1) Anti-convulsants: Paramethadione, phenytoin, trimethadone;
- (2) anti-hypertensive drugs: Captopril, methyldopa;
- (3) antimicrobials: Aminoglycosides, amphotericin B, cephalosporins, ethambutol;
- (4) antineoplastic agents: Cisplatin, methotrexate, mitomycin-C, nitrosoureas, radiation;
- (5) sulfonamide diuretics: Acetazolamide, chlorthalidone, furosemide, thiazides;
- (6) halogenated alkanes, hydrocarbons, and solvents that may occur in some settings: Carbon tetrachloride, ethylene glycol, toluene; iodinated radiographic contrast media; non-steroidal anti-inflammatory drugs; and,
- (7) other miscellaneous compounds: Acetaminophen, allopurinol, amphetamines, azathioprine, cimetidine, cyclosporine, lithium, methoxyflurane, methysergide, D-penicillamine, phenacetin, phenendione.

A list of drugs associated with acute interstitial nephritis includes:

- (1) Anti-microbial drugs: Cephalosporins, chloramphenicol, colistin, erythromycin, ethambutol, isoniazid, paraaminosalicylic acid, penicillins, polymyxin B, rifampin, sulfonamides, tetracyclines, and vancomycin;
- (2) other miscellaneous drugs: Allopurinol, antipyrene, azathioprine, captopril, cimetidine, clofibrate, methyldopa, phenindione, phenylpropanolamine, phenytoin, probenecid, sulfapyrazone, sulfonamid diuretics, triamterene;
- (3) metals: Bismuth, gold.

This list has been derived from commonly available medical textbooks (e.g., Ex. 14-18). The list has been included merely to facilitate the physician's, employer's, and employee's understanding. The list does not represent an official OSHA opinion or policy regarding the use of these medications for particular employees. The use of such medications should be under physician discretion.

APPENDIX A – ATTACHMENT 3:

BIOLOGICAL MONITORING AND MEDICAL EXAMINATION RESULTS

Employee _____ Testing Date _____

Cadmium in Urine _____ $\mu\text{g/g Cr}$ –Normal Levels: $\leq 3 \mu\text{g/g Cr}$.

Cadmium in Blood _____ $\mu\text{g/lwb}$ –Normal Levels: $\leq 5 \mu\text{g/lwb}$.

Beta-2-microglobulin in Urine _____ $\mu\text{g/g Cr}$ –Normal Levels: $\leq 300 \mu\text{g/g Cr}$.

Physical Examination Results: N/A _____ Satisfactory _____

Unsatisfactory _____ (see physician again).

Physician's Review of Pulmonary Function Test: N/A _____ Normal _____ Abnormal _____.

Next biological monitoring or medical examination scheduled for _____

The biological monitoring program has been designed for three main purposes: 1) to identify employees at risk of adverse health effects from excess, chronic exposure to cadmium; 2) to prevent cadmium-induced disease(s); and 3) to detect and minimize existing cadmium-induced disease(s).

The levels of cadmium in the urine and blood provide an estimate of the total amount of cadmium in the body. The amount of a specific protein in the urine (beta-2-microglobulin) indicates changes in kidney function. All three tests must be evaluated together. A single mildly elevated result may not be important if testing at a later time indicates that the results are normal and the workplace has been evaluated to decrease possible sources of cadmium exposure. The levels of cadmium or beta-2-microglobulin may change over a period of days to months and the time needed for those changes to occur is different for each worker.

If the results for biological monitoring are above specific “high levels” [cadmium urine greater than 10 micrograms per gram of creatinine ($\mu\text{g/g Cr}$), cadmium blood greater than 10 micrograms per liter of whole blood ($\mu\text{g/lwb}$), or beta-2-microglobulin greater than 1000 micrograms per gram of creatinine ($\mu\text{g/g Cr}$)], the worker has a much greater chance of developing other kidney diseases.

One way to measure for kidney function is by measuring beta-2-microglobulin in the urine. Beta-2-microglobulin is a protein which is normally found in the blood as it is being filtered in the kidney, and the kidney reabsorbs or returns almost all of the beta-2-microglobulin to the blood. A very small amount (less than $300 \mu\text{g/g Cr}$ in the urine) of beta-2- microglobulin is not reabsorbed into the blood, but is released in the urine. If cadmium damages the kidney, the amount of beta-2-microglobulin in the urine increases because the kidney cells are unable to reabsorb the beta-2-microglobulin normally. An increase in the amount of beta-2-microglobulin in the urine is a very early sign of kidney dysfunction.

A small increase in beta-2-microglobulin in the urine will serve as an early warning sign that the worker may be absorbing cadmium from the air, cigarettes contaminated in the workplace, or eating in areas that are cadmium contaminated.

Even if cadmium causes permanent changes in the kidney's ability to reabsorb beta-2- microglobulin, and the beta-2-microglobulin is above the “high levels”, the loss of kidney function may not lead to any serious health problems. Also, renal function naturally declines as people age. The risk for changes in kidney function for workers who have biological monitoring results between the “normal values” and the “high levels” is not well known. Some people are more cadmium-tolerant, while others are more cadmiumsusceptible.

For anyone with even a slight increase of beta-2-microglobulin, cadmium in the urine, or cadmium in the blood, it is very important to protect the kidney from further damage. Kidney damage can come from other sources than excess cadmium-exposure so it is also recommended that if a worker's levels are “high” he/she should receive counseling about drinking more water; avoiding cadmium-tainted tobacco and certain medications (nephrotoxins, acetaminophen); controlling diet, vitamin intake, blood pressure and diabetes; etc.

OCCUPATIONAL HEALTH HISTORY INTERVIEW WITH REFERENCE TO CADMIUM EXPOSURE

Directions: To be read by employee and signed prior to the interview.

Please answer the questions you will be asked as completely and carefully as you can. These questions are asked of everyone who works with cadmium. You will also be asked to give blood and urine samples. The doctor will give your employer a written opinion on whether you are physically capable of working with cadmium. Legally, the doctor cannot share personal information you may tell him/her with your employer. The following information is considered strictly confidential. The results of the tests will go to you, your doctor and your employer. You will also receive an information sheet explaining the results of any biological monitoring or physical examinations performed.

If you are just being hired, the results of this interview and examination will be used to:

- (1).** Establish your health status and see if working with cadmium might be expected to cause unusual problems,
- (2).** Determine your health status today and see if there are changes over time,
- (3).** See if you can wear a respirator safely.

If you are not a new hire: OSHA says that everyone who works with cadmium can have periodic medical examinations performed by a doctor. The reasons for this are:

- (a).** If there are changes in your health, either because of cadmium or some other reason, to find them early,
- (b).** to prevent kidney damage.

I have read these directions and understand them:

Please sign below.

Employee Name (Please Print)

Employee Signature

Date

Notes:

Handwriting practice lines consisting of 20 sets of three horizontal lines (top, middle dashed, bottom).

Chapter 10

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Permit-Required Confined Spaces

Cain's Pipeline & Industrial Services, LLC. has adopted this policy for entry and work within permit required confined spaces from the following OSHA regulations:

§1910.146 – Permit-Required Confined Spaces

This policy has been implemented by ***Cain's Pipeline & Industrial Services, LLC.*** to ensure that proper safe work practices and procedures are followed to protect employees from the hazards associated with confined spaces. ***Brent Messina*** is designated as the Program Administrator responsible for managing and supervising the Permit-Required Confined Spaces Program. The following practices, procedures, and controls will be enforced as an integral part of our Company safety policy:

- ***Brent Messina*** will ensure that all employees with access to, or duties within, confined spaces are trained in the understanding, knowledge, and skills necessary for the safe performance of duties assigned in those areas. Training will be provided to each affected employee:
 - Before the employee is first assigned confined spaces job duties.
 - Before there is a change in assigned duties.
 - Whenever there is a change in permit space operations that present a hazard about which an employee has not previously been trained.
 - Whenever ***Brent Messina*** has reason to believe either that there are deviations from the required permit space entry procedures or that there are inadequacies in the employee's knowledge or use of these procedures.
- ***Cain's Pipeline & Industrial Services, LLC.*** will certify that the required training has been accomplished. The certification will include employee name, trainer signature/initials, dates of training, and will be made available to employees and their authorized representative.
- Employees must demonstrate proficiency in the following duties of entry into, or work within, confined spaces to complete and receive documented certification of training:
 - Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure.
 - Properly use equipment as required.
 - Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space if required.
 - Alert the attendant whenever the entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or detects a prohibited condition.

- Exit from the permit space as quickly as possible when an order to evacuate is given by the attendant or the entry supervisor, the entrant recognizes any warning sign or symptom of exposure to a dangerous situation, the entrant detects a prohibited condition, or an evacuation alarm is activated.
- *Brent Messina* will identify permit-required confined spaces in our Company's workplaces. Employees will be required to obtain a permit to enter and/or work in those spaces. Prior to entry, *Brent Messina* will assess the conditions and hazards, and decide if workers will enter a permit space. *Brent Messina*, or the assigned entry supervisor, will be responsible for testing and monitoring atmospheric conditions as required. Procedures will be initiated to eliminate or control the hazards in the space including, but not limited to, the following:
 - Specifying acceptable entry conditions.
 - Providing each authorized entrant or that employee's authorized representative with the opportunity to observe any monitoring or testing of permit spaces.
 - Isolating the permit space.
 - Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards.
 - Providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards, and prohibit unauthorized entry.
 - Re-evaluating or verifying that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry. Employees and their representatives are entitled to request additional monitoring at any time.
 - Canceling entry permits once the work is completed, or conditions change, so that occupation of the confined space is no longer safe
- *Cain's Pipeline & Industrial Services, LLC.* will provide and maintain the following equipment at no cost to employees, and ensure that employees use the equipment properly:
 - Testing and monitoring equipment required for atmospheric conditions.
 - Ventilating equipment.
 - Communications equipment.
 - Personal protective equipment where engineering controls do not eliminate hazards, or threat of hazards.
 - Lighting equipment.
 - Barriers and shields as required,
 - Equipment, such as ladders, needed for safe ingress and egress by authorized entrants.
 - Rescue and emergency equipment, except to the extent that the equipment is provided by rescue services.
 - Any other equipment necessary for safe entry into and rescue from permit spaces.

- An attendant will be designated for each area for the purpose of testing and monitoring conditions and personnel anytime employees are assigned to confined spaces. Personnel involved in confined space activities will be designated as attendant, entry supervisor, or authorized entrant, and assigned specific duties relating to confined entry procedures as follows:
 - Authorized entrants are those permitted by an employer to enter a permit space. Entrants have the following duties and responsibilities:
 - 1.** Knowing the permit-space hazards, including the symptoms and consequences of exposure.
 - 2.** Using equipment properly.
 - 3.** Communicating regularly with the attendant.
 - 4.** Notifying the attendant immediately of hazardous conditions.
 - 5.** Leaving the space immediately during a hazardous condition or when the attendant orders an evacuation.
 - Authorized attendants are those who monitor entrants' activities from outside the space. Attendants have the following duties and responsibilities:
 - 1.** Knowing the permit-space hazards, including the symptoms and consequences of exposure.
 - 2.** Knowing how many entrants are in permit space.
 - 3.** Staying out of the space during entry operations.
 - 4.** Keeping in contact with entrants.
 - 5.** Ordering an evacuation for a hazardous condition.
 - 6.** Keeping unauthorized persons away from the space.
 - 7.** Activating rescue procedures.
 - The entry supervisor makes sure attendants and entrants follow entry-permit procedures. The entry supervisor is responsible for the following:
 - 1.** Knowing the permit-space hazards, including the symptoms and consequences of exposure.
 - 2.** Verifying that the entry permit is accurate and current.
 - 3.** Stopping entry operations and canceling the entry permit when permit-space work is done or during a hazardous condition.
 - 4.** Ensuring that responders will be available in an emergency.
 - 5.** Removing any unauthorized person who enters the space.
 - 6.** Ensuring that entry operations are consistent if another authorized person must replace an attendant or an entrant.
- Prior to beginning any work at a new job-site, *Brent Messina*, or the entry supervisor will verify the closest emergency medical and rescue service's ability to respond to a confined space emergency. The number for the verified emergency service will be prominently posted on the permit at the permit entry portal. In the event of an emergency requiring emergency service response, the assigned attendant will notify the entry supervisor, who is responsible for contacting emergency services.

- This service will be determined by *Brent Messina* to be qualified to provide emergency rescue and medical services in the event of a confined space emergency. The attendant will remain on station to assist in evacuating the space and prevent the entry of unauthorized rescue personnel.
- *Cain's Pipeline & Industrial Services, LLC.* will evaluate a prospective Rescue and Emergency Service's ability to respond to a rescue summons in a timely manner, considering the hazard(s) identified. What will be considered timely will vary according to the specific hazards involved in each entry. For example, §1910.134, Respiratory Protection, requires that standby person(s) be provided that are capable of immediate action to rescue employee(s) wearing respiratory protection while in work areas defined as IDLH atmospheres.
- *Brent Messina* will evaluate a prospective rescue service's ability, in terms of proficiency with rescue-related tasks and equipment, to function appropriately while rescuing entrants from the particular permit space or types of permit spaces identified.
- *Brent Messina* will select a rescue team or service from those evaluated that:
 - Has the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified.
 - Is equipped for and proficient in performing the needed rescue services.
- *Brent Messina* will inform each rescue team or service of the hazards they may confront when called on to perform rescue at the site.
- *Brent Messina* will provide the rescue team or service selected with access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations.
- *Cain's Pipeline & Industrial Services, LLC.* employees who have been designated to provide permit space rescue and emergency services will be instructed in and adhere to the following measures:
 - *Brent Messina* will provide affected employees with the personal protective equipment (PPE) needed to conduct permit space rescues safely and train affected employees so they are proficient in the use of that PPE, at no cost to those employees.
 - *Brent Messina* will train affected employees to perform assigned rescue duties and ensure that such employees successfully complete the training required to establish proficiency as an authorized entrant.
 - *Brent Messina* will train affected employees in basic first-aid and cardiopulmonary resuscitation (CPR) and will ensure that at least one member of the rescue team or service holding a current certification in first aid and CPR is available.
 - *Brent Messina* will ensure that affected employees practice making permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces. Representative permit spaces will, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.

- To facilitate non-entry rescue, retrieval systems or methods will be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems will meet the following requirements:
 - Each authorized entrant will use a chest or full body harness, with a retrieval line attached at the center of the entrant's back, above the entrant's head, or at another point which presents a profile small enough for the successful removal of the entrant.
 - The other end of the retrieval line will 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 will be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.
- If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information will be made available to the medical facility treating the exposed entrant.
- In the event that an IDLH (Immediately Dangerous to Life and Health) entry is deemed necessary, *Brent Messina* will first contact the designated emergency response service, and ensure that emergency service is available on site before allowing entry into the confined space.
- The assigned entry supervisor will be responsible for providing first aid where necessary after contacting emergency services.
- No employee will enter a permit-required confined space without first completing an entry permit and having the entry supervisor sign the permit. The steps of the entry-permit procedure include the following:
 - Obtain an entry permit prior to entering the space.
 - Accomplish all pre-permit activities required for entering the space, including atmospheric testing, controlling hazards, having required equipment on hand, and providing for emergency services.
 - Complete all items on the entry permit.
 - Have the entry supervisor authorize and sign the permit. If any item on the permit is checked "NO" (meaning not yet completed or available), the permit will not be signed.
 - Attach a copy of the entry permit outside the entry portal of the confined space. Keep it there until the entry operations are completed and the supervisor cancels the permit.
 - Proceed with entry operations.
- Atmospheric monitoring will be performed regularly during confined space operations to ensure that conditions do not exist, or change, to threaten employees safety. Ventilation of confined spaces is required before entry, during monitoring, and throughout the operation. Monitoring or re-evaluation of conditions may be requested at any time during the operation by any employee, or their representative, who suspects that changes have occurred which might present a hazard to personnel.
- All proposed entrants, attendants, and entry supervisors will participate in the review of the initial atmospheric monitoring, and the completion and review of the entry permit.

- Procedures for coordinating entry operations for multiple employers working simultaneously as authorized entrants in a permit space, so that employees of one employer do not endanger the employees of any other employer include the following:
 - When *Cain's Pipeline & Industrial Services, LLC.* makes arrangements to have another contractor perform work that involves permit space entry, *Cain's Pipeline & Industrial Services, LLC.* will:
 - 1.** Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with *Cain's Pipeline & Industrial Services, LLC.*'s permit space program.
 - 2.** Apprise the contractor of the elements, including the hazards identified and *Cain's Pipeline & Industrial Services, LLC.*'s experience with the space, that make the space in question a permit space.
 - 3.** Apprise the contractor of any precautions or procedures that *Cain's Pipeline & Industrial Services, LLC.* has implemented for the protection of employees in or near permit spaces where contractor personnel will be working.
 - 4.** Coordinate entry operations with the contractor, when our Company's personnel and the contractor's personnel will be working in or near permit spaces.
 - 5.** Debrief the contractor at the conclusion of the entry operations regarding any hazards confronted or created in permit spaces during entry operations.
 - In addition to complying with the permit space requirements that apply to our Company, each contractor who is retained to perform permit space entry operations will:
 - 1.** Obtain any available information regarding permit space hazards and entry operations from our Company's entry supervisor.
 - 2.** Coordinate entry operations with the entry supervisor, when both our Company's personnel and the contractor's personnel will be working in or near permit spaces.
 - 3.** Inform our Company's entry supervisor of any hazards confronted or created in permit spaces, either during the entry operation or through a debriefing.
- If more than one confined space is to be monitored by a single attendant, the means and procedures that will be used in order to enable the attendant to respond to emergencies in one or more permit spaces that he/she is monitoring work include:
 - Continuously maintains an accurate count of authorized entrants in the permit spaces and ensures that the means used to identify authorized entrants accurately identifies who is in the permit space.
 - Remains outside the permit spaces during entry operations until relieved by another attendant.
 - Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space.

- Monitors activities inside and outside the spaces to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit spaces immediately under any of the following conditions if the attendant:
 - 1.** Detects a prohibited condition.
 - 2.** Detects the behavioral effects of hazard exposure in an authorized entrant.
 - 3.** Detects a situation outside the spaces that could endanger the authorized entrants.
 - 4.** Cannot effectively and safely perform all the duties required.
 - Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.
 - Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.
- Multiple confined space entry operations will be under the direct control of the entry supervisor, who will be available on site. The entry supervisor:
 - Verifies that rescue services are available and that the means for summoning them are operable.
 - Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted, and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.
 - Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
 - Determines, whenever responsibility for a permit space entry operation is transferred, and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the permit and that acceptable entry conditions are maintained.
 - Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations.
 - Terminates the entry and cancels the permit as required.
- *Brent Messina*, or the entry supervisor will have the authority to cancel an entry permit upon completion of the assigned task, upon finding unsuitable conditions or preparation, or if unsuitable conditions develop. The entry supervisor will ensure that all personnel have exited the space, that equipment, tools, and materials have been removed, and that no condition which might create a hazard has been left unresolved. The entry supervisor will then mark the permit cancelled, sign the space provided for cancellation, and present the cancelled permit to *Brent Messina* for filing in records.
- The Permit-Required Confined Space Program will be reviewed in the event of an accident/injury, near miss, if employee protection is deemed inadequate, any unauthorized entry, employee complaints, or at least annually using the cancelled entry permits as reference. Revisions will be made to the program as necessary to ensure the safety of our employees.

Certification of Employee Training for Confined Spaces

Cain's Pipeline & Industrial Services, LLC. certifies that the following employee has been trained in the understanding, knowledge, and skills necessary for the safe performance of duties assigned in permit required confined spaces.

Employee Name: _____

Has demonstrated proficiency in the following duties of entry into, or work within confined spaces to complete and receive documented certification of training:

- Knowledge of the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure.
- Proper use of the following equipment as required.
 - Testing and monitoring equipment required for atmospheric conditions.
 - Ventilating equipment
 - Communications equipment
 - Personal protective equipment Lighting equipment
 - Barriers and shields as required
 - Equipment, such as ladders, needed for safe ingress and egress by authorized entrants;
 - Rescue and emergency equipment
 - Any other equipment necessary for safe entry into and rescue from permit spaces.
- Communication with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space if required.
- Alerting the attendant whenever the entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or detects a prohibited condition.
- Exit from the permit space as quickly as possible when an order to evacuate is given by the attendant or the entry supervisor, the entrant recognizes any warning sign or symptom of exposure to a dangerous situation, the entrant detects a prohibited condition, or an evacuation alarm is activated.

Employee Trained By

Date of Training

Signature of Trainer

Date

Employee Signature

Date

Cc: Employee file, Program file

CONFINED SPACE ENTRY PERMIT

Cain's Pipeline & Industrial Services, LLC.

Entry Supervisor:

Permit Number:

Date:

Location and Description of Confined Spaces:

Purpose of Entry:

Scheduled Start _____ a.m.
_____ p.m.
Day _____ Date _____ Time _____

Scheduled Finish _____ a.m.
_____ p.m.
Day _____ Date _____ Time _____

Designated Emergency Medical Service for this job:

Name:

Phone:

Employee(s) In Charge of Entry:

Attendants:

Entrants:

Entrants:

Pre-Entry Authorization (Check those items below which are applicable to this confined space permit.)

☐ Oxygen-Deficient Atmosphere	☐ Engulfment	☐ Energized Electrical Equipment
☐ Oxygen-Enriched Atmosphere	☐ Toxic Atmosphere	☐ Entrapment
☐ Welding/Cutting	☐ Flammable Atmosphere	☐ Hazardous Chemical

Note: If welding/cutting operations are to be performed, attach "Hot Work" form to entry form.

SAFETY PRECAUTIONS/EQUIPMENT TO BE USED

☐ Self-Contained Breathing Apparatus	☐ Lifelines	☐ Signs Posted
☐ Air-Line Respirator	☐ Respirators	☐ Clearance Secured
☐ Fire-Retardant Clothing	☐ Lockout/Tagout	☐ Lighting
☐ Ventilation	☐ Fire Extinguishers	☐ Ground Fault Interrupter
☐ Protective Gloves	☐ Barricade Job Area	

Remarks/Comments

ENVIRONMENTAL CONDITIONS

<i>Tests to be Taken</i>	<i>Date/Time</i>	<i>Re-Testing</i>	<i>Date/Time</i>
Oxygen _____ %	_____ am/pm	Oxygen _____ %	_____ am/pm
Lower Explosive Limit _____ %	_____ am/pm	Lower Explosive Limit _____ %	_____ am/pm
Toxic Atmosphere _____		Toxic Atmosphere _____	
Instruments Used _____		Instruments Used _____	

Signature of Employee conducting safety checks:

Remarks/Comments on the overall condition of the confined space:

☐ **ENTRY AUTHORIZATION** — All actions and/or conditions for safe entry have been performed.

_____	_____	_____	_____
Entry Supervisor Name	Signature	Time	Date

☐ **ENTRY CANCELLATION** — Entry has been completed and all entrants have exited permit space.

_____	_____	_____	_____
Entry Supervisor Name	Signature	Time	Date

Received and reviewed by Program Administrator:

Date: _____ Signature: _____

§1910.146 PERMIT-REQUIRED CONFINED SPACES.

(a) Scope and application. This section contains requirements for practices and procedures to protect employees in general industry from the hazards of entry into permit-required confined spaces. This section does not apply to agriculture, to construction, or to shipyard employment (Parts 1928, 1926, and 1915 of this chapter, respectively).

(b) Definitions. (See DEFINITIONS at the end of this section)

(c) General requirements.

(1) The employer shall evaluate the workplace to determine if any spaces are permit-required confined spaces.

Note: Proper application of the decision flow chart in Appendix A to §1910.146 would facilitate compliance with this requirement.

(2) If the workplace contains permit spaces, the employer shall inform exposed employees, by posting danger signs or by any other equally effective means, of the existence and location of and the danger posed by the permit spaces.

Note: A sign reading "DANGER – PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER" or using other similar language would satisfy the requirement for a sign.

(3) If the employer decides that its employees will not enter permit spaces, the employer shall take effective measures to prevent its employees from entering the permit spaces and shall comply with paragraphs (c)(1), (c)(2), (c)(6), and (c)(8) of this section.

(4) If the employer decides that its employees will enter permit spaces, the employer shall develop and implement a written permit space program that complies with this section. The written program shall be available for inspection by employees and their authorized representatives.

(5) An employer may use the alternate procedures specified in paragraph (c)(5)(ii) of this section for entering a permit space under the conditions set forth in paragraph (c)(5)(i) of this section.

(i) An employer whose employees enter a permit space need not comply with paragraphs (d) through (f) and (h) through (k) of this section, provided that:

(A) The employer can demonstrate that the only hazard posed by the permit space is an actual or potential hazardous atmosphere;

(B) The employer can demonstrate that continuous forced air ventilation alone is sufficient to maintain that permit space safe for entry;

(C) The employer develops monitoring and inspection data that supports the demonstrations required by paragraphs (c)(5)(i)(A) and (c)(5)(i)(B) of this section;

(D) If an initial entry of the permit space is necessary to obtain the data required by paragraph (c)(5)(i)(C) of this section, the entry is performed in compliance with paragraphs (d) through (k) of this section;

(E) The determinations and supporting data required by paragraphs (c)(5)(i)(A), (c)(5)(i)(B), and (c)(5)(i)(C) of this section are documented by the employer and are made available to each employee who enters the permit space under the terms of paragraph (c)(5) of this section or to that employee's authorized representative; and

(F) Entry into the permit space under the terms of paragraph (c)(5)(i) of this section is performed in accordance with the requirements of paragraph (c)(5)(ii) of this section.

Note: See paragraph (c)(7) of this section for reclassification of a permit space after all hazards within the space have been eliminated.

(ii) The following requirements apply to entry into permit spaces that meet the conditions set forth in paragraph (c)(5)(i) of this section.

(A) Any conditions making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.

(B) When entrance covers are removed, the opening shall be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.

(C) Before an employee enters the space, the internal atmosphere shall be tested, with a calibrated direct-reading instrument, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order. Any employee who enters the space, or that employee's authorized representative, shall be provided an opportunity to observe the pre-entry testing required by this paragraph.

(D) There may be no hazardous atmosphere within the space whenever any employee is inside the space.

(E) Continuous forced air ventilation shall be used, as follows:

(1) An employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere;

(2) The forced air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have left the space;

(3) The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space.

(F) The atmosphere within the space shall be periodically tested as necessary to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere. Any employee who enters the space, or that employee's authorized representative, shall be provided with an opportunity to observe the periodic testing required by this paragraph.

(G) If a hazardous atmosphere is detected during entry:

(1) Each employee shall leave the space immediately;

(2) The space shall be evaluated to determine how the hazardous atmosphere developed;

(3) Measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.

(H) The employer shall verify that the space is safe for entry and that the pre-entry measures required by paragraph (c)(5)(ii) of this section have been taken, through a written certification that contains the date, the location of the space, and the signature of the person providing the certification. The certification shall be made before entry and shall be made available to each employee entering the space or to that employee's authorized representative.

(6) When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, the employer shall reevaluate that space and, if necessary, reclassify it as a permit-required confined space.

(7) A space classified by the employer as a permit-required confined space may be reclassified as a non-permit confined space under the following procedures:

(i) If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated.

(ii) If it is necessary to enter the permit space to eliminate hazards, such entry shall be performed under paragraphs (d) through (k) of this section. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated.

Note: Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards. Paragraph (c)(5) covers permit space entry where the employer can demonstrate that forced air ventilation alone will control all hazards in the space.

(iii) The employer shall document the basis for determining that all hazards in a permit space have been eliminated, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification shall be made available to each employee entering the space or to that employee's authorized representative.

(iv) If hazards arise within a permit space that has been declassified to a non-permit space under paragraph (c)(7) of this section, each employee in the space shall exit the space. The employer shall then reevaluate the space and determine whether it must be reclassified as a permit space, in accordance with other applicable provisions of this section.

(8) When an employer (host employer) arranges to have employees of another employer (contractor) perform work that involves permit space entry, the host employer shall:

(i) Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting the requirements of this section;

(ii) Apprise the contractor of the elements, including the hazards identified and the host employer's experience with the space, that make the space in question a permit space;

- (iii) Apprise the contractor of any precautions or procedures that the host employer has implemented for the protection of employees in or near permit spaces where contractor personnel will be working;
 - (iv) Coordinate entry operations with the contractor, when both host employer personnel and contractor personnel will be working in or near permit spaces, as required by paragraph (d)(11) of this section; and
 - (v) Debrief the contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations.
- (9) In addition to complying with the permit space requirements that apply to all employers, each contractor who is retained to perform permit space entry operations shall:
- (i) Obtain any available information regarding permit space hazards and entry operations from the host employer;
 - (ii) Coordinate entry operations with the host employer, when both host employer personnel and contractor personnel will be working in or near permit spaces, as required by paragraph (d)(11) of this section; and
 - (iii) Inform the host employer of the permit space program that the contractor will follow and of any hazards confronted or created in permit spaces, either through a debriefing or during the entry operation.
- (d) Permit-required confined space program (permit space program). Under the permit space program required by paragraph (c)(4) of this section, the employer shall:
- (1) Implement the measures necessary to prevent unauthorized entry;
 - (2) Identify and evaluate the hazards of permit spaces before employees enter them;
 - (3) Develop and implement the means, procedures, and practices necessary for safe permit space entry operations, including, but not limited to, the following:
 - (i) Specifying acceptable entry conditions;
 - (ii) Providing each authorized entrant or that employee's authorized representative with the opportunity to observe any monitoring or testing of permit spaces;
 - (iii) Isolating the permit space;
 - (iv) Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards;
 - (v) Providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards; and
 - (vi) Verifying that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry.
 - (4) Provide the following equipment (specified in paragraphs (d)(4)(i) through (d)(4)(ix) of this section) at no cost to employees, maintain that equipment properly, and ensure that employees use that equipment properly:
 - (i) Testing and monitoring equipment needed to comply with paragraph (d)(5) of this section;
 - (ii) Ventilating equipment needed to obtain acceptable entry conditions;
 - (iii) Communications equipment necessary for compliance with paragraphs (h)(3) and (i)(5) of this section;
 - (iv) Personal protective equipment insofar as feasible engineering and work practice controls do not adequately protect employees;
 - (v) Lighting equipment needed to enable employees to see well enough to work safely and to exit the space quickly in an emergency;
 - (vi) Barriers and shields as required by paragraph (d)(3)(v) of this section;
 - (vii) Equipment, such as ladders, needed for safe ingress and egress by authorized entrants;
 - (viii) Rescue and emergency equipment needed to comply with paragraph (d)(9) of this section, except to the extent that the equipment is provided by rescue services; and
 - (ix) Any other equipment necessary for safe entry into and rescue from permit spaces.

(5) Evaluate permit space conditions as follows when entry operations are conducted:

- (i) Test conditions in the permit space to determine if acceptable entry conditions exist before entry is authorized to begin, except that, if isolation of the space is infeasible because the space is large or is part of a continuous system (such as a sewer), pre-entry testing shall be performed to the extent feasible before entry is authorized and, if entry is authorized, entry conditions shall be continuously monitored in the areas where authorized entrants are working;**
- (ii) Test or monitor the permit space as necessary to determine if acceptable entry conditions are being maintained during the course of entry operations; and**
- (iii) When testing for atmospheric hazards, test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors.**
- (iv) Provide each authorized entrant or that employee's authorized representative an opportunity to observe the pre-entry and any subsequent testing or monitoring of permit spaces;**
- (v) Reevaluate the permit space in the presence of any authorized entrant or that employee's authorized representative who requests that the employer conduct such reevaluation because the entrant or representative has reason to believe that the evaluation of that space may not have been adequate;**
- (vi) Immediately provide each authorized entrant or that employee's authorized representative with the results of any testing conducted in accord with paragraph (d) of this section.**

Note: Atmospheric testing conducted in accordance with Appendix B to §1910.146 would be considered as satisfying the requirements of this paragraph. For permit space operations in sewers, atmospheric testing conducted in accordance with Appendix B, as supplemented by Appendix E to §1910.146, would be considered as satisfying the requirements of this paragraph.

(6) Provide at least one attendant outside the permit space into which entry is authorized for the duration of entry operations;

Note: Attendants may be assigned to monitor more than one permit space provided the duties described in paragraph (i) of this section can be effectively performed for each permit space that is monitored. Likewise, attendants may be stationed at any location outside the permit space to be monitored as long as the duties described in paragraph (i) of this section can be effectively performed for each permit space that is monitored.

(7) If multiple spaces are to be monitored by a single attendant, include in the permit program the means and procedures to enable the attendant to respond to an emergency affecting one or more of the permit spaces being monitored without distraction from the attendant's responsibilities under paragraph (i) of this section;

(8) Designate the persons who are to have active roles (as, for example, authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) in entry operations, identify the duties of each such employee, and provide each such employee with the training required by paragraph (g) of this section;

(9) Develop and implement procedures for summoning rescue and emergency services, for rescuing entrants from permit spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting a rescue;

(10) Develop and implement a system for the preparation, issuance, use, and cancellation of entry permits as required by this section;

(11) Develop and implement procedures to coordinate entry operations when employees of more than one employer are working simultaneously as authorized entrants in a permit space, so that employees of one employer do not endanger the employees of any other employer;

(12) Develop and implement procedures (such as closing off a permit space and canceling the permit) necessary for concluding the entry after entry operations have been completed;

(13) Review entry operations when the employer has reason to believe that the measures taken under the permit space program may not protect employees and revise the program to correct deficiencies found to exist before subsequent entries are authorized; and

Note: Examples of circumstances requiring the review of the permit space program are: any unauthorized entry of a permit space, the detection of a permit space hazard not covered by the permit, the detection of a condition prohibited by the permit, the occurrence of an injury or near-miss during entry, a change in the use or configuration of a permit space, and employee complaints about the effectiveness of the program.

(14) Review the permit space program, using the canceled permits retained under paragraph (e)(6) of this section within 1 year after each entry and revise the program as necessary, to ensure that employees participating in entry operations are protected from permit space hazards.

Note: Employers may perform a single annual review covering all entries performed during a 12-month period. If no entry is performed during a 12-month period, no review is necessary. Appendix C to §1910.146 presents examples of permit space programs that are considered to comply with the requirements of paragraph (d) of this section.

(e) Permit system.

(1) Before entry is authorized, the employer shall document the completion of measures required by paragraph (d)(3) of this section by preparing an entry permit.

Note: Appendix D to §1910.146 presents examples of permits whose elements are considered to comply with the requirements of this section.

(2) Before entry begins, the entry supervisor identified on the permit shall sign the entry permit to authorize entry.

(3) The completed permit shall be made available at the time of entry to all authorized entrants or their authorized representatives, by posting it at the entry portal or by any other equally effective means, so that the entrants can confirm that pre-entry preparations have been completed.

(4) The duration of the permit may not exceed the time required to complete the assigned task or job identified on the permit in accordance with paragraph (f)(2) of this section.

(5) The entry supervisor shall terminate entry and cancel the entry permit when:

(i) The entry operations covered by the entry permit have been completed; or

(ii) A condition that is not allowed under the entry permit arises in or near the permit space.

(6) The employer shall retain each canceled entry permit for at least 1 year to facilitate the review of the permit-required confined space program required by paragraph (d)(14) of this section. Any problems encountered during an entry operation shall be noted on the pertinent permit so that appropriate revisions to the permit space program can be made.

(f) Entry permit. The entry permit that documents compliance with this section and authorizes entry to a permit space shall identify:

(1) The permit space to be entered;

(2) The purpose of the entry;

(3) The date and the authorized duration of the entry permit;

(4) The authorized entrants within the permit space, by name or by such other means (for example, through the use of rosters or tracking systems) as will enable the attendant to determine quickly and accurately, for the duration of the permit, which authorized entrants are inside the permit space;

Note: This requirement may be met by inserting a reference on the entry permit as to the means used, such as a roster or tracking system, to keep track of the authorized entrants within the permit space.

(5) The personnel, by name, currently serving as attendants;

(6) The individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry;

(7) The hazards of the permit space to be entered;

(8) The measures used to isolate the permit space and to eliminate or control permit space hazards before entry;

Note: Those measures can include the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.

(9) The acceptable entry conditions;

(10) The results of initial and periodic tests performed under paragraph (d)(5) of this section, accompanied by the names or initials of the testers and by an indication of when the tests were performed;

(11) The rescue and emergency services that can be summoned and the means (such as the equipment to use and the numbers to call) for summoning those services;

(12) The communication procedures used by authorized entrants and attendants to maintain contact during the entry;

(13) Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this section;

(14) Any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety; and

(15) Any additional permits, such as for hot work, that have been issued to authorize work in the permit space.

(g) Training.

(1) The employer shall provide training so that all employees whose work is regulated by this section acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned under this section.

- (2) Training shall be provided to each affected employee:
- (i) Before the employee is first assigned duties under this section;
 - (ii) Before there is a change in assigned duties;
 - (iii) Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained;
 - (iv) Whenever the employer has reason to believe either that there are deviations from the permit space entry procedures required by paragraph (d)(3) of this section or that there are inadequacies in the employee's knowledge or use of these procedures.
- (3) The training shall establish employee proficiency in the duties required by this section and shall introduce new or revised procedures, as necessary, for compliance with this section.
- (4) The employer shall certify that the training required by paragraphs (g)(1) through (g)(3) of this section has been accomplished. The certification shall contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees and their authorized representatives.
- (h) Duties of authorized entrants. The employer shall ensure that all authorized entrants:
- (1) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
 - (2) Properly use equipment as required by paragraph (d)(4) of this section;
 - (3) Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space as required by paragraph (i)(6) of this section;
 - (4) Alert the attendant whenever:
 - (i) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or
 - (ii) The entrant detects a prohibited condition; and
 - (5) Exit from the permit space as quickly as possible whenever:
 - (i) An order to evacuate is given by the attendant or the entry supervisor,
 - (ii) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation,
 - (iii) The entrant detects a prohibited condition, or
 - (iv) An evacuation alarm is activated.
- (i) Duties of attendants. The employer shall ensure that each attendant:
- (1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
 - (2) Is aware of possible behavioral effects of hazard exposure in authorized entrants;
 - (3) Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants under paragraph (f)(4) of this section accurately identifies who is in the permit space;
 - (4) Remains outside the permit space during entry operations until relieved by another attendant;
- Note: When the employer's permit entry program allows attendant entry for rescue, attendants may enter a permit space to attempt a rescue if they have been trained and equipped for rescue operations as required by paragraph (k)(1) of this section and if they have been relieved as required by paragraph (i)(4) of this section.
- (5) Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space under paragraph (i)(6) of this section;
 - (6) Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions:
 - (i) If the attendant detects a prohibited condition;
 - (ii) If the attendant detects the behavioral effects of hazard exposure in an authorized entrant;
 - (iii) If the attendant detects a situation outside the space that could endanger the authorized entrants; or
 - (iv) If the attendant cannot effectively and safely perform all the duties required under paragraph (i) of this section;
 - (7) Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;

(8) Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:

- (i) Warn the unauthorized persons that they must stay away from the permit space;**
- (ii) Advise the unauthorized persons that they must exit immediately if they have entered the permit space; and**
- (iii) Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;**

(9) Performs non-entry rescues as specified by the employer's rescue procedure; and

(10) Performs no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

(j) Duties of entry supervisors. The employer shall ensure that each entry supervisor:

(1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

(2) Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;

(3) Terminates the entry and cancels the permit as required by paragraph (e)(5) of this section;

(4) Verifies that rescue services are available and that the means for summoning them are operable;

(5) Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and

(6) Determines, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

(k) Rescue and emergency services.

(1) An employer who designates rescue and emergency services, pursuant to paragraph (d)(9) of this section, shall:

(i) Evaluate a prospective rescuer's ability to respond to a rescue summons in a timely manner, considering the hazard(s) identified;

Note to paragraph (k)(1)(i): What will be considered timely will vary according to the specific hazards involved in each entry. For example, §1910.134, Respiratory Protection, requires that employers provide a standby person or persons capable of immediate action to rescue employee(s) wearing respiratory protection while in work areas defined as IDLH atmospheres.

(ii) Evaluate a prospective rescue service's ability, in terms of proficiency with rescue-related tasks and equipment, to function appropriately while rescuing entrants from the particular permit space or types of permit spaces identified;

(iii) Select a rescue team or service from those evaluated that:

(A) Has the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified;

(B) Is equipped for and proficient in performing the needed rescue services;

(iv) Inform each rescue team or service of the hazards they may confront when called on to perform rescue at the site; and

(v) Provide the rescue team or service selected with access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations.

Note to paragraph (k)(1): Non-mandatory Appendix F contains examples of criteria which employers can use in evaluating prospective rescuers as required by paragraph (k)(i) of this section.

(2) An employer whose employees have been designated to provide permit space rescue and emergency services shall take the following measures:

(i) Provide affected employees with the personal protective equipment (PPE) needed to conduct permit space rescues safely and train affected employees so they are proficient in the use of that PPE, at no cost to those employees;

(ii) Train affected employees to perform assigned rescue duties. The employer must ensure that such employees successfully complete the training required to establish proficiency as an authorized entrant, as provided by paragraphs (g) and (h) of this section;

(iii) Train affected employees in basic first-aid and cardiopulmonary resuscitation (CPR). The employer shall ensure that at least one member of the rescue team or service holding a current certification in first aid and CPR is available; and

(iv) Ensure that affected employees practice making permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces. Representative permit spaces shall, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed.

(3) To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems shall meet the following requirements.

(i) Each authorized entrant shall use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head, or at another point which the employer can establish presents a profile small enough for the successful removal of the entrant. 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.

(ii) 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 vertical type permit spaces more than 5 feet (1.52 m) deep.

(4) If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

(I) Employee participation.

(1) Employers shall consult with affected employees and their authorized representatives on the development and implementation of all aspects of the permit space program required by paragraph (c) of this section.

(2) Employers shall make available to affected employees and their authorized representatives all information required to be developed by this section.

[illegible]

Chapter 11

Cain's Pipeline & Industrial Services, LLC.

Policy for Construction Cranes /Crane Operator

Cain's Pipeline & Industrial Services, LLC. has adopted this program to ensure the Crane Operator is fully qualified and suitably prepared to assure the safety of employees from the following OSHA regulations:

§1926.1400 - Cranes

This policy applies to "Crane Operators", cranes, and other material handling equipment for the movement of material by hoisting. ***Brent Messina*** is designated as the Competent Person in authority over all crane and hoisting operations. ***Brent Messina*** will ensure that all safety measures and systems are in place, all safety procedures are adhered to, and ensure regular inspections of the crane, operational site, and rigging equipment are made. ***Cain's Pipeline & Industrial Services, LLC.*** has implemented and will enforce the following work practices and procedures to assure that no employee will be exposed to hazards during crane operations:

Operator Certification

It is a requirement of ***Cain's Pipeline & Industrial Services, LLC.*** that only certified employees are allowed to operate cranes. All employees that were certified prior to November 8th 2010 must be recertified within 4 years of this date through one of the following:

- An accredited crane operator testing organization,
- An audited program provided by ***Cain's Pipeline & Industrial Services, LLC.***, or
- Have U.S. military licensing by a government authority.

Operators not certified prior to November 8th 2010 must be certified through one of these programs prior to being allowed to operate cranes for our company.

Employees are required to attend refresher training every 4 years.

Crane Operator Requirements and Qualifications

- Operators must meet the physical qualifications, pass a physical, a written examination, understand and be able to use a load chart, as well as calculate loads for the crane type.
- An employee selected to operate a crane will meet these specific requirements. No person will be permitted to operate a crane whose hearing or eye-sight is impaired, or who may be suffering from heart disease or similar ailments. The following physical qualifications will be minimum requirements for crane operators and trainees:
 - Have corrected vision that meets the same requirements as vision for a valid driver's license. Possession of a driver's license or a doctor's certificate is evidence of meeting this requirement.
 - Be able to read and understand signs, labels, and instruction manuals.
 - They will be able to distinguish colors, regardless of position of colors, if color differential is required for operation.
 - Their hearing, with or without hearing aid, must be adequate for a specific operation.

- Have effective use of all 4 limbs.
- Be of a height sufficient to operate the controls and to have an unobstructed view over the controls into the work area.
- Be free of known convulsive disorders and episodes of unconsciousness. Evidence that an operator or trainee is subject to seizures or loss of physical control will be sufficient reason for disqualification.
- Have coordination between eyes, hands, and feet.
- They will have sufficient strength, endurance, agility, coordination, and speed of reaction to meet the demands of equipment operation.
- They will have normal depth perception, field of vision, reaction time, manual dexterity, coordination, and no tendencies to dizziness or similar undesirable characteristics.
- Evidence of physical defects or emotional instability which could render the operator or trainee a hazard to their self or others, or could interfere with their safe performance may be sufficient cause for disqualification.

Qualifications for crane operators will be maintained every four years and will include medical and vision evaluations.

Assembly & Disassembly of Cranes

It is the policy of *Cain's Pipeline & Industrial Services, LLC.* that only a qualified competent person is allowed to direct the assembly and disassembly of cranes.

When assembling and disassembling a crane the manufacture's procedures and prohibitions must be followed and not deviated from in anyway.

Ground Conditions

It is a requirement of *Cain's Pipeline & Industrial Services, LLC.* that ground conditions must be stable, drained, and graded by a qualified grade checker prior to any crane being assembled. The same rule applies for supporting materials for the crane. When using supporting materials for the crane the manufacture's specifications must be followed to ensure the adequate support and degree of level are met.

Hazard Identification & Risk Assessment

It is the determination of *Cain's Pipeline & Industrial Services, LLC.* to ensure that prior to work being performed a hazard identification and risk assessment is conducted by a designated competent person. Boundaries of the work zone must be identified by marking with flags and range limiting devices. The work zone must be defined using a 360 degree radius around the crane or the max radius of the crane.

This assessment must ensure that no part of the crane, load line, load, or any part of the crane can get closer than 20 feet to an electrical power line.

In the instance that the assessment identifies that the crane , load line, load or any part of the crane could get closer than 20 feet to a electrical power line, the following measures must be followed:

- Any overhead wire will be considered an energized line until a representative of the owner or utility has checked and indicated otherwise.
- Before any crane operation is started closer than 20 feet to a power line the owner or utility representative will be notified.

- Except where electrical power lines and equipment have been deenergized and visibly grounded at the point of work or where an insulating barrier, not a part of the crane has been erected, or the employee is insulated or isolated from the crane, a crane will maintain clearances in accordance to the following:

Voltage (KV)	Minimum Clearance Distance (Feet)
Up to 50	10
50 to 200	15
200 to 350	20
350 to 500	25
500 to 750	35
750 to 1000	45
Over 1000	As established by the line owner

Where the assessment identifies that the crane has the potential to hit and injure or pin/crush a worker against an object, the hazardous areas of the crane swing radius will be marker with warning lines or railings.

Inspections

It is a requirement of *Cain's Pipeline & Industrial Services, LLC.* that a visual inspection of the crane must be conducted prior to each shift by a designated competent person. The inspection will ensure that the crane is in proper working order.

The things to be inspected visually prior to each shift include the following:

- Control mechanisms for wear and malfunction, each daily use.
- Deterioration or leakage of air or hydraulic systems, each daily use.
- Hydraulic system for oil level, each daily use.
- Hydraulic hoses and fittings for leaks and deterioration.
- All running ropes, each daily use.
- Lifting hooks for deformation or cracks. A hook having a crack, a throat opening of more than 15% of normal or more than 10 degree twist from the plane of an unbent hook will be replaced.
- Rope reeving in conformance with the original installation.
- Electrical apparatus for malfunction, wear, dirt, and moisture accumulations.
- Tires for specified pressure.
- The ground conditions.

Monthly inspections will be made and documented by a designated competent person.

The things to be inspected monthly include the following:

- Structural members and boom for cracks, deformation, and corrosion.
- Bolts and rivets for tightness.
- Sheaves, drums, pins, bearings, shafts, gears, rollers, locking and clamping devices for wear, distortion, and cracks.

- Power sources for performance.
- Brake & clutch system parts, linings, pawls, & ratchets for excessive wear.
- Load, boom angle, and other indicators for inaccuracies over their full range.
- Travel, steering, braking, and locking devices for malfunction.
- Tires for wear or damage.
- Radiators and oil coolers for leakage, blockage of air passages, and improper performance.
- Rust on piston rods and control valves.
- Oil strainers and filters for blockage.

The documentation of monthly inspections must include:

- The parts of the crane checked.
- The results of the inspection.
- The name on signature of the inspector with the date of the inspection.

Records of the documentation must be kept for not less than 3 months.

Operation

It is a requirement of *Cain's Pipeline & Industrial Services, LLC.* that prior to operations beginning the proper safety devices must be installed on the crane and in proper working order. If any of the safety devices such as but not limited to; the crane level indicator, boom stops, jib stops, foot pedal brake locks or horns, are not in proper working order, the crane must be taken out of service and operation will not continue until deemed in proper working order.

- *Cain's Pipeline & Industrial Services, LLC.* will comply with the manufacturer's specifications and limitations applicable to the operation of any and all cranes and derricks. Where manufacturer's specifications are not available, the limitations assigned to the equipment will be based on the determinations of a qualified engineer competent in this field and such determinations will be appropriately documented and recorded. Attachments used with cranes will not exceed the capacity, rating, or scope recommended by the manufacturer.
- Rated load capacities, recommended operating speeds, special hazard warnings, or instruction, and the operations manual for the crane will be kept in the cab of the crane at all times.
- Hand signals to crane and derrick operators will be those prescribed by the applicable ANSI standard for the type of crane in use. An illustration of the signals will be posted at the job site.
- *Brent Messina* is the designated Competent Person who will inspect all machinery and equipment prior to each use, and during use, to make sure it is in safe operating condition. Any deficiencies will be repaired, or defective parts replaced, before continued use.
- *Cain's Pipeline & Industrial Services, LLC.* will maintain a crane and its accessories in a condition which will not endanger an operator or other employees.

- A thorough, annual inspection of the hoisting machinery will be made by *Brent Messina* or by a government or private agency recognized by the U.S. Department of Labor. *Cain's Pipeline & Industrial Services, LLC.* will maintain a record of the dates and results of inspections for each hoisting machine and piece of equipment.
- Whenever internal combustion engine powered equipment exhausts in enclosed spaces, tests will be made and recorded to see that employees are not exposed to unsafe concentrations of toxic gases or oxygen deficient atmospheres.
- A portable dry powder fire extinguisher with not less than 5 BC rating, or higher, will be available in the cab, in the operating enclosure, or on the unit. The operator and maintenance employees will be trained in its use.
- Modifications or additions which affect the safe operation of the equipment may only be made with the manufacturer's written approval. The original safety factor of the equipment will not be reduced if modifications or changes are made to the equipment. Modifications or changes will be certified by a qualified registered engineer. The capacity, operation, and maintenance instruction plates, tags, or decals will be changed accordingly to reflect any modifications or changes.

It is the policy of *Cain's Pipeline & Industrial Services, LLC.* that the operator has the authority to stop or refuse to handle loads if he or she feels that the operation jeopardizes safety concerns. The operations must not proceed until a qualified person deems that the safety is assured.

Signal Person

It is a requirement of *Cain's Pipeline & Industrial Services, LLC.* that if the point of operation is not in full view to the operator, a signal person must be provided for the operation to continue. The same rule applies if:

- The view is obstructed where the crane is traveling.
- The operator deems it necessary due to the site specific safety concerns.

General Crane Operations

- An equipment operator will be familiar with the equipment and its proper care. If adjustments or repairs are necessary or if any defects are known, the operator will report the needed adjustments or repairs or the defects to the responsible supervisor and, upon changing shifts, notify the next operator of the defects.
- All controls will be tested by an operator before beginning a new shift. Any controls that do not operate properly will be adjusted or repaired before operations are begun.
- No minor under eighteen years of age will be employed in occupations involving the operation of any power-driven hoisting apparatus or assisting in such operations by work such as hooking on, loading slings, rigging gear, etc.
- An equipment operator will not engage in any practice that will divert the operator's attention while actually operating equipment. The operator will not eat, smoke, or read while actually engaged in the operation of the crane, or operate the crane when physically unfit.
- Each equipment operator will be responsible for those operations that are under the operator's direct control. When there is any doubt as to safety, an operator will stop operations and consult with the supervisor before continuing work.

- An equipment operator will not leave equipment unattended unless the operator is notified by the responsible supervisor that it is safe to do so. Before leaving, the operator will do all of the following:
 - Land any attached load.
 - Disengage clutches.
 - Put the controls in the off or neutral position.
 - Open the main switch or stop the engine.
 - Engage manual locking devices, in the absence of automatic holding equipment, and the crane is secured against accidental travel.
- When there is a warning sign or lockout on the switch or engine starting controls, an equipment operator will not close the switch or start operations until the sign has been removed by the person who placed it there.
- Before closing the switch or starting the equipment, an operator will put all controls in the off or neutral position and will make sure that all personnel are in the clear.
- If power fails during operation, an equipment operator will do all of the following:
 - Set all brakes and locking devices.
 - Move all clutch or other power controls to the off or neutral position.
 - Communicate with the responsible supervisor in charge of equipment operations.
 - If practical, and applicable, land the load under brake control.
- An operator will respond to signals only from the designated signaller using appropriate signals, except where voice communications equipment is used. An operator will obey a stop signal from anyone. Operating signals will follow an established standard. Whistle signals may be used where one crane only is in operation.
- A crane will be equipped with an audible signaling device which will be actuated before traveling without a signaller and intermittently during travel. When moving a crane, the following signals will be used:
 - Stop, 1 audible signal.
 - Go ahead, 2 audible signals.
 - Back up, 3 audible signals.
- The operator, or someone especially designated, will properly lubricate all working parts of the crane.
- Cranes will be kept clean.
- Whenever the operator finds the main or emergency switch open, it will not be closed, even when starting on regular duty, until it is determined that no one is on or about the crane. The crane will not be oiled or repaired unless the main switch is open.
- If the power goes off, the operator will immediately throw all controllers to the "OFF" position until the power is again available.
- Before closing the main switch, the operator will make sure that all controllers are in the "OFF" position until the power is again available.
- When lowering a load, the operator will proceed carefully and make sure the load is under safe control.

- When leaving the cage the operator will throw all controllers to the "OFF" position and open the main switch.
- Necessary clothing and personal belongings will be stored in such a manner as not to interfere with access or operation.
- Tools, oil cans, waste, extra fuses, and other necessary articles will be stored in the tool box, and will not be permitted to lie loose in or about the cab.
- *Brent Messina* will insure that operators are familiar with the operation and care of the fire extinguishers provided.
- A legible rating chart will be provided at the operator station showing not less than the following information for cranes:
 - Load capacity relating to corresponding boom angles and operating radii for all boom lengths, jib lengths, and angles. Where optional equipment, such as outriggers or extra counterweights are provided by the manufacturer, alternate ratings will be provided in addition.
 - Where structural competence limits the ratings, such information will be shown on the chart.
- The required parts of line for hoist reeving, including the size and construction of rope will be on the rating chart or in the operating manual.
- A crane will not be operated with more than the designed amount of ballast or counterweight. The amount of ballast or counterweight will not be changed without authorization of the manufacturer in writing and making corresponding changes in the rating chart.
- When assembling or disassembling a boom on the ground, it will be blocked to prevent dropping the boom and boom sections.
- When a boom section is manually telescoped it will be positioned so that through and through pinning of the cylinder eye may be accomplished and will be checked in a horizontal position.
- When 2 or more cranes are used to lift a single load, 1 designated employee will direct the rigging, lift, and movement.
- A locomotive crane will not be rotated into a position where other rail cars on an adjacent track might strike it, except where it has been ascertained that cars are not moving on the adjacent track and flag protection has been provided.
- Specified tire pressures will be maintained.

Attaching and Holding a Load

- A load will be attached to the hook by means of a sling or other lifting device. The hoist rope will not be wrapped around a load except when setting or removing a pole.
- Before starting to hoist, the operator will make sure:
 - The hoist rope is not kinked.
 - The multiple part lines are not twisted around each other.
 - The hook is not swinging when brought over the load.
- An employee will not be permitted to pass or stand under a suspended load.
- An operator will not load a crane beyond the rated load. A load which is limited by structural competence rather than by stability will be checked by the operator to determine that the weight does not exceed the rated load.

Moving a Load

- In moving a load, an operator will avoid sudden acceleration and deceleration of a movement of the boom which would cause a swinging action by the load.
- An operator will not move a load or hook if an employee is on it.
- A load will be secured and balanced before it is lifted more than 6 inches.
- An operator will test the hoisting brakes before moving a near rated load by raising the load a few inches and applying the hoisting brakes. This requirement applies to both single or multiple line reeving.
- A load or boom will not be lowered below a point where less than 2 full wraps of rope remain on the drum.
- A load will not be moved in a manner to contact obstructions.
- The rotational speed of a crane will be such that the center of the load does not swing out beyond the radius of the point sheave in use.
- A tag line will be used when rotation of the load would be hazardous.
- A crane will not be used for dragging a load sideways.
- A load will not be lifted over the front area of a truck crane, unless it is within the capacity of the rating chart for the front area of the truck crane.
- Floats or pads secured to outriggers will be used when the load to be handled at a particular radius exceeds the rated load without outriggers. A wood block used to support an outrigger will be:
 - Of such size as to prevent shifting and toppling of the load.
 - Of such strength to resist crushing.
 - Free of defects such as knots and cracks which could effect its ability to support the load.
- Before moving with a load, a designated employee will determine:
 - Position to carry the load.
 - Boom location.
 - Ground conditions.
 - Travel route.
 - Speed of movement.
 - Location of overhead wires.
- A crane, while moving, from 1 location to another, will have:
 - The boom carried in line with the direction of movement.
 - The superstructure secured against rotation, except when negotiating a turn with an operator in the cab or the boom on a dolly.
 - An empty hook restrained against movement.
- A crane with or without a load will not travel with the boom at a height that it may bounce back over the cab.
- A crane operating at a fixed radius will have the boom-hoist pawl or other positive locking device engaged.

Refueling

- A crane fuel tank will not be refueled while the engine is running.
- When refueling is done with portable containers, the containers will be safety cans having automatic closing caps and be labeled as approved by underwriters' laboratories, inc., factory mutual laboratory, or other nationally recognized laboratory.
- Smoking or other sources of sparks and flame will be not less than 25 feet from a refueling operation.

Wire Rope Inspection

- Running ropes in continuous service will have an inspection not less than once a month. The inspection will include:
 - Measurement of diameter of rope.
 - Count of broken wires in 1 lay when concentrated.
 - End connections for broken wires.
 - Corrosion, kinking, crushing, cutting, or other conditions affecting the capability of the rope.
 - Cracked, bent, worn, corroded, or improperly applied end connectors.
- For rope in contact with equalizer sheaves or with saddles, or on sheaves where rope travel is limited, the inspection will include moving the rope from its normal position on the sheave and examining the rope at the rope contact point.
- Inspection of a non-rotating type rope will include the determination that the wires are not broken or worn within the rope.
- A rope which has been idle more than 1 month will be given a complete inspection before being placed in service.

Occasional and Out-of Service Inspections

- A crane which has been idle more than 1 month, but less than 6 months will receive an inspection before being placed in service.
- A crane, which has been idle more than 6 months, will receive an inspection before being placed in service.
- A standby crane will be inspected at not less than 6 month intervals.

Tests for Cranes

- A crane, prior to initial use and after modification, will be given an operational test to insure compliance, including the following:
 - Load hoisting and lowering mechanisms.
 - Boom hoisting and lowering mechanisms.
 - Travel mechanism.
 - Safety devices.
 - Boom extension mechanisms for a mobile hydraulic crane.
- A test load will not exceed 110% of the rated load at any working radius.
- Results of operational tests and load tests will be maintained at the job site.
- Where rerating is necessary, it will be as prescribed in Section 5-2.2 of Chapter 5-2 of USAS B30.5-1968, Crawler, Locomotive and Truck Crane standard, Rerating will not be in excess of the original load rating unless a letter of approval is obtained from the manufacturer and maintained at the job site.

General Maintenance

- *Cain's Pipeline & Industrial Services, LLC.* will establish and maintain a preventative maintenance program under the supervision of an authorized and trained employee or outside service.
- Before adjustments and repairs to a crane are started, the following steps will be taken:
 - The crane will be placed where it does not interfere with other operations.
 - A "warning" or "out of order" sign will be placed at the controls, and the controls will be in the "off" position. The sign need not be used if the energy source is locked out.
 - The power plant will be disconnected, locked out, or made safe by other means.
 - The boom will be lowered to the ground or otherwise secured against dropping.
 - All hydraulic cylinders used for boom hoist and boom telescope on a mobile hydraulic crane will be retracted.
 - Hydraulic oil pressure from all hydraulic circuits will be relieved before loosening or removing hydraulic components of a mobile hydraulic crane.
 - The load block will be lowered to the ground or otherwise secured against dropping, except when operation is necessary for the adjustment.
- After adjustments and repairs have been completed, the crane will not be returned to operations until all guards have been installed, safety devices activated, trapped air removed from the hydraulic system of a mobile hydraulic crane, and maintenance equipment and warning signs or out of order signs removed.
- Hazardous conditions disclosed by the inspection requirements will be corrected before operation of the crane is resumed.
- Adjustments will be maintained to assure correct functioning of such components as operating mechanisms, safety devices, control systems, power plants, brakes, and clutches.
- The original safety factor will be maintained when repairs and replacements are made. Hooks showing defects will be replaced. Pitted or burned electrical contacts affecting their operations will be replaced in sets.
- A crane or its wire rope will not be used as a ground or to carry current. The ground will be attached to the part being welded while welding.

Wire Rope Maintenance

- Running wire ropes will be replaced when they show 6 random broken wires in 1 rope lay or 3 broken wires in 1 strand of a rope lay; wear of 1/3 of the original diameter of outside individual wires; kinking, crushing, or bird caging; heat damage; reduction in nominal diameter of 3/64 inch for ropes to 3/4 inch, 1/16 inch for ropes 7/8 inch to 1 1/8 inch, 3/32 inch for ropes 1 1/4 inch to 1 1/2.
- A standing wire rope will be replaced if it has more than 2 broken wires in 1 lay section beyond an end connection or 1 broken wire at an end connection.
- A wire rope having more than 1 broken wire at a socketed fitting will be resocketed.
- Wire rope will be stored in a manner to prevent damage or deterioration and handled in a manner to prevent kinking or twisting.

- Before cutting preformed rope, seizing will be placed on each side of the cut to prevent unlaying of the strands. On non-preformed rope 7/8 inch in diameter or smaller, 2 seizings will be placed on each side of the cut, and for non-preformed rope more than 7/8 inch in diameter, 3 seizings on each side will be used.
- During installation, wire rope will not be dragged in dirt or around sharp objects.

Crane Definitions

Authorized – means appointed by a duly constituted administrative or regulatory authority.

Boom (Crane) – means a structural member hinged at the lower end to a fixed location and used for supporting hoisting tackle.

Boom Angle – means the acute angle between the longitudinal center line of the boom and the horizontal.

Boom Hoist Mechanism – means a device for supporting the boom and controlling the boom angle.

Boom Point – means the outer extremity of the crane boom that contains the hoist sheave assembly.

Boom Stop – means a device used to limit the angle of the boom at the highest recommended position.

Brake – means a device used for retarding or stopping motion by friction or power means.

Clutch – means a device for the engagement or disengagement of power.

Commercial Truck-mounted Crane – means a crane which consists of a rotating superstructure (center post or turntable), a boom, operating machinery, and 1 or more operator's stations, which is mounted on a frame that is attached to a commercial truck chassis, which usually retains a payload hauling capability, and which has a power source that usually powers the crane. The crane's function is to lift, lower, and swing loads at various radii.

Counterweight – means a weight that is used to supplement the weight of the machine in providing stability for lifting working loads.

Crawler Crane – means a crane which consists of a rotating superstructure that has a power plant, operating machinery, and a boom and which is mounted on a base and equipped with crawler treads for travel. The crane's function is to lift, lower, and swing loads at various radii.

Crosshead – means an overhead structural member that supports the hoist platform to which the hoisting or load cables are attached.

Deadman Control – means a device that stops and locks the machinery when the control is released.

Derrick – means an apparatus which consists of a mast or equivalent member held at the head by guys or braces, with or without a boom, and which is used with a hoisting mechanism and operating ropes.

Designated – means selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.

Direct Geared Hoist – means a hoist that has a drum geared directly to the machine's power source.

Drum – means the cylindrical member around which rope is wound for lifting or lowering the load or boom or swinging the boom supporting structure.

Drum Capacity – means the length of a specific diameter of rope that can be wound on a drum.

Dynamic Loading – means the loads introduced into the machine or its components by forces in motion.

Flange Point – means a point of contact between the rope and the drum flange where the rope changes layers.

Friction Drum Hoist – means a hoist which has a drum that is controlled by friction clutches and brakes and which is provided with drum ratchets and pawls.

Gudgeon Pin – means a pin that is used to connect the base of a boom to the main frame.

Headache Ball – means a weight that is attached to the load line to cause the unloaded line to lower by gravity.

Hoist – means a system of power driven drums, gears, cables, chains, or hydraulic cylinders capable of lifting and lowering loads.

Jib – means an extension that is attached to the boom point to provide added boom length for lifting specified loads. The jib may be in line with the boom or offset to various angles in the vertical plane of the boom.

Landing – means the floor or stage elevation at which the cab or platform can be entered.

Limit Switch – means a device used to interrupt or stop the travel of the load by automatically cutting power from the power source and applying the brakes.

Load Rating – means the rating in pounds established by the manufacturer and is dependent on such factors as anchorage, structural competence, rope strength, and hoist capacity.

Lockout Device – means a positive mechanical method for disconnecting the power supply.

Locomotive Crane – means a crane which consists of a rotating superstructure that has a power plant, operating machinery, and a boom and which is mounted on a base or car that is equipped for travel on a railroad track. A locomotive crane may be self-propelled or propelled by an outside source. The crane's function is to lift, lower, and swing loads at various radii.

Mobile Hydraulic Crane – means a crane using a hydraulic means of powering some of the basic crane functions.

Outriggers (stabilizers) – means extendable or fixed members which are attached to the mounting base and which rest on supports at the outer ends that are used to support the crane or elevator.

Pawl (dog) – means a device for positively holding a member against motion in 1 or more directions.

Personnel Hoist – means a type of elevator which is used for the raising or lowering of personnel and or materials and which is guided.

Power-controlled Lowering – means a system or device in the power train, other than the load hoist brake, that can control the lowering rate of speed of the load hoist mechanism.

Qualified Person – means a person who, through attainment of a recognized degree or certificate of professional standing or by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.

Rail Clamp – means a tong-like metal device which is mounted on a locomotive crane car and which can be connected to the track.

Rated Load – means the maximum load permitted by the manufacturer's specifications.

Rated Rope (line) Pull – means the manufacturer's recommended load in pounds applied to the rope attached to the hoist drum.

Reeving – means a rope system in which the rope travels around drums and sheaves.

Rotation Resistant Rope – means a wire rope consisting of an inner layer of strands laid in one direction covered by a layer of strands laid in the opposite direction which has the effect of counteracting torque by reducing the tendency of the finished rope to rotate.

Running Rope – means a rope that travels around sheaves or drums.

Safety Device – means a device used to prevent the unwanted or unsafe operation of a piece of equipment.

Safety Factor – means the ratio of the breaking strength of a piece of material or object to the maximum designed load or stress applied when in use.

Side Loading – means a load applied at an angle to the vertical plane of the boom.

Signal System – means an audible or visual method of communication between the equipment operator and the persons on the landing or floors.

Spooling Rope – means a winding of rope on a cylindrical drum in evenly spaced, uniform layers.

Standby – means not to be in regular service, but used intermittently or occasionally as required.

Standing Rope – means a supporting rope which maintains a constant distance between points of attachment to the 2 components connected by the rope.

Structural Competence – means the ability of a machine and its components to withstand the stresses imposed by applied loads.

Swing – means the rotation of a mast or boom for movement of loads in a horizontal direction about the axis of rotation.

Tackle – means an assembly of ropes and sheaves arranged for lifting, lowering, and pulling.

Telescoping Boom – means a base boom from which 1 or more boom sections are extended for additional length.

Tie-in – means a rigid device used to affix the hoist tower to the structure.

Two-blocking – means the condition in which the lower load block or hook assembly comes in contact with the upper load block or boom point sheave assembly.

Truck Crane – means a rotating superstructure with a power plant, operating machinery, and a boom mounted on a truck equipped with a power plant for travel.

Wheel-mounted Carrier Crane (multiple-control stations) – means a crane which consists of the rotating superstructure, operating machinery, and operator's station and boom and which is mounted on a crane carrier that is equipped with axles and rubber-tired wheels for travel, a power source, and separate stations for driving and operating. The crane's function is to lift, lower, and swing loads at various radii.

Wheel-mounted Carrier Crane (single-control station) – means a crane which consists of a rotating superstructure, operating machinery, and boom and which is mounted on a crane carrier that is equipped with axles and rubber-tired wheels for travel, a power source, and a single-control station for driving and operating. The crane's function is to lift, lower, and swing loads at various radii.

Whip Line – means a separate or auxiliary hoist rope system of lighter load capacity and higher speed than provided by the main hoist.

Winch Head – means a rotating cylindrical drum which has curved end flanges and which is used for load handling by means of fiber rope coiled about its barrel with hand tension applied to the nonload end.

Working Load – means external load, in pounds (kilograms) or tons (metric tons), applied to a hoist, including the weight of auxiliary load attaching equipment.

SITE-SPECIFIC CRANE OPERATION PLAN & CHECKLIST

Company:		Job Name & Location:	
Job Supervisor:		Date(s) on Site:	
Project Engineer:		Qualified Person:	
Crane Operator:		Qualified Rigger:	
Scope of Work			
Roofing ☐	Sq. Ft.:	Tons:	
Siding ☐	Sq. Ft.:	Tons:	
Decking ☐	Sq. Ft.:	Tons:	
General Miscellaneous ☐	Sq. Ft.:	Tons:	
General Description of Work:			
Site Layout			
1. Has controlling contractor provided adequate access to site?		☐ Yes ☐ No	
2. Is laydown area firm, properly graded, well drained, and accessible?		☐ Yes ☐ No	
Pre-Construction Site Conference			
Has a Pre-Construction Site Conference been held?		☐ Yes ☐ No	
Please list those attending:			
Sequence of Crane Activity			
1. Give a general sequence of Crane activities:			
2. Material delivery date:			
3. How will activities be coordinated with other trades:			
Cranes			
1. Crane Type:			
2. Crane Brand:			
3. Crane Capacity:			
4. How is the site prepared for the crane?			
5. How many different locations will the crane have and where are they?			
6. What is the path for overhead loads?			
7. How will employees be notified of overhead loads?			
8. Are there any critical lifts? (75% of capacity or dual crane)		☐ Yes ☐ No	
a. How many?			
9. Describe critical lifts:			
10. Are lift permits attached for critical lifts?		☐ Yes ☐ No	
11. Are lift permits attached for all lifts over 5,000 lbs.		☐ Yes ☐ No	

Fall Protection		
Has fall protection training been documented?	☐	Yes ☐ No
Is a Competent Person on-site at all times?	☐	Yes ☐ No
Were fall protection systems designed by a Qualified Person?	☐	Yes ☐ No
Falling Object Protection		
Method for securing loose items aloft:		
Are all personnel wearing hard hats?	☐	Yes ☐ No
Are Crane operation areas properly barricaded?	☐	Yes ☐ No
Hazardous Non-Routine Tasks		
Are Job Hazard Analyses performed on all non-routine tasks?	☐	Yes ☐ No
Attach Job Hazard Analyses.		
Training Certification		
Are all personnel properly trained for performing job-related activities?	☐	Yes ☐ No
Are all personnel properly trained for the use of fall protection systems?	☐	Yes ☐ No
Attach documentation of training.		
List of Qualified and Competent Persons		
1. Qualified Person for fall protection system design:		
2. Qualified Rigger:		
3. Crane Operator:		
4. Crane Inspector:		
5. Fall Protection Competent Person:		
Emergency Rescue Procedures		
☐ Self-Rescue	☐ Emergency Response Team	☐ Manbasket
☐ Stair Tower	☐ First Aid Trained Personnel	☐ Hoists
☐ Aerial Lifts	☐ Other	
Other Considerations Specific to this Site:		
Comments:		
Completed By:		Date:
Reviewed By:		Date:

INSPECTION ITEMS & DESCRIPTION

ITEM	DESCRIPTION / PURPOSE
1.) Manufacturer's Operating and Maintenance Manuals	Manufacturer's operating and maintenance manuals shall accompany all mobile hoisting equipment. These manuals set forth specific inspection, operation and maintenance criteria for each mobile crane and lifting capacity.
2.) Guarding	All exposed moving parts such as gears, chains, reciprocating or rotating parts are guarded or isolated.
3.) Swing Clearance Protection	Materials for guarding rear swing area.
4.) High-Voltage Warning Sign	High-voltage warning signs displaying restrictions and requirements should be installed at the operator's station and at strategic locations on the crane.
5.) Boom Stops	Shock absorbing or hydraulic type boom stops are installed in a manner to resist boom overturning.
6.) Jib Boom Stops	Jib stops are restraints to resist overturning.
7.) Boom Angle Indicator	A boom angle indicator readable for the operator station is installed accurately to indicate boom angle.
8.) Boom Hoist Disconnect, Automatic Boom Hoist Shutoff	A boom hoist disconnect safety shutoff or hydraulic relief to automatically stops the boom hoist when the boom reaches a predetermined high angle.
9.) Two-Blocking Device	Cranes with telescoping booms should be equipped with a two-blocking damage prevention feature that has been tested on-site in accordance with manufacturers requirements. All cranes hydraulic and fixed boom used to hoist personnel must be equipped with two-blocking devices on all hoistlines intended to be used in the operation. The anti-two blocking device has automatic capabilities for controlling functions that may cause a two-blocking condition.
10.) Power Controlled Lowering	Cranes for use to hoist personnel must be equipped for power controlled lowering operation on all hoistlines. Check clutch, chains, and sprockets for wear.
11.) Leveling Indicating Device	A device or procedure for leveling the crane must be provided.
12.) Sheaves	Sheave grooves shall be smooth and free from surface defects, cracks, or worn places that could cause rope damage. Flanges must not be broken, cracked, or chipped. The bottom of the sheave groove must form a close fitting saddle for the rope being used. Lower load blocks must be equipped with close fitting guards. Almost every wire rope installation has one or more sheaves – ranging from traveling blocks with complicated reeving patterns to equalizing sheaves where only minimum rope movement is noticed.
13.) Main Hoist and Auxiliary Drums System	Drum crushing is a rope condition sometimes observed which indicates deterioration of the rope. Spooling is that characteristic of a rope which affects how it wraps onto and off a drum. Spooling is affected by the care and skill with which the first larger of wraps is applied on the drum. Manufacturer's criteria during inspection usually specify: ▪ Minimum number of wraps to remain on the drum. ▪ Condition of drum grooves ▪ Condition of flanges at the end of drum. ▪ Rope end attachment. ▪ Spooling characteristics of rope. ▪ Rope condition.
14.) Main Boom, Jib Boom, Boom Extension	Boom jibs, or extensions, must not be cracked or corroded. Bolts and rivets must be tight. Certification that repaired boom members meet manufacturers original design standard shall be documented. Non-certified repaired members shall not be used until recertified.
15.) Load Hooks and Hook Blocks	Hooks and blocks must be permanently labeled with rated capacity. Hooks and blocks are counterweighted to the weight of the overhaul line from highest hook position. Hooks must not have cracks or throat openings more than 15% of normal or twisted off center more than 10° from the longitudinal axis. All hooks

	used to hoist personnel must be equipped with effective positive safety catches especially on hydraulic cranes.
16.) Hydraulic Hoses Fittings and Tubing	Flexible hoses must be sound and show no signs of leaking at the surface or its junction with the metal and couplings. Hoses must not show blistering or abnormal deformation to the outer covering and no leaks at threaded or clamped joints that cannot be eliminated by normal tightening or recommended procedures. There should be no evidence of excessive abrasion or scrubbing on the outer surfaces of hoses, rigid tubing, or hydraulic fittings.
17.) Outriggers	Outrigger number, locations, types and type of control are in accordance with manufacturer's specifications. Outriggers are designed and operated to relieve all weight from wheels or tracks within the boundaries of the outriggers. If not, the manufacturer's specifications and operating procedures must be clearly defined. Outriggers must be visible to the operator or a signal person during extension or setting.
18.) Load Rating Chart	A durable rating chart(s) with legible letters and figures must be attached to the crane in a location accessible to the operator while at the controls. The rating charts shall contain the following: ▪ A full and complete range of manufacturer's crane loading ratings at all stated operating radii. ▪ Optional equipment on the crane such as outriggers and extra counterweight which effect ratings. ▪ A work area chart for which capacities are listed in the load rating chart, i.e. over side, over rear, over front. ▪ Weights of auxiliary equipment, i.e. load block, jibs, boom extensions. ▪ A clearly distinguishable list of ratings based on structural, hydraulic or other factors rather than stability. ▪ A list of no-load work areas. ▪ A description of hoistline reeving requirements on the chart or in operator's manual.
19.) Wire Rope	Main hoist and auxiliary wire rope inspection should include examining for ▪ Broken wires. ▪ Excess wear. ▪ External damage from crushing, kinking, cutting or corrosion.
20.) Cab	Contains all crane function controls in additional to mechanical boom angle indicators, electric wipers, dash lights, warning lights and buzzers, fire extinguishers, seat belts, horn, and clear unbroken glass.
21.) Braking Systems	Truck cranes and self-propelled cranes mounted on rubber-tired chassis or frames must be equipped with a service brake system, secondary stopping emergency brake system and a parking brake system. Unless the owner/operator can show written evidence that such systems were not required by the standards or regulations in force at the date of manufacture and are not available from the manufacturer. The braking systems must have been inspected and tested and found to be in conformance with applicable requirements. Crawler cranes are provided with brakes or other locking devices that effectively hold the machine stationary on level grade during the working cycle. The braking system must be capable of stopping and holding the machine on the maximum grade recommended for travel. The brakes or locks are arranged to engage or remain engaged in the event of loss of operating pressure or power.
22.) Turntable/Crane Body	Make sure that the rotation point of a crane gears and rollers are free of damage, wear and properly adjusted and the components are securely locked and free of cracks or damage. The swing locking mechanism must be functional (pawl, pin) and operated in the cab.
23.) Counterweight	The counterweight must be approved and installed according to manufacturer's specifications with attachment points secured.

CRANE INSPECTION REPORT

Use only equipment which is in safe working condition. DO NOT operate equipment if any inspected items need repair.

Cain's Pipeline & Industrial Services, LLC.

Time:

Date:

Job Site Location:

Operator's Name:

Supervisor's Name:

Inspector(s) Name:

Hour Meter Reading:

Subcontractors On-Site (List Name and Trade):

Equipment Type:

Equipment I.D. Numbers:

Manufacturer:

OK REPAIR N/A GENERAL SITE INFORMATION:

- ☐ ☐ ☐ Safety Program Manual on site?
- ☐ ☐ ☐ Are required OSHA Posters posted?
- ☐ ☐ ☐ Emergency Phone numbers posted?
- ☐ ☐ ☐ Tailgate/Toolbox talks up-to-date?
- ☐ ☐ ☐ Site Lift Plan completed?

OK REPAIR N/A GENERAL SITE INFORMATION:

- ☐ ☐ ☐ Hazard assessment of work area?
- ☐ ☐ ☐ Controls in place for identified hazards?
- ☐ ☐ ☐ Crane swing areas signed and barricaded?
- ☐ ☐ ☐ Operator's manual on lift?
- ☐ ☐ ☐ Prelift meeting completed?

OK REPAIR N/A CARRIER VEHICLE:

- ☐ ☐ ☐ Motor
- ☐ ☐ ☐ Crank case oil is clean and full
- ☐ ☐ ☐ Clutch /Converter
- ☐ ☐ ☐ Drive Line
- ☐ ☐ ☐ Transmission fluid at proper level
- ☐ ☐ ☐ Frame
- ☐ ☐ ☐ Brakes
- ☐ ☐ ☐ Differentials
- ☐ ☐ ☐ Outriggers
- ☐ ☐ ☐ Engine coolant is about 2" below cap

OK REPAIR N/A CARRIER VEHICLE:

- ☐ ☐ ☐ Cab
- ☐ ☐ ☐ Steering
- ☐ ☐ ☐ Lights
- ☐ ☐ ☐ Fire Extinguisher
- ☐ ☐ ☐ Glass
- ☐ ☐ ☐ Warning Lights
- ☐ ☐ ☐ Access
- ☐ ☐ ☐ Rims & Bolts
- ☐ ☐ ☐ Cuts or bulges in the tires
- ☐ ☐ ☐ Tires properly inflated (look on load charts for MFGR recommendations)

OK REPAIR N/A HYDRAULICS:

- ☐ ☐ ☐ Relief Valve(s)
- ☐ ☐ ☐ Restrictor Valves
- ☐ ☐ ☐ Pipe Lines
- ☐ ☐ ☐ Hose Lines
- ☐ ☐ ☐ Outrigger Cylinders
- ☐ ☐ ☐ Boom Hoist Cylinder
- ☐ ☐ ☐ Boom Crowd Cylinder
- ☐ ☐ ☐ Control Valves
- ☐ ☐ ☐ Swing Motor

OK REPAIR N/A HYDRAULICS:

- ☐ ☐ ☐ Hoist Motor
- ☐ ☐ ☐ Pumps
- ☐ ☐ ☐ Bearings
- ☐ ☐ ☐ Check hydraulic oil level
- ☐ ☐ ☐ Mounting Bolts
- ☐ ☐ ☐ Swing Gear
- ☐ ☐ ☐ Swing Pinion
- ☐ ☐ ☐ Seals - Hydraulic

OK REPAIR N/A BOOM:

- ☐ ☐ ☐ Shipper Welds
- ☐ ☐ ☐ Boom Welds
- ☐ ☐ ☐ Pins - Boom Pivot
- ☐ ☐ ☐ Support Roller
- ☐ ☐ ☐ Boom Pins

OK REPAIR N/A BOOM:

- ☐ ☐ ☐ Bearing Sheave
- ☐ ☐ ☐ Load Block Sheave
- ☐ ☐ ☐ Load Block Hook
- ☐ ☐ ☐ Boom Main Section

OK REPAIR N/A WEDGE SOCKETS:

- ☐ ☐ ☐ Wire rope size and wedge socket is a proper match?
- ☐ ☐ ☐ Dead end of wire rope extends at least 9 inches beyond wedge socket?
- ☐ ☐ ☐ Dead end of the wire rope is secured properly?

OK			REPAIR			N/A			SHEAVES:		
☐	☐	☐	The wire rope is seated properly in the sheaves?								
☐	☐	☐	The wire rope keepers (keeps cable from coming out of the sheaves) are in good shape?								
☐	☐	☐	Check the bolts on the sheave plates for tightness?								
☐	☐	☐	Check for any weld cracks?								
☐	☐	☐	Signs of bent or buckled panels or parts?								
OK			REPAIR			N/A			OPERATIONAL CHECKS:		
☐	☐	☐	Crane operators' logs up-to-date and on-site?								
☐	☐	☐	Operators familiar with load charts?								
☐	☐	☐	Load chart is in cab?								
☐	☐	☐	Hand signal charts on crane?								
☐	☐	☐	Handrails leading into crane cab are good condition?								
☐	☐	☐	Out riggers are extended out; working properly?								
☐	☐	☐	Out rigger pads not cracked?								
☐	☐	☐	Outriggers extended & swing radius barricades in place?								
☐	☐	☐	Hydraulic hoses in good condition?								
☐	☐	☐	The drum cable is properly spooled?								
☐	☐	☐	Boom angle indicator is available and working?								
☐	☐	☐	Swing through 360 degrees, does boom angle indicator stay the same throughout rotation?								
☐	☐	☐	Does boom swing brake work properly?								
☐	☐	☐	Back-up alarm is working?								
☐	☐	☐	Does the horn work?								
☐	☐	☐	Engine started, gauges are checked & working properly?								
☐	☐	☐	Crane is leveled, working properly?								
☐	☐	☐	Boom up, unlock the swing break, does it swing when level?								
☐	☐	☐	Extend out the boom, are all sections extending evenly?								
☐	☐	☐	Brakes & brake systems check out?								
☐	☐	☐	Safety pressure relief valves check out?								
☐	☐	☐	Is equipment a safe distance from edge of trench or excavation?								
OK			REPAIR			N/A			MATERIALS HANDLING:		
☐	☐	☐	Chains and slings inspected and tagged as required?								
☐	☐	☐	Employees kept from under suspended loads?								
☐	☐	☐	Materials properly stored or stacked?								
☐	☐	☐	Employees using proper lifting methods?								
☐	☐	☐	Tag lines used to guide loads?								
OK			REPAIR			N/A			HOOKS – Replace If:		
☐	☐	☐	If hook throat opening has increased by 15%								
☐	☐	☐	If load-bearing point (throat) has been worn by 10%, the hook must be replaced.								
☐	☐	☐	If hook tip is twisted by 10° or more, the hook must be replaced.								
☐	☐	☐	Check for excessive damage from chemicals and for deformation and cracks.								
☐	☐	☐	Check for and replace damaged, inoperative, or missing hook latches.								

Unsafe Conditions, Situations, Acts, or Practices Observed: _____

Comments: _____

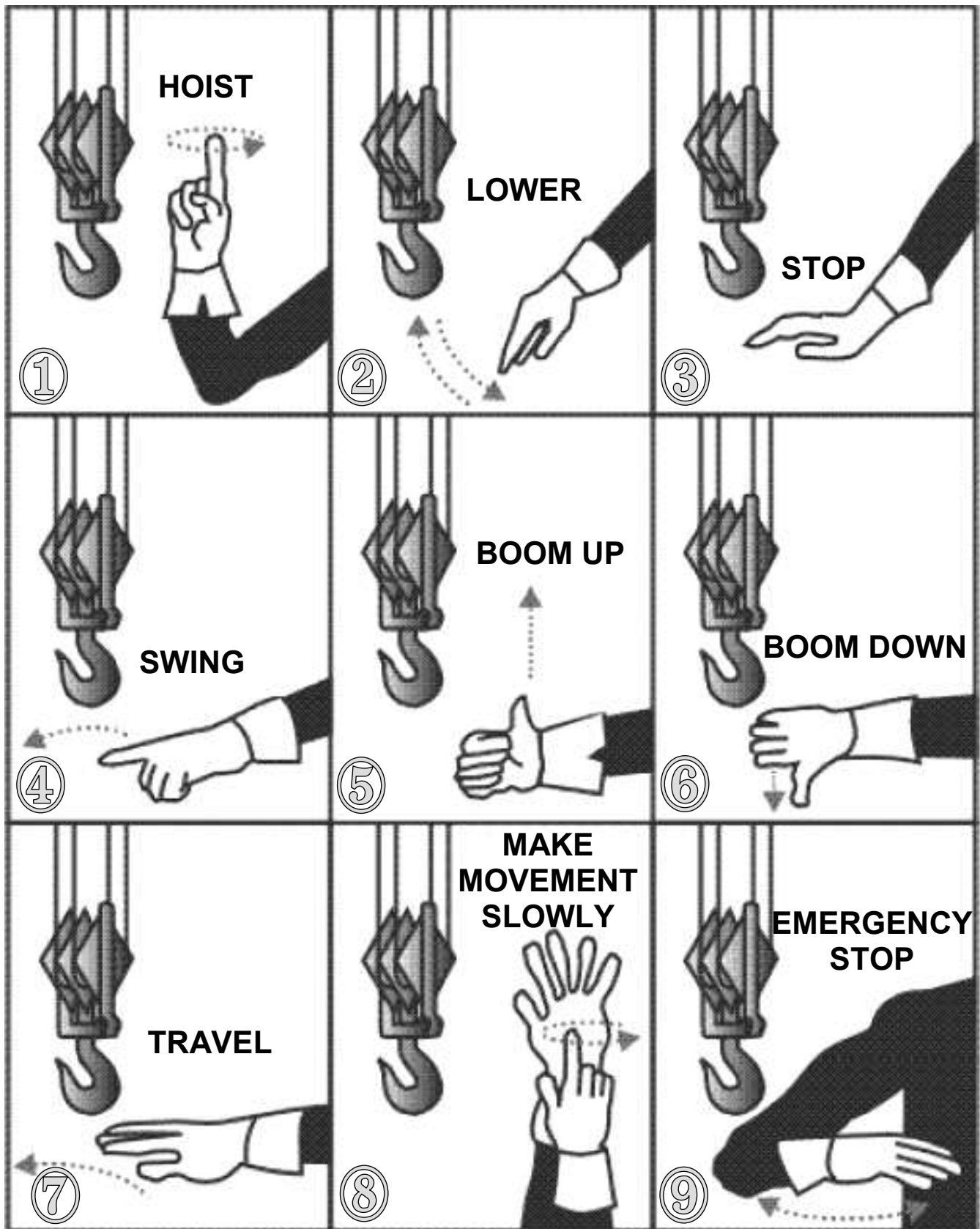
Signature (person) performing inspection/evaluation if different from operator)

Date

Operator's Signature

Date

RECOMMENDED HAND SIGNALS FOR CONTROLLING CRANE OPERATIONS



 USE MAIN HOIST Tap fist on head; then use regular signals.	 USE WHIP LINE (Auxiliary hoist) Tap elbow with one hand, then use regular signals	 DOG EVERYTHING Clasp hands in front of body.
 RAISE THE BOOM AND LOWER THE LOAD With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.	 LOWER THE BOOM AND RAISE THE LOAD With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.	 TRAVEL (Both Tracks) Use both fists in front of body, making a circular motion about each other, indicating direction of travel, forward or backward. (For crawler cranes Only)
 TRAVEL Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.	 EXTENDED BOOM (Telescoping Boom) Both fists in front of body with thumbs pointing outward.	 RETRACT BOOM (Telescoping Boom) Both fists in front of body with thumbs pointing toward each other.

[illegible]

Chapter 12

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Disciplinary Procedures & Methods

Enforcement of Safety Policies

The compliance of all employees with ***Cain's Pipeline & Industrial Services, LLC.*** Safety and Health Program is mandatory and shall be considered a condition of employment. All safety rules, procedures, and plans in effect are to be followed as specified in the safety program. Employees found to be in violation of Company safety policy may be subject to penalty.

Brent Messina is the supervisor for disciplinary actions and any employee in a position of management or supervisory capacity may initiate disciplinary action against any employee found to be in violation of Company policy. Not following verbal or written safety procedures, guidelines, rules, horse play, failure to wear selected PPE, abuse of selected PPE, and etc. constitutes a safety violation.

The following outlines the disciplinary measures which will be taken against employees found to be in violation:

Periodic safety inspections of the workplace and equipment will be undertaken to ensure that all personnel, including supervisory positions, are demonstrating the required commitment to safety. A general neglect of safe work procedures, practices, and requirements in the workplace, or neglect of equipment safety, will be viewed as a lack of supervisory enforcement of safety policy and the appropriate supervisor/management personnel will be subject to the same disciplinary procedures described below.

The following programs will be utilized to ensure employee compliance with the safety program and all safety rules:

- Training programs
- Retraining
- Optional safety incentive programs
- Disciplinary action

Training Programs

The importance of safe work practices and the consequences of failing to abide by safety rules will be covered in the New Employee Safety Orientation and at Tailgate/Toolbox Safety Training. This will help ensure that all employees understand and abide by The Company's safety policies.

Retraining

Employees that are observed performing unsafe acts or not following proper procedures or rules will be retrained by their foreman or supervisor. A Safety Contact Report may be completed by the supervisor to document the training. If multiple employees are involved, additional safety meetings will be held.

Safety Incentive Programs

Although strict adherence to safety policies and procedures is required of all employees, The Company may choose to periodically provide recognition of safety-conscious employees and jobsites without accidents through a safety incentive program.

Disciplinary Action

The failure of an employee to adhere to safety policies and procedures established by *Cain's Pipeline & Industrial Services, LLC*. can have a serious impact on everyone concerned. An unsafe act can threaten not only the health and well being of the employee committing the unsafe act but can also affect the safety of his/her coworkers and/or customers. Accordingly, any employee who violates any of The Company's safety policies will be subject to disciplinary action.

When a "Safety Violation Notice" is issued, appropriate supervisory personnel will meet with employee(s) to discuss the infraction and inform individual(s) of the rule or procedure that was violated and the corrective action to be taken.

Note: Failure to promptly report any on-the-job accident or injury, on the same day as occurrence, is considered a serious violation of The Company's Code of Safe Practices. Any employee who fails to immediately report a work-related accident or injury, no matter how minor shall be subject to disciplinary action.

Employees will be disciplined for infractions of safety rules and unsafe work practices that are observed, not just those that result in an injury. Often, when an injury occurs, the accident investigation will reveal that the injury was caused because the employee violated an established safety rule and/or safe work practice(s).

In any disciplinary action, the foreman should be cautious that discipline is given to the employee for safety violations, and not simply because the employee was injured on the job or filed a Workers' Compensation claim.

Violations of safety rules and the Code of Safe Practices are to be considered equal to violations of other Company policy. Discipline for safety violations will be administered in a manner that is consistent with The Company's system of progressive discipline. If, after training, violations occur, disciplinary action will be taken as follows:

1. **Oral warning.** Documented, including date and facts on the "Safety Warning Report" form. Add any pertinent witness statements. Restate the policy and correct practice(s).
2. **Written warning.** Retrain as to correct procedure/practice.
3. **Written warning with suspension.**
4. **Termination.**

As in all disciplinary actions, each situation is to be carefully evaluated and investigated. The particular step taken in the disciplinary process will depend on the severity of the violation, employee history, and regard to safety. Foremen and superintendents should consult with the office if there is any question about whether or not disciplinary action is justified. Employees may be terminated immediately for willful or extremely serious violations. Union employees are entitled to the grievance process specified by their contract.

Note: Consistency in the enforcement of safety rules shall be exercised at all times.

EMPLOYEE SAFETY WARNING REPORT

Employee's Name		Position	
Date of Warning	Violation Time	☐ am ☐ pm	Violation Date
Supervisor		Department	
Type of Warning	☐ Verbal ☐ Written	☐ Serious ☐ Other:	
Type of Violation	☐ Unsafe Act ☐ Improper Safety Attire	☐ Unsafe condition ☐ Other	
Supervisor's Statement			
Employee's Statement (Check Proper Box)			
☐ I agree with the Supervisor's statement ☐ I disagree with the Supervisor's statement because:			
List all previous warnings and retraining below			
When warned and <u>by whom</u>		I have read and understand this warning decision	
First Warning (Describe reason)		Employee's Signature	
		Date	
Date Date retrained		Supervisor's Signature	
Second Warning (Describe reason)		Date	
Date Date retrained		Copy Distribution	
Third Warning (Describe reason)		☐ Employee	
		☐ Employee's Supervisor	
		☐ Personnel Department	
Date Date retrained		☐ Safety Committee	
The Supervisor must complete this form immediately after the employee has been interviewed. A decision must be made on the following to ensure violators <u>will not</u> participate in the current safety incentive program.			
☐ No further action ☐ Suspension ☐ Other:			
☐ Suspension from current safety incentive program ☐ Dismissal			
Submit this form for review at the next Safety Committee meeting			
Safety Committee Notes			

[illegible]

Chapter 13

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Electrical Hazards

Qualified and Non-Qualified Personnel

This policy for the prevention of employee exposure to electrical hazards is adopted by ***Cain's Pipeline & Industrial Services, LLC.*** in accordance with the following OSHA regulations:

§1910.332 – Training §1910.333 – Selection and Use of Work Practices

NFPA 70E - Standards for Electrical Safety in the Workplace

Cain's Pipeline & Industrial Services, LLC. has implemented this policy to ensure that no employee is exposed to electrical hazards in the workplace. ***Brent Messina*** is the supervisor responsible for ensuring the following policy for controls, training, personal protective equipment, and safe work practices is enforced:

- Only qualified personnel are authorized to perform work, service, or maintenance on electrical parts or systems at *Cain's Pipeline & Industrial Services, LLC.*.
- Non-qualified personnel are prohibited by Company Policy from working on or near exposed energized electrical circuits or systems. If a work task requires unqualified personnel, any exposed electrical systems will be de-energized and lockout/tagout procedures adhered to, per Company Policy, before unqualified personnel are allowed access to the work areas. Non-qualified personnel will be trained in the recognition and avoidance of electrical hazards in the work area.
- *Brent Messina* will ensure that all employees exposed to work involving electrical systems or energized parts will be trained in and familiar with the safety-related work practices required by OSHA regulation and NFPA 70E that pertain to their respective job assignments.
- *Brent Messina* will ensure that all employees exposed to work involving electrical systems will be trained in, and familiar with, the following:
 - The requirements of NFPA 70E Standards for Electrical Safety in the Workplace
 - The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.
 - The skills and techniques necessary to determine the nominal voltage of exposed live parts.
 - The clearance distances specified in §1910.333(c) and the corresponding voltages to which the qualified person will be exposed.
- Safety-related work practices will 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. The specific safety-related work practices will be consistent with the nature and extent of the associated electrical hazards.

- Live parts to which an employee may be exposed will be de-energized before the employee works on or near them
- If the exposed live parts are not de-energized for reasons of increased or additional hazards, other safety-related work practices such as insulating shielding will be used to protect employees who may be exposed to the electrical hazards involved
- Live electrical parts or systems which an employee may be exposed to will be de-energized prior to beginning work on the system. Systems will be assured of being de-energized by proper lockout procedures following company policy.
- Any work to be performed on energized parts will require the use of appropriate personal protective equipment, insulating and shielding materials, and insulated tools.
- If work is to be performed near overhead lines, the lines will be de-energized and grounded, or other protective measures such as insulating shielding will be provided before work is started.
- Vehicles or equipment working near overhead lines will be required to maintain a safe working distance of at least 10 feet. If the voltage is higher than 50 kV, the clearance will be increased 4 inches for every 10 kV over that voltage.
- Employees may not enter spaces containing exposed energized parts or work on energized parts unless illumination is provided that enables the employee to perform the work safely. Employees may not reach blindly into areas which may contain energized parts.
- When an employee works in a confined or enclosed space (such as a manhole or vault) that contains exposed energized parts, *Cain's Pipeline & Industrial Services, LLC*. will provide, and the employee will use, protective shields, protective barriers, or insulating materials as necessary to avoid inadvertent contact with these parts. Doors, hinged panels, and the like will be secured to prevent their swinging into an employee and causing the employee to contact exposed energized parts.
- All workers will maintain the safe approach distances as stated in §1910.333(c)(3) Table S-5.
- Conductive materials and equipment that are in contact with any part of an employee's body will be handled in a manner to prevent them from contacting exposed energized conductors or circuit parts, or will be shielded to prevent conduction of electrical energy. Conductive articles of jewelry and clothing (such as watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear) may not be worn if they might contact exposed energized parts while performing work.
- If conductive materials will be handled in the vicinity of energized electrical parts, the hazardous parts will be shielded or otherwise insulated to prevent accidental contact by the employee or materials being handled.
- Portable ladders will have nonconductive siderails if they are used where the employee or the ladder could contact exposed energized parts. The employee will ensure that the placement of any ladder will allow a safe working distance from any energized parts or equipment.

Training

The training required will be of the classroom or on-the-job type. The degree of training provided will be determined by the risk to the employee based upon the NFPA 70E - Standards for Electrical Safety in the Workplace.

- The training requirements apply to employees who face a risk of electric shock that is not reduced to a safe level by the electrical installation requirements.
- Other employees who also may reasonably be expected to face comparable risk of injury due to electric shock or other electrical hazards will also be trained.
- Employees will be trained in and familiar with the safety-related work practices required that pertain to their respective job assignments.
- Employees who are not qualified persons will also be trained in and familiar with any electrically related safety practices not specifically addressed by regulations but which are necessary for their safety.
- Qualified persons (i.e. those permitted to work on or near exposed energized parts) will, at a minimum, be trained in and familiar with the following:
 - The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.
 - The skills and techniques necessary to determine the nominal voltage of exposed live parts.
 - The specified clearance distances and the corresponding voltages to which the qualified person will be exposed.
 - Qualified persons whose work on energized equipment involves either direct contact or contact by means of tools or materials will also have the required training.

Safe Work Practices

- Safe work practices will 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. The specific safe work practices will be consistent with the nature and extent of the associated electrical hazards.
- Live parts to which an employee may be exposed will be deenergized before the employee works on or near them, unless *Brent Messina* can demonstrate that deenergizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations. Live parts that operate at less than 50 volts to ground need not be deenergized if there will be no increased exposure to electrical burns or to explosion due to electric arcs.
- If the exposed live parts are not deenergized for reasons of increased or additional hazards or infeasibility, other safe work practices will be used to protect employees who may be exposed to the electrical hazards involved. Such work practices will protect employees against contact with energized circuit parts directly with any part of their body or indirectly through some other conductive object. The work practices that are used will be suitable for the conditions under which the work is to be performed and for the voltage level of the exposed electric conductors or circuit parts.

Deenergized Electrical Equipment

- Conductors and parts of electric equipment that have been deenergized but have not been locked out or tagged will be treated as energized parts. This applies to work on or near them.
- While any employee is exposed to contact with parts of fixed electric equipment or circuits which have been deenergized, the circuits energizing the parts will be locked out or tagged or both.

Lockout-Tagout Procedures

- *Brent Messina* will maintain a written copy of these procedures and will make them available for inspection by employees and OSHA.
- Deenergizing equipment.
 - Safe procedures for deenergizing circuits and equipment will be determined before circuits or equipment are deenergized.
 - The circuits and equipment to be worked on will be disconnected from all electric energy sources. Control circuit devices, such as push buttons, selector switches, and interlocks, may not be used as the sole means for deenergizing circuits or equipment. Interlocks for electric equipment may not be used as a substitute for lockout and tagging procedures.
 - Stored electric energy which might endanger personnel will be released. Capacitors will be discharged and high capacitance elements will be short-circuited and grounded, if the stored electric energy might endanger personnel.
 - Stored non-electrical energy in devices that could reenergize electric circuit parts will be blocked or relieved to the extent that the circuit parts could not be accidentally energized by the device.
- Application of locks and tags includes
 - A lock and a tag will be placed on each disconnecting means used to deenergize circuits and equipment on which work is to be performed. The lock will be attached so as to prevent persons from operating the disconnecting means unless they resort to undue force or the use of tools.
 - Each tag will contain a statement prohibiting unauthorized operation of the disconnecting means and removal of the tag.
 - If a lock cannot be applied, or if *Brent Messina* can demonstrate that tagging procedures will provide a level of safety equivalent to that obtained by the use of a lock, a tag may be used without a lock.
 - A tag used without a lock will be supplemented by at least one additional safety measure that provides a level of safety equivalent to that obtained by use of a lock. Examples of additional safety measures include the removal of an isolating circuit element, blocking of a controlling switch, or opening of an extra disconnecting device.

- A lock may be placed without a tag only under the following conditions:
 - 1.** Only one circuit or piece of equipment is deenergized.
 - 2.** The lockout period does not extend beyond the work shift.
 - 3.** Employees exposed to the hazards associated with reenergizing the circuit or equipment are familiar with this procedure.
- Verification of deenergized condition requirements will be met before any circuits or equipment can be considered and worked as deenergized.
 - A qualified person will operate the equipment operating controls or otherwise verify that the equipment cannot be restarted.
 - A qualified person will use test equipment to test the circuit elements and electrical parts of equipment to which employees will be exposed and will verify that the circuit elements and equipment parts are deenergized. The test will also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage backfeed even though specific parts of the circuit have been deenergized and presumed to be safe. If the circuit to be tested is over 600 volts, nominal, the test equipment will be checked for proper operation immediately after this test.
- Reenergizing equipment requirements will be met before circuits or equipment are reenergized, even temporarily.
 - A qualified person will conduct tests and visual inspections to verify that all tools, electrical jumpers, shorts, grounds, or other devices have been removed, so that the circuits and equipment can be safely energized.
 - Employees exposed to the hazards associated with reenergizing the circuit or equipment will be warned to stay clear of circuits and equipment.
 - Each lock and tag will be removed by the employee who applied it or under his or her direct supervision. However, if this employee is absent from the workplace, then the lock or tag may be removed by a qualified person designated to perform this task provided that:
 - 1.** *Brent Messina* ensures that the employee who applied the lock or tag is not available at the workplace.
 - 2.** *Brent Messina* ensures that the employee is aware that the lock or tag has been removed before he or she resumes work at that workplace.
 - There will be a visual determination that all employees are clear of the circuits and equipment.

Energized Electrical Equipment

- Only qualified personnel may work on electric circuit parts or equipment that have not been deenergized under the previously stated procedures. Such personnel will be capable of working safely on energized circuits and will be familiar with the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools.

- If work is to be performed under or near overhead lines, the lines will be deenergized and grounded, or other protective measures will be provided before work is started. If the lines are to be deenergized, arrangements will be made with the person or organization that operates or controls the electric circuits involved to deenergize and ground them. If protective measures, such as guarding, isolating, or insulating, are provided, these precautions will prevent employees from contacting such lines directly with any part of their body or indirectly through conductive materials, tools, or equipment.
- When an unqualified person is working in an elevated position near overhead lines, the location will 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:
 - For voltages to ground 50kV or below – 10 feet.
 - For voltages to ground over 50kV – 10 feet plus 4 inches for every 10kV over 50kV.
- 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 above. For voltages normally encountered with overhead power line, objects which do not have an insulating rating for the voltage involved are considered to be conductive.
- 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 Table S-5 unless:
 - 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).
 - The energized part is insulated both from all other conductive objects at a different potential and from the person.
 - The person is insulated from all conductive objects at a potential different from that of the energized part.

Table S-5 - Approach Distances for Qualified Employees - Alternating Currents

Voltage range (phase to phase)	Minimum approach distance
300V and less	Avoid Contact
Over 300V, not over 750V	1 ft. 0 in.
Over 750V, not over 2kV	1 ft. 6 in.
Over 2kV, not over 15kV	2 ft. 0 in.
Over 15kV, not over 37kV	3 ft. 0 in.
Over 37kV, not over 87.5kV	3 ft. 6 in.
Over 87.5kV, not over 121kV	4 ft. 0 in.
Over 121kV, not over 140kV	4 ft. 6 in.

- Any vehicle or mechanical equipment capable of having parts of its structure elevated near energized overhead lines will be operated so that a clearance of 10 ft. is maintained. If the voltage is higher than 50kV, the clearance will be increased 4 in. for every 10kV over that voltage. However, under any of the following conditions, the clearance may be reduced:

- If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4 ft. If the voltage is higher than 50kV, the clearance will be increased 4 in. for every 10 kV over that voltage.
- 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.
- 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 Table S-5.
- Employees standing on the ground will not contact the vehicle or mechanical equipment or any of its attachments, unless:
 - The employee is using protective equipment rated for the voltage.
 - 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 below.
- 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.
- Additional precautions, such as the use of barricades or insulation, will 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.

Illumination

- Employees may not enter spaces containing exposed energized parts, unless illumination is provided that enables the employees to perform the work safely.
- Where lack of illumination or an obstruction precludes observation of the work to be performed, employees may not perform tasks near exposed energized parts.
- Employees may not reach blindly into areas which may contain energized parts.

Confined Spaces

- When an employee works in a confined or enclosed space (such as a manhole or vault) that contains exposed energized parts, *Cain's Pipeline & Industrial Services, LLC.* will provide, and the employee will use, protective shields, protective barriers, or insulating materials as necessary to avoid inadvertent contact with these parts.
- Doors, hinged panels, and the like will be secured to prevent their swinging into an employee and causing the employee to contact exposed energized parts.

Conductive Materials and Equipment

- Conductive materials and equipment that are in contact with any part of an employee's body will be handled in a manner that will prevent them from contacting exposed energized conductors or circuit parts.

- If an employee will handle long dimensional conductive objects (such as ducts and pipes) in areas with exposed live parts, *Brent Messina* will institute work practices (such as the use of insulation, guarding, and material handling techniques) which will minimize the hazard.

Portable Ladders

- Portable ladders will have nonconductive siderails if they are used where the employee or the ladder could contact exposed energized parts.

Conductive Apparel

- Conductive articles of jewelry and clothing (such a watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear) may not be worn if they might contact exposed energized parts. However, such articles may be worn if they are rendered nonconductive by covering, wrapping, or other insulating means.

Housekeeping

- Where live parts present an electrical contact hazard, employees may not perform housekeeping duties at such close distances to the parts that there is a possibility of contact, unless adequate safeguards (such as insulating equipment or barriers) are provided.
- Electrically conductive cleaning materials (including conductive solids such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions) may not be used in proximity to energized parts unless procedures are followed which will prevent electrical contact.

Interlocks

- Only a qualified person following the requirements of this section may defeat an electrical safety interlock, and then only temporarily while he or she is working on the equipment. The interlock system will be returned to its operable condition when this work is completed.

§1910.332 TRAINING.

(a) **Scope.** The training requirements contained in this section apply to employees who face a risk of electric shock that is not reduced to a safe level by the electrical installation requirements of §§1910.303 through 1910.308.

Note: Employees in occupations listed in Table S-4 face such a risk and are required to be trained. Other employees who also may reasonably be expected to face a comparable risk of injury due to electric shock or other electrical hazards must also be trained.

(b) **Content of training.**

(1) **Practices addressed in this standard.** Employees shall be trained in and familiar with the safety-related work practices required by §§1910.331 through 1910.335 that pertain to their respective job assignments.

(2) **Additional requirements for unqualified persons.** Employees who are covered by paragraph (a) of this section but who are not qualified persons shall also be trained in and familiar with any electrically related safety practices not specifically addressed by §§1910.331 through 1910.335 but which are necessary for their safety.

(3) **Additional requirements for qualified persons.** Qualified persons (i.e., those permitted to work on or near exposed energized parts) shall, at a minimum, be trained in and familiar with the following:

(i) The skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.

(ii) The skills and techniques necessary to determine the nominal voltage of exposed live parts.

(iii) The clearance distances specified in §1910.333(c) and the corresponding voltages to which the qualified person will be exposed.

Note 1: For the purposes of §§1910.331 through 1910.335, a person must have the training required by paragraph (b)(3) of this section in order to be considered a qualified person.

Note 2: Qualified persons whose work on energized equipment involves either direct contact or contact by means of tools or materials must also have the training needed to meet §1910.333(c)(2).

(c) **Type of training.** The training required by this section shall be of the classroom or on-the-job type. The degree of training provided shall be determined by the risk to the employee.

TABLE S-4—TYPICAL OCCUPATIONAL CATEGORIES OF EMPLOYEES FACING A HIGHER THAN NORMAL RISK OF ELECTRICAL ACCIDENT

Occupation	
Blue collar supervisors. ¹	Material handling equipment operators. ¹
Electrical and electronic engineers. ¹	Mechanics and repairers. ¹
Electrical and electronic equipment assemblers. ¹	Painters. ¹
Electrical and electronic technicians. ¹	Riggers and roustabouts. ¹
Electricians.	Stationary engineers. ¹
Industrial machine operators. ¹	Welders.
¹ Workers in these groups do not need to be trained if their work or the work of those they supervise does not bring them or the employees they supervise close enough to exposed parts of electric circuits operating at 50 volts or more to ground for a hazard to exist.	

§1910.333 SELECTION AND USE OF WORK PRACTICES.

(a) **General.** Safety-related 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. The specific safety-related work practices shall be consistent with the nature and extent of the associated electrical hazards.

(1) **Deenergized parts.** Live parts to which an employee may be exposed shall be deenergized before the employee works on or near them, unless the employer can demonstrate that deenergizing introduces additional or increased hazards or is infeasible due to equipment design or operational limitations. Live parts that operate at less than 50 volts to ground need not be deenergized if there will be no increased exposure to electrical burns or to explosion due to electric arcs.

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 circuit parts because of infeasibility due to equipment design or operational limitations include testing or electric circuits that

can only be performed with the circuit energized and work on circuits that form an integral part of a continuous industrial process in a chemical plant that would otherwise need to be completely shut down in order to permit work on one circuit or piece of equipment.

Note 3: Work on or near deenergized parts is covered by paragraph (b) of this section.

(2) **Energized parts.** If the exposed live parts are not deenergized (i.e., for reasons of increased or additional hazards or infeasibility), other safety-related work practices shall be used to protect employees who may be exposed to the electrical hazards involved. Such work practices shall protect employees against contact with

energized circuit parts directly with any part of their body or indirectly through some other conductive object. The work practices that are used shall be suitable for the conditions under which the work is to be performed and for the voltage level of the exposed electric conductors or circuit parts. Specific work practice requirements are detailed in paragraph (c) of this section.

(b) Working on or near exposed deenergized parts.

(1) **Application.** This paragraph applies to work on exposed deenergized parts or near enough to them to expose the employee to any electrical hazard they present. Conductors and parts of electric equipment that have been deenergized but have not been locked out or tagged in accordance with paragraph (b) of this section shall be treated as energized parts, and paragraph (c) of this section applies to work on or near them.

(2) **Lockout and tagging.** While any employee is exposed to contact with parts of fixed electric equipment or circuits which have been deenergized, the circuits energizing the parts shall be locked out or tagged or both in accordance with the requirements of this paragraph. The requirements shall be followed in the order in which they are presented (i.e., paragraph (b)(2)(i) first, then paragraph (b)(2)(ii), etc.).

Note 1: As used in this section, fixed equipment refers to equipment fastened in place or connected by permanent wiring methods.

Note 2: Lockout and tagging procedures that comply with paragraphs (c) through (f) of §1910.147 will also be deemed to comply with paragraph (b)(2) of this section provided that:

- (1) The procedures address the electrical safety hazards covered by this Subpart; and
- (2) The procedures also incorporate the requirements of paragraphs (b)(2)(iii)(D) and (b)(2)(iv)(B) of this section.

(i) **Procedures.** The employer shall maintain a written copy of the procedures outlined in paragraph (b)(2) and shall make it available for inspection by employees and by the Assistant Secretary of Labor and his or her authorized representatives.

Note: The written procedures may be in the form of a copy of paragraph (b) of this section.

(ii) Deenergizing equipment.

(A) Safe procedures for deenergizing circuits and equipment shall be determined before circuits or equipment are deenergized.

(B) The circuits and equipment to be worked on shall be disconnected from all electric energy sources. Control circuit devices, such as push buttons, selector switches, and interlocks, may not be used as the sole means for deenergizing circuits or equipment. Interlocks for electric equipment may not be used as a substitute for lockout and tagging procedures.

(C) Stored electric energy which might endanger personnel shall be released. Capacitors shall be discharged and high capacitance elements shall be short-circuited and grounded, if the stored electric energy might endanger personnel.

Note: If the capacitors or associated equipment are handled in meeting this requirement, they shall be treated as energized.

(D) Stored non-electrical energy in devices that could reenergize electric circuit parts shall be blocked or relieved to the extent that the circuit parts could not be accidentally energized by the device.

(iii) Application of locks and tags.

(A) A lock and a tag shall be placed on each disconnecting means used to deenergize circuits and equipment on which work is to be performed, except as provided in paragraphs (b)(2)(iii)(C) and (b)(2)(iii)(E) of this section. The lock shall be attached so as to prevent persons from operating the disconnecting means unless they resort to undue force or the use of tools.

(B) Each tag shall contain a statement prohibiting unauthorized operation of the disconnecting means and removal of the tag.

(C) If a lock cannot be applied, or if the employer can demonstrate that tagging procedures will provide a level of safety equivalent to that obtained by the use of a lock, a tag may be used without a lock.

(D) A tag used without a lock, as permitted by paragraph (b)(2)(iii)(C) of this section, shall be supplemented by at least one additional safety measure that provides a level of safety equivalent to that obtained by the use of a lock. Examples of additional safety measures include the removal of an isolating circuit element, blocking of a controlling switch, or opening of an extra disconnecting device.

(E) A lock may be placed without a tag only under the following conditions:

- (1) Only one circuit or piece of equipment is deenergized, and
- (2) The lockout period does not extend beyond the work shift, and
- (3) Employees exposed to the hazards associated with reenergizing the circuit or equipment are familiar with this procedure.

(iv) Verification of deenergized condition. The requirements of this paragraph shall be met before any circuits or equipment can be considered and worked as deenergized.

(A) A qualified person shall operate the equipment operating controls or otherwise verify that the equipment cannot be restarted.

(B) A qualified person shall use test equipment to test the circuit elements and electrical parts of equipment to which employees will be exposed and shall verify that the circuit elements and equipment parts are deenergized. The test shall also determine if any energized condition exists as a result of inadvertently induced voltage or unrelated voltage backfeed even though specific parts of the circuit have been deenergized and presumed to be safe. If the circuit to be tested is over 600 volts, nominal, the test equipment shall be checked for proper operation immediately before and immediately after this test.

(v) Reenergizing equipment. These requirements shall be met, in the order given, before circuits or equipment are reenergized, even temporarily.

(A) A qualified person shall conduct tests and visual inspections, as necessary, to verify that all tools, electrical jumpers, shorts, grounds, and other such devices have been removed, so that the circuits and equipment can be safely energized.

(B) Employees exposed to the hazards associated with reenergizing the circuit or equipment shall be warned to stay clear of circuits and equipment.

(C) Each lock and tag shall be removed by the employee who applied it or under his or her direct supervision. However, if this employee is absent from the workplace, then the lock or tag may be removed by a qualified person designated to perform this task provided that:

- (1) The employer ensures that the employee who applied the lock or tag is not available at the workplace, and
- (2) The employer ensures that the employee is aware that the lock or tag has been removed before he or she resumes work at that workplace.

(D) There shall be a visual determination that all employees are clear of the circuits and equipment.

(c) Working on or near exposed energized parts.

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

(2) Work on energized equipment. Only qualified persons may work on electric circuit parts or equipment that have not been deenergized under the procedures of paragraph (b) of this section. Such persons shall be capable of working safely on energized circuits and shall be familiar with the proper use of special precautionary techniques, personal protective equipment, insulating and shielding materials, and insulated tools.

(3) Overhead lines. 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. 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.

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.

Note: The work practices used by qualified persons installing insulating devices on overhead power transmission or distribution lines are covered by §1910.269 of this Part, not by §§1910.332 through

1910.335 of this Part. Under paragraph (c)(2) of this section, unqualified persons are prohibited from performing this type of work.

(i) Unqualified persons.

(A) 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:

- (1) For voltages to ground 50 kV or below – 10 feet (305 cm);
- (2) For voltages to ground over 50 kV – 10 feet (305 cm) plus 4 inches (10 cm) for every 10 kV over 50 kV.

(B) 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 paragraph (c)(3)(i)(A) of this section.

Note: 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.

(ii) Qualified persons. 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 Table S-5 unless:

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

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

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

TABLE S-5. – Approach Distances for Qualified Employees - Alternating Current

Voltage range (phase to phase)	Minimum approach distance
300 V and less	Avoid contact.
Over 300 V, not over 750 V	1 foot 0 inch (30.5 cm).
Over 750 V, not over 2 kV	1 foot 6 inches (46 cm).
Over 2 kV, not over 15 kV	2 feet 0 inch (61 cm).
Over 15 kV, not over 37 kV	3 feet 0 inch (91 cm).
Over 37 kV, not over 87.5 kV	3 feet 6 inches (107 cm).
Over 87.5 kV, not over 121 kV	4 feet 0 inch (122 cm).
Over 121 kV, not over 140 kV	4 feet 6 inches (137 cm).

(iii) Vehicular and mechanical equipment.

(A) 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 (305 cm) is maintained. If the voltage is higher than 50 kV, the clearance shall be increased 4 inches (10 cm) for every 10 kV over that voltage. However, under any of the following conditions, the clearance may be reduced:

- (1) If the vehicle is in transit with its structure lowered, the clearance may be reduced to 4 feet (122 cm). If the voltage is higher than 50 kV, the clearance shall be increased 4 inches (10 cm) for every 10 kV over that voltage.
- (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.
- (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 Table S-5.

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

- (1) The employee is using protective equipment rated for the voltage; or
- (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 paragraph (c)(3)(iii) of this section.

(C) 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. 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.

(4) Illumination.

(i) Employees may not enter spaces containing exposed energized parts, unless illumination is provided that enables the employees to perform the work safely.

(ii) Where lack of illumination or an obstruction precludes observation of the work to be performed, employees may not perform tasks near exposed energized parts. Employees may not reach blindly into areas which may contain energized parts.

(5) Confined or enclosed work spaces. When an employee works in a confined or enclosed space (such as a manhole or vault) that contains exposed energized parts, the employer shall provide, and the employee shall use, protective shields, protective barriers, or insulating materials as necessary to avoid inadvertent contact with these parts. Doors, hinged panels, and the like shall be secured to prevent their swinging into an employee and causing the employee to contact exposed energized parts.

(6) Conductive materials and equipment. Conductive materials and equipment that are in contact with any part of an employee's body shall be handled in a manner that will prevent them from contacting exposed energized conductors or circuit parts. If an employee must handle long dimensional conductive objects (such as ducts and pipes) in areas with exposed live parts, the employer shall institute work practices (such as the use of insulation, guarding, and material handling techniques) which will minimize the hazard.

(7) Portable ladders. Portable ladders shall have nonconductive siderails if they are used where the employee or the ladder could contact exposed energized parts.

(8) Conductive apparel. Conductive articles of jewelry and clothing (such as watch bands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, or metal headgear) may not be worn if they might contact exposed energized parts. However, such articles may be worn if they are rendered nonconductive by covering, wrapping, or other insulating means.

(9) Housekeeping duties. Where live parts present an electrical contact hazard, employees may not perform housekeeping duties at such close distances to the parts that there is a possibility of contact, unless adequate safeguards (such as insulating equipment or barriers) are provided. Electrically conductive cleaning materials (including conductive solids such as steel wool, metalized cloth, and silicon carbide, as well as conductive liquid solutions) may not be used in proximity to energized parts unless procedures are followed which will prevent electrical contact.

(10) Interlocks. Only a qualified person following the requirements of paragraph (c) of this section may defeat an electrical safety interlock, and then only temporarily while he or she is working on the equipment. The interlock system shall be returned to its operable condition when this work is completed.

Notes:

Handwriting practice lines consisting of 20 sets of three horizontal lines (top, middle, and bottom) for letter formation.

Chapter 14

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Fall Protection

Cain's Pipeline & Industrial Services, LLC. has adopted this program for the prevention of employee exposure to fall hazards from the following OSHA regulations:

§1926.501 – ***Duty to have Fall Protection***

§1926.502 – ***Fall Protection Systems – Criteria and Practices***

§1926.503 – ***Training Requirements***

Cain's Pipeline & Industrial Services, LLC. has implemented this policy to ensure that proper safe work practices and procedures are followed to protect employees from the fall hazards. ***Brent Messina*** is the Qualified Person designated as the Program Administrator responsible for managing and supervising the Fall Protection Program. The following work practices, procedures, and engineering controls will be enforced as an integral part of our Company Safety Policy:

- *Cain's Pipeline & Industrial Services, LLC.* will provide at no cost to employees fall protection such as guard rails, safety nets, or personal fall arrest systems whenever employees are potentially exposed to falls to lower levels from heights of six feet or greater. This includes work near and around excavations. Exception: When the standard methods of protection are not feasible or a greater hazard would be created. The exposure determination shall be made without regards to the use of PPE. Scaffolds, ladders, or vehicles will only be used when appropriate fall protection is in place.
- *Brent Messina* will ensure that all employees who participate in work where fall hazards are present are trained in recognition of fall hazards, fall protection procedures, equipment, and work practices. Written certification records will be maintained showing who was trained, types of training, dates of training, signature of person providing training, and the date training was determined to be adequate. Employees will be certified upon completion of training in the following areas:
 - The nature of fall hazards in the work area.
 - The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used.
 - The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, personal fall restraint systems, slide guard systems, positioning devices, and other protection to be used.
 - The role of each employee in the safety monitoring system when this system is used.
 - The limitations on the use of mechanical equipment during the performance of roofing work.
 - The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection.
 - The role of employees in the fall protection work plan.

- Employee re-training in fall protection will be provided when:
 - Previous training is deemed deficient.
 - Changes in work environment occur which would necessitate additional training.
 - Changes in fall protection equipment or systems occur.
 - Employee is observed applying unsafe work practices.
- Fall protection will be required at all times for employees working at heights of 6 feet or above. The fall protection system used will be appropriate for the specific work location or situation where it is required following the guidelines of §1926.502.
- *Brent Messina* is designated the competent person in charge of the fall protection program for *Cain's Pipeline & Industrial Services, LLC.* and will specify a fall protection system for each work-site. *Brent Messina* will supervise implementation of the fall protection system and inspect the system prior to use.
- *Cain's Pipeline & Industrial Services, LLC.* will implement a safety monitoring system where no alternative measure is feasible. In the event a conventional fall protection system is deemed inappropriate, *Brent Messina* will designate the work area a controlled access zone, and will assign a Competent Person to monitor the safety of other employees and will ensure that the safety monitor complies with the following requirements. The assigned safety monitor will:
 - Be competent to recognize fall hazards.
 - Warn the monitored employee(s) when it appears they are unaware of a fall hazard or is acting in an unsafe manner.
 - The safety monitor shall be on the same walking/working surface and within visual sighting distance of the employee(s) being monitored.
 - The safety monitor shall be close enough to communicate orally with the employee(s) being monitored.
 - The safety monitor will have no other responsibilities that could take his/her attention from the monitoring function.
- All accidents and serious incidents involving *Cain's Pipeline & Industrial Services, LLC.* employees will be reported immediately to the supervisor for the work location. All accidents/incidents will be investigated under the guidelines of the company Accident Investigation Program. Changes will be implemented to the Fall Protection Plan as necessary.
- *Cain's Pipeline & Industrial Services, LLC.* will provide for prompt rescue of employees in the event of a fall or will assure the employees are able to rescue themselves.
- All materials and equipment purchased and used at *Cain's Pipeline & Industrial Services, LLC.* for fall protection will comply to ANSI and ASTM standards required for that material or equipment.

SITE-SPECIFIC FALL PROTECTION WORK PLAN

This Fall Protection Work Plan enables workers performing operations with fall hazards to use alternative fall protection systems or methods when conventional systems are not feasible. Under these special circumstances, properly documented fall protection plans give **Cain's Pipeline & Industrial Services, LLC** the flexibility to use more appropriate methods of fall protection when conventional systems are not practical or that they pose a greater safety hazard to workers than other fall protection alternatives. This fall protection plan meets the following requirements:

- **A qualified person** prepared the plan specifically for the site where the work will be performed.
- **The plan documents** why conventional fall protection systems are not feasible and show how alternative methods will reduce or eliminate fall hazards.
- **The plan describes** all measures that will be taken to minimize or eliminate fall hazards at the worksite.

This Fall Protection Work Plan is specific for the following project:

Location of Job: _____

Date plan prepared or modified: _____

Plan prepared by: _____

Plan approved by: _____

Plan supervised by: _____

Statement of Company Policy: *Cain's Pipeline & Industrial Services, LLC* is dedicated to protecting employees from workplace injuries and illnesses. Company management and supervisors are responsible for identifying and correcting hazards on the job. All employees are responsible for working safely. This plan supplements our existing "Safety and Health Program."

This Plan addresses the use of conventional fall protection at a number of areas on this project and identifies specific activities that require unconventional means of fall protection. These activities include:

- _____
- _____
- _____
- _____

Each employee will be trained in these procedures and will strictly adhere to them except when doing so would expose the employee to greater hazards. If, in the employee's opinion, this is the case, the employee is to notify the competent person of his or her concern and have the concern addressed before proceeding.

It is the responsibility of _____, Competent Person, to implement this Fall Protection Work Plan. Work operations will be checked frequently and safety policy and procedures will be enforced.

The Crew Foreman, _____, is responsible for correcting unsafe practices or conditions immediately.

Designated "First Aid Trained" personnel on this site include: _____.

In the event of serious injury, company personnel are directed to call 911 or local Emergency Medical Services at: _____.

It is the responsibility of **Brent Messina** to ensure that all employees understand and adhere to the procedures of this plan and follow the instruction of the crew supervisor. It is the responsibility of the employee to alert management to unsafe or hazardous conditions or practices that may cause injury to employees.

Any changes to the Fall Protection Work Plan must be approved by the Qualified Person, _____.

Appropriate fall protection systems will be used on this job when the risk of fall exists. These processes will be conducted by employees trained to do this type of work and trained to recognize the fall hazards. This plan details how fall-hazards will be minimized by **Cain's Pipeline & Industrial Services, LLC..** Following are the specific requirements for fall protection on this project:

- This Fall Protection Plan must be kept at the jobsite at all times when operations are in progress.
- The implementation of the fall protection plan will be under the supervision of a competent person.
- The personal fall arrest system will include, but not limited to, an anchorage, connectors, and a body harness used to arrest an employee in a fall from the working level.
- A personal fall-restraint system will be used to prevent a worker from reaching an unprotected edge and thus prevent a fall from occurring. The system will consist of an anchorage, connectors, and a body harness or a body belt. The attachment point to the body belt or full body harness will be at the back, front, or side D-rings.
- An anchorage will be used to secure a point of attachment for lifelines, lanyards or deceleration devices. The anchorage will be located directly above the worker, if possible, to reduce the chance of a swing fall. The anchorage will be high enough above a worker to ensure that the arrest system, and not the next lower level, stops the fall. This will make the anchorage, the lanyard, and the harness a complete system. Connectors include carabiners, snap hooks, and D-rings.
- A body harness will be secured about the person in a manner that distributes the fall arrest forces over at least the thighs, pelvis, waist, chest, and shoulders with a means for attaching the harness to other components of the fall arrest system.
- A connector will be used to couple (connect) parts of the personal fall arrest system or positioning device system together.
- A lanyard (flexible line of rope, wire, or strap that generally has a connector at each end) will be used for connecting the body harness to a deceleration device, lifeline, or anchorage.

- A deceleration device such as a rope, grab, ripstitch lanyard, specially woven lanyard, tearing or deforming lanyards, automatic self-retracting lifelines/lanyards will be used to dissipate a substantial amount of energy during a fall arrest, or otherwise limit the energy imposed on an employee during fall arrest.
- A lifeline (compact consisting of a flexible line for connection to an anchorage at one end to hang vertically, or for connection to anchorages at both ends to stretch horizontally), will be used as a means for connecting other components of a personal fall arrest system to the anchorage.
- A body belt, which shall only be used as a positioning device, will be secured about the waist and attached to a lanyard, lifeline, or deceleration device.
- A positioning device system (body harness system) may be used to allow an employee to be supported on an elevated vertical surface and work with both hands free while leaning backwards.
- A rope grab (deceleration device that travels on a lifeline and automatically, by friction, engages the lifeline and locks) will be implemented to arrest a fall.
- A self-retracting lifeline/lanyard (deceleration device containing a drum-wound line which can be slowly extracted from, or retracted onto, the drum under minimal tension during normal employee movement and which, after onset of a fall, automatically locks the drum) may be used to arrest the fall.
- In the event an employee falls, *Cain's Pipeline & Industrial Services, LLC.* will investigate the circumstances of the fall to determine if the fall protection plan needs to be changed (e.g. new practices, procedures, or training) and will implement those changes to prevent similar types of falls.
- Work on or from scaffolds will be prohibited during storms or high winds unless a qualified person has determined that it is safe for employees to be on the scaffold and those employees are protected by a personal fall arrest system.
- Appropriate Personal Protective Equipment, such as hard hats, will be worn at all times when falling objects hazards exist.
- _____
- _____
- _____

Additional Information: _____

This Fall Protection Work Plan approved by:

Name: _____ Title: _____
 (Please Print)

Signature: _____ Date: _____

Fall Protection Work Plan must be kept at the jobsite at all times when operations are in progress.

FALL HAZARD ASSESSMENT

Cain's Pipeline & Industrial Services, LLC.

Job Name:		Location:	
Date Assessed:	Related Operating Procedures Reviewed: ☐ YES ☐ NO	Location Marked and Entry Controlled: ☐ YES ☐ NO	
FALL HAZARD ASSESSMENT CHECKLIST			
1. Can an employee enter the area without restriction and perform work?		☐ YES	☐ NO
2. Are fall prevention systems such as cages, guardrails, toeboards, and manlifts in place		☐ YES	☐ NO
3. Have slipping and tripping hazards been removed or controlled?		☐ YES	☐ NO
4. Have visual warnings of fall hazards been installed?		☐ YES	☐ NO
5. Can the distance a worker could fall be reduced by installing platforms, nets etc.?		☐ YES	☐ NO
6. Are any permanently installed floor coverings, gratings, hatches, or doors missing?		☐ YES	☐ NO
7. Does the location contain any other recognized safety and or health hazards?		☐ YES	☐ NO
8. Is the space designated as a Permit Required Confined Space?		☐ YES	☐ NO
9. Have anchor points been designated and load tested?		☐ YES	☐ NO
Assessment Information: (indicate specifics with initials)			
Initials	Hazard	Remarks/Recommendations	
	Total potential fall distance:		
	Number of workers involved:		
	Frequency of task:		
	Obtainable anchor point strength:		
	Required anchor point strength: (not less than 5000 lbs)		
Additional Requirements:			
Potential environmental conditions that could impact safety:			
Initials	Condition	Remarks/Recommendations	
Possible required structural alterations:			
Initials	Alteration	Remarks/Recommendations	
Possible task modification that may be required:			
Initials	Task	Remarks/Recommendations	
Training requirements:			
Initials	Requirement	Remarks/Recommendations	
Personal protective equipment required:			
Initials	Requirement	Remarks/Recommendations	
Comments:			
☐ Approved AUTHORIZATION			
I certify that I have conducted a Fall Hazard Assessment of the above designated location and have detailed the findings of the assessment on this form. * Further detailed on attachment: ☐ YES ☐ NO			
Title:		Date:	Time:
Name:		Signature:	

FALL PROTECTION PROGRAM

Employee Acknowledgment

By my signature below, I acknowledge that I have received instruction and have read the *Cain's Pipeline & Industrial Services, LLC*. Fall Protection Program. I have been given the opportunity to ask questions and have received answers, instruction, and clarification to my questions. I understand the contents of and agree to follow *Cain's Pipeline & Industrial Services, LLC*. policy with regard to the Fall Protection Program.

Fall Protection Program received on _____, 20 ____

Printed Name of Employee

Signature of Employee

Date

Social Security Number

Printed Name of Trainer

Signature of Trainer

Date

cc: Employee Personnel File

CERTIFICATION

Employee Training for Fall Protection

Cain's Pipeline & Industrial Services, LLC. certifies that the following employee has been trained in the understanding, knowledge, and skills necessary for the safe performance of duties assigned in areas of fall protection hazards.

_____ has demonstrated
(Employee Name)
proficiency in the following areas of fall protection:

- The nature of fall hazards in the work area.
- The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used.
- The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, personal fall restraint systems, slide guard systems, positioning devices, and other protection to be used.
- The role of each employee in the safety monitoring system when this system is used.
- The limitations on the use of mechanical equipment during the performance of roofing work.
- The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection.
- The role of employees in the fall protection work plan.

Employee Trained By

Date of Training

Signature of Trainer

Date

Employee Signature

Date

cc: Employee Personnel File

§1926.501 — DUTY TO HAVE FALL PROTECTION.

(a) General.

(1) This section sets forth requirements for employers to provide fall protection systems. All fall protection required by this section shall conform to the criteria set forth in §1926.502 of this subpart.

(2) The employer shall determine if the walking/working surfaces on which its employees are to work have the strength and structural integrity to support employees safely. Employees shall be allowed to work on those surfaces only when the surfaces have the requisite strength and structural integrity.

(b)(1) **Unprotected Sides and Edges.** Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet or more above a lower level shall be protected from falling by the use of guardrail systems, safety nets, or personal fall arrest systems.

(2) Leading Edges.

(i) Each employee who is constructing a leading edge which is 6 feet or more above lower levels shall be protected from falling by the use of guardrail systems, safety nets, or personal fall arrest systems. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of §1926.502.

NOTE: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to establish a fall protection plan which complies with §1926.502(k) for a particular workplace situation, in lieu of implementing any of those systems.

(ii) Each employee on a walking/working surface 6 feet or more above a lower level where leading edges are under construction, but who is not engaged in the leading edge work, shall be protected from falling by the use of guardrail systems, safety nets, or personal fall arrest systems. If a guardrail system is chosen to provide the fall protection, and a controlled access zone has already been established for leading edge work, the control line may be used in lieu of a guardrail along the edge that parallels the leading edge.

(3) **Hoist Areas.** Each employee in a hoist area shall be protected from falling 6 feet or more to lower levels by guardrail systems or personal fall arrest systems. If guardrail systems, (or chain, gate, or guardrail) or portions thereof, are removed to facilitate the hoisting operation (e.g., during landing of materials), and an employee must lean through the access opening or out over the edge of the access opening (to receive or guide equipment and materials, for example), that employee shall be protected from fall by a personal fall arrest system.

(4) Holes.

(i) Each employee on walking/working surfaces shall be protected from falling through holes (including skylights) more than 6 feet above lower levels, by personal fall arrest systems, covers, or guardrail systems erected around such holes.

(ii) Each employee on walking/working surfaces shall be protected from tripping in or stepping into or through holes (including skylights) by covers,

(iii) Each employee on walking/working surfaces shall be protected from objects falling through holes (including skylights) by covers.

(5) **Formwork and reinforcing steel.** Each employee on the face of formwork or reinforcing steel shall be protected from falling 6 feet or more to lower levels by personal fall arrest systems, safety net systems, or positioning device systems.

(6) **Ramps, runways, and other walkways.** Each employee on ramps, runways, or other walkways shall be protected from falling 6 feet or more to lower levels by guardrail systems.

(7) Excavations.

(i) Each employee at the edge of an excavation 6 feet or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barrier.

(ii) Each employee at the edge of a well, pit, shaft, and similar excavation 6 feet or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers.

(8) Dangerous equipment.

- (i) Each employee less than 6 feet or more above dangerous equipment shall be protected from falling into or onto the dangerous equipment by guardrail systems, or by equipment guards.
- (ii) Each employee 6 feet or more above dangerous equipment shall be protected from fall hazards by guardrail systems, personal fall arrest systems, or safety net systems.

(9) Overhand bricklaying and related work.

- (i) Except as otherwise provided in paragraph (b) of this section, each employee performing overhand bricklaying and related work 6 feet or more above lower levels, shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or shall work in a controlled access zone.
- (ii) Each employee reaching more than 10 inches below the level of the walking/working surface on which they are working, shall be protected from falling by a guardrail system, safety net system or personal fall arrest system.

NOTE: Bricklaying operations performed on scaffolds are regulated by Subpart L – Scaffolds.

(10) Roofing work on low slope roofs. Except as otherwise provided in paragraph (b) of this section, each employee engaged in roofing activities on low slope roofs, with unprotected sides and edges 6 feet or more above lower levels shall be protected from falling by guardrail systems, safety net systems, personal fall arrest systems, or a combination of warning line system and guardrail system, warning line system and safety net system, or warning line system and personal fall arrest system or 4 warning line system and monitoring system. Or, on roofs 50-feet or less in width (see Appendix A to subpart M of this part), the use of a safety monitoring system alone [i.e. without the warning line system] is permitted.

(11) Steep roofs. Each employee on a steep roof with unprotected sides and edges 6 feet or more above lower levels shall be protected from falling by guardrail systems with toeboards, safety net systems, or personal fall arrest systems.

(12) Precast concrete erection. Each employee engaged in the erection of precast concrete members (including but not limited to the erection of wall panels, columns beams, and floor and roof “tees”) and related operations such as grouting of precast concrete members, who is 6 feet or more above lower levels shall be protected from falling by guardrail systems, safety net systems, or personal fall arrest systems. Unless another provision in paragraph (b) of this section provides for an alternative fall protection measure. Exception: When the employer can demonstrate that it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of §1926.502.

NOTE: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with §1926.502 for a particular workplace situation, in lieu of implementing any of those systems.

(13) Residential construction. Each employee engaged in residential construction activities 6 feet or more above lower levels shall be protected by guardrail systems, safety net system, or personal fall arrest system unless another provision in paragraph (b) of this section provides for an alternative fall protection measure. Exception: When the employer can demonstrate it is infeasible or creates a greater hazard to use these systems, the employer shall develop and implement a fall protection plan which meets the requirements of paragraph (k) of §1926.502.

NOTE: There is a presumption that it is feasible and will not create a greater hazard to implement at least one of the above listed fall protection systems. Accordingly, the employer has the burden of establishing that it is appropriate to implement a fall protection plan which complies with §1926.502 for a particular workplace situation, in lieu of implementing any of those systems.

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

(15) Walking/working surfaces not otherwise addressed. Except as provided in §1926.500(a)(2) or in §1926.501 (b)(1) through (b)(14), each employee on a walking/working surface 6 feet or more above lower levels shall be protected from falling by a guardrail system, safety net system, or personal fall arrest system.

(c) Protection from falling objects. When an employee is exposed to falling objects, the employer shall have each employee wear a hard hat and shall implement one of the following measures:

- (1) Erect toeboards, screens, or guardrail systems to prevent objects from falling from higher levels; or,
- (2) Erect a canopy structure and keep potential fall objects far enough from the edge of the higher level so that those objects would not go over the edge if they were accidentally displaced; or,
- (3) Barricade the area to which objects could fall, prohibit employees from entering the barricaded area, and keep objects that may fall far enough away from the edge of a higher level so that those objects would not go over the edge if they were accidentally displaced.

§1926.502 — FALL PROTECTION SYSTEMS CRITERIA AND PRACTICES.

(a) General.

- (1) Fall protection systems required by this part shall comply with the applicable provisions of this section.
- (2) Employers shall provide and install all fall protection systems required by this subpart for an employee, and shall comply with all other pertinent requirements of this subpart before that employee begins the work that necessitates the fall protection.

(b) Guardrail systems. Guardrail systems and their use shall comply with the following provisions:

- (1) Top edge height of top rails, or equivalent guardrail system members, shall be 42 inches (1.1 m) plus or minus 3 inches (8 cm) above the walking/working level. When conditions warrant, the height of the top edge may exceed the 45-inch height, provided the guardrail system meets all other criteria of this paragraph.

NOTE: When employees are using stilts, the top edge height of the top rail, or equivalent member, shall be increased an amount equal to the height of the stilts.

- (2) Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members shall be installed between the top edge of the guardrail system and the walking/working surface when there is no wall or parapet wall at least 21 inches (53 cm) high.

(i) Midrails, when used, shall be installed at a height midway between the top edge of the guardrail system and the walking/working level.

(ii) Screens and mesh, when used, shall extend from the top rail to the walking/working level and along the entire opening between top rail supports.

(iii) Intermediate members (such as balusters), when used between posts, shall be not more than 19 inches (48 cm) apart.

(iv) Other structural members (such as additional midrails and architectural panels) shall be installed such that there are no openings in the guardrail system that are more than 19 inches (.5 m) wide.

- (3) Guardrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds (890 N) applied within 2 inches (5.1 cm) of the top edge, in any outward or downward direction, at any point along the top edge.

(4) When the 200 pound (890 N) test load specified in paragraph (b)(3) of this section is applied in a downward direction, the top edge of the guardrail shall not deflect to a height less than 39 inches (1.0 m) above the walking/working level. Guardrail system components selected and constructed in accordance with the Appendix B to subpart M of this part will be deemed to meet this requirement.

(5) Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members shall be capable of withstanding, without failure, a force of at least 150 pounds (666 N) applied in any downward or outward direction at any point along the midrail or other member.

(6) Guardrail systems shall be so surfaced as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

(7) The ends of all top rails and midrails shall not overhang the terminal posts, except where such overhang does not constitute a projection hazard.

(8) Steel banding and plastic banding shall not be used as top rails or midrails.

(9) Top rails and midrails shall be at least one-quarter inch (0.6 cm) nominal diameter or thickness to prevent cuts and lacerations. If wire rope is used for top rails, it shall be flagged at not more than 6-foot intervals with high-visibility material.

(10) When guardrail systems are used at hoisting areas, a chain, gate or removable guardrail section shall be placed across the access opening between guardrail sections when hoisting operations are not taking place.

(11) When guardrail systems are used at holes, they shall be erected on all unprotected sides or edges of the hole.

(12) When guardrail systems are used around holes used for the passage of materials, the hole shall have not more than two sides provided with removable guardrail sections to allow the passage of materials. When

the hole is not in use, it shall be closed over with a cover, or a guardrail system shall be provided along all unprotected sides or edges.

(13) When guardrail systems are used around holes which are used as points of access (such as ladderways), they shall be provided with a gate, or be so offset that a person cannot walk directly into the hole.

(14) Guardrail systems used on ramps and runways shall be erected along each unprotected side or edge.

(15) Manila, plastic or synthetic rope being used for top rails or midrails shall be inspected as frequently as necessary to ensure that it continues to meet the strength requirements of paragraph (b)(3) of this section.

(c) **Safety net systems.** Safety net systems and their use shall comply with the following provisions:

(1) Safety nets shall be installed as close as practicable under the walking/working surface on which employees are working, but in no case more than 30 feet (9.1 m) below such level. When nets are used on bridges, the potential fall area from the walking/working surface to the net shall be unobstructed.

(2) Safety nets shall extend outward from the outermost projection of the work surface as follows:

Vertical distance from working level to horizontal plane of net	Minimum required horizontal distance of outer edge of net from the edge of the working surface
Up to 5 feet	8 feet
More than 5 feet up to 10 feet	10 feet
More than 10 feet	13 feet

(3) Safety nets shall be installed with sufficient clearance under them to prevent contact with the surface or structures below when subjected to an impact force equal to the drop test specified in paragraph (c)(4) of this section.

(4) Safety nets and their installations shall be capable of absorbing an impact force equal to that produced by the drop test specified in paragraph (c)(4)(i) of this section.

(i) Except as provided in paragraph (c)(4)(ii) of this section, safety nets and safety net installations shall be drop-tested at the jobsite after initial installation and before being used as a fall protection system, whenever relocated, after major repair, and at 6-month intervals if left in one place. The drop-test shall consist of a 400 pound (180 kg) bag of sand 30 ±2 inches (76 ±5 cm) in diameter dropped into the net from the highest walking/working surface at which employees are exposed to fall hazards, but not from less than 42 inches (1.1 m) above that level.

(ii) When the employer can demonstrate that it is unreasonable to perform the drop-test required by paragraph (c)(4)(i) of this section, the employer (or a designated competent person) shall certify that the net and net installation is in compliance with the provisions of paragraphs (c)(3) and (c)(4)(i) of this section by preparing a certification record prior to the net being used as a fall protection system.

The certification record must include an identification of the net and net installation for which the certification record is being prepared; the date that it was determined that the identified net and net installation were in compliance with paragraph (c)(3) of this section and the signature of the person making the determination and certification. The most recent certification record for each net and net installation shall be available at the jobsite for inspection.

(5) Defective nets shall not be used. Safety nets shall be inspected at least once a week for wear, damage, and other deterioration. Defective components shall be removed from service. Safety nets shall also be inspected after any occurrence which could affect the integrity of the safety net system.

(6) Materials, scrap pieces, equipment, and tools which have fallen into the safety net shall be removed as soon as possible from the net and at least before the next work shift.

(7) The maximum size of each safety net mesh opening shall not exceed 36 square inches (230 cm²) nor be longer than 6 inches (15 cm) on any side, and the opening, measured center-to-center of mesh ropes or webbing, shall not be longer than 6 inches (15 cm). All mesh crossings shall be secured to prevent enlargement of the mesh opening.

(8) Each safety net (or section of it) shall have a border rope for webbing with a minimum breaking strength of 5,000 pounds (22.2 kN).

(9) Connections between safety net panels shall be as strong as integral net components and shall be spaced not more than 6 inches (15 cm) apart.

(d) **Personal fall arrest systems.** Personal fall arrest systems and their use shall comply with the provisions set forth below. Effective January 1, 1998, body belts are not acceptable as part of a personal fall arrest system.

Note: The use of a body belt in a positioning device system is acceptable and is regulated under paragraph (e) of this section.

- (1) Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.
- (2) Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of the system.
- (3) Dee-rings and snaphooks shall have a minimum tensile strength of 5,000 pounds (22.2 kN).
- (4) Dee-rings and snaphooks shall be proof-tested to a minimum tensile load of 3,600 pounds (16 kN) without cracking, breaking, or taking permanent deformation.
- (5) Snaphooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snaphook by depression of the snaphook keeper by the connected member, or shall be a locking type snaphook designed and used to prevent disengagement of the snaphook by the contact of the snaphook keeper by the connected member. Effective January 1, 1998, only locking type snaphooks shall be used.
- (6) Unless the snaphook is a locking type and designed for the following connections, snaphooks shall not be engaged:
 - (i) directly to webbing, rope or wire rope;
 - (ii) to each other;
 - (iii) to a dee-ring to which another snaphook or other connector is attached;
 - (iv) to a horizontal lifeline; or
 - (v) to any object which is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.
- (7) On suspended scaffolds or similar work platforms with horizontal lifelines which may become vertical lifelines, the devices used to connect to a horizontal lifeline shall be capable of locking in both directions on the lifeline.
- (8) Horizontal lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest system, which maintains a safety factor of at least two.
- (9) Lanyards and vertical lifelines shall have a minimum breaking strength of 5,000 pounds (22.2 kN).
- (10)
 - (i) Except as provided in paragraph (d)(10)(ii) of this section, when vertical lifelines are used, each employee shall be attached to a separate lifeline.
 - (ii) During the construction of elevator shafts, two employees may be attached to the same lifeline in the hoistway, provided both employees are working atop a false car that is equipped with guardrails; the strength of the lifeline is 10,000 pounds [5,000 pounds per employee attached] (44.4 kN); and all other criteria specified in this paragraph for lifelines have been met.
- (11) Lifelines shall be protected against being cut or abraded.
- (12) Self-retracting lifelines and lanyards which automatically limit free fall distance to 2 feet (0.61 m) or less shall be capable of sustaining a minimum tensile load of 3,000 pounds (13.3 kN) applied to the device with the lifeline or lanyard in the fully extended position.
- (13) Self-retracting lifelines and lanyards which do not limit free fall distance to 2 feet (0.61 m) or less, ripstitch lanyards, and tearing and deforming lanyards shall be capable of sustaining a minimum tensile load of 5,000 pounds (22.2 kN) applied to the device with the lifeline or lanyard in the fully extended position.
- (14) Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body belts and body harnesses shall be made from synthetic fibers.
- (15) Anchorages used for attachment of personal fall arrest equipment shall be independent of any anchorage being used to support or suspend platforms and capable of supporting at least 5,000 pounds (22.2 kN) per employee attached, or shall be designed, installed, and used as follows:
 - (i) as part of a complete personal fall arrest system which maintains a safety factor of at least two; and
 - (ii) under the supervision of a qualified person.
- (16) Personal fall arrest systems, when stopping a fall, shall:
 - (i) limit maximum arresting force on an employee to 900 pounds (4 kN) when used with a body belt;
 - (ii) limit maximum arresting force on an employee to 1,800 pounds (8 kN) when used with a body harness;
 - (iii) be rigged such that an employee can neither free fall more than 6 feet (1.8 m), nor contact any lower level;
 - (iv) bring an employee to a complete stop and limit maximum deceleration distance an employee travels to 3.5 feet (1.07 m); and,
 - (v) have sufficient strength to withstand twice the potential impact energy of an employee free falling a distance of 6 feet (1.8 m), or the free fall distance permitted by the system, whichever is less.

NOTE: If the personal fall arrest system meets the criteria and protocols contained in Appendix C to subpart M, and if the system is being used by an employee having a combined person and tool weight of less than 310 pounds (140 kg), the system will be considered to be in compliance with the provisions of paragraph (d)(16) of this section. If the system is used by an employee having a combined tool and body weight of 310 pounds (140 kg) or more, then the employer must appropriately modify the criteria and protocols of the Appendix to provide proper protection for such heavier weights, or the system will not be deemed to be in compliance with the requirements of paragraph (d)(16) of this section.

(17) The attachment point of the body belt shall be located in the center of the wearer's back. The attachment point of the body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head.

(18) Body belts, harnesses, and components shall be used only for employee protection (as part of a personal fall arrest system or positioning device system) and not to hoist materials.

(19) Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined by a competent person to be undamaged and suitable for reuse.

(20) The employer shall provide for prompt rescue of employees in the event of a fall or shall assure that employees are able to rescue themselves.

(21) Personal fall arrest systems shall be inspected prior to each use for wear, damage and other deterioration, and defective components shall be removed from service.

(22) Body belts shall be at least one and five-eighths (1 5/8) inches (4.1 cm) wide.

(23) Personal fall arrest systems shall not be attached to guardrail systems, nor shall they be attached to hoists except as specified in other subparts of this Part.

(24) When a personal fall arrest system is used at hoist areas, it shall be rigged to allow the movement of the employee only as far as the edge of the walking/working surface.

(e) Positioning device systems. Positioning device systems and their use shall conform to the following provisions:

(1) Positioning devices shall be rigged such that an employee cannot free fall more than 2 feet (.9 m).

(2) Positioning devices shall be secured to an anchorage capable of supporting at least twice the potential impact load of an employee's fall or 3,000 pounds (13.3 kN), whichever is greater.

(3) Connectors shall be drop forged, pressed or formed steel, or made of equivalent materials.

(4) Connectors shall have a corrosion-resistant finish, and all surfaces and edges shall be smooth to prevent damage to interfacing parts of this system.

(5) Connecting assemblies shall have a minimum tensile strength of 5,000 pounds (22.2 kN).

(6) Dee-rings and snaphooks shall be proof-tested to a minimum tensile load of 3,600 pounds (16 kN) without cracking, breaking, or taking permanent deformation.

(7) Snaphooks shall be sized to be compatible with the member to which they are connected to prevent unintentional disengagement of the snaphook by depression of the snaphook keeper by the connected member, or shall be a locking type snaphook designed and used to prevent disengagement of the snaphook by the contact of the snaphook keeper by the connected member. As of January 1, 1998, only locking type snaphooks shall be used.

(8) Unless the snaphook is a locking type and designed for the following connections, snaphooks shall not be engaged:

(i) directly to webbing, rope or wire rope;

(ii) to each other;

(iii) to a dee-ring to which another snaphook or other connector is attached;

(iv) to a horizontal lifeline; or

(v) to any object which is incompatibly shaped or dimensioned in relation to the snaphook such that unintentional disengagement could occur by the connected object being able to depress the snaphook keeper and release itself.

(9) Positioning device systems shall be inspected prior to each use for wear, damage, and other deterioration, and defective components shall be removed from service.

(10) Body belts, harnesses, and components shall be used only for employee protection (as part of a personal fall arrest system or positioning device system) and not to hoist materials.

(f) Warning line systems. Warning line systems and their use shall comply with the following provisions:

(1) The warning line shall be erected around all sides of the roof work area.

- (i) When mechanical equipment is not being used, the warning line shall be erected not less than 6 feet (1.8 m) from the roof edge.
 - (ii) When mechanical equipment is being used, the warning line shall be erected not less than 6 feet (1.8 m) from the roof edge which is parallel to the direction of mechanical equipment operation, and not less than 10 feet (3.1 m) from the roof edge which is perpendicular to the direction of mechanical equipment operation.
 - (iii) Points of access, materials handling areas, storage areas, and hoisting areas shall be connected to the work area by an access path formed by two warning lines.
 - (iv) When the path to a point of access is not in use, a rope, wire, chain, or other barricade, equivalent in strength and height to the warning line, shall be placed across the path at the point where the path intersects the warning line erected around the work area, or the path shall be offset such that a person cannot walk directly into the work area.
- (2) Warning lines shall consist of ropes, wires, or chains, and supporting stanchions erected as follows:
- (i) The rope, wire, or chain shall be flagged at not more than 6-foot (1.8 m) intervals with high-visibility material;
 - (ii) The rope, wire, or chain shall be rigged and supported in such a way that its lowest point (including sag) is no less than 34 inches (.9 m) from the walking/working surface and its highest point is no more than 39 inches (1.0 m) from the walking/working surface;
 - (iii) After being erected, with the rope, wire, or chain attached, stanchions shall be capable of resisting, without tipping over, a force of at least 16 pounds (71 N) applied horizontally against the stanchion, 30 inches (.8 m) above the walking/working surface, perpendicular to the warning line, and in the direction of the floor, roof, or platform edge;
 - (iv) The rope, wire, or chain shall have a minimum tensile strength of 500 pounds (2.22 kN), and after being attached to the stanchions, shall be capable of supporting, without breaking, the loads applied to the stanchions as prescribed in paragraph (f)(2)(iii) of this section; and
 - (v) The line shall be attached at each stanchion in such a way that pulling on one section of the line between stanchions will not result in slack being taken up in adjacent sections before the stanchion tips over.
- (3) No employee shall be allowed in the area between a roof edge and a warning line unless the employee is performing roofing work in that area.
- (4) Mechanical equipment on roofs shall be used or stored only in areas where employees are protected by a warning line system, guardrail system, or personal fall arrest system.
- (h) Safety monitoring systems. (See §1926.501 (b)(10) and §1926.502 (k)) and their use shall comply with the following provisions:**
- (1) The employer shall designate a competent person to monitor the safety of other employees and the employer shall ensure that the safety monitor complies with the following requirements:**
 - (i) The safety monitor shall be competent to recognize fall hazards;**
 - (ii) The safety monitor shall warn other employees when it appears that they are unaware of a fall hazard or are acting in an unsafe manner;**
 - (iii) The safety monitor shall be on the same walking/working surface and within visual sighting distance of the employee being monitored;**
 - (iv) The safety monitor shall be close enough to communicate orally with the employee; and**
 - (v) The safety monitor shall not have other responsibilities which could take the monitor's attention from the monitoring function.**
 - (1) A safety monitoring system shall not be used as a fall protection system for any work other than roofing work on roof slopes of 2 in 12 (vertical to horizontal) or less.
 - (2) The use of a safety monitoring system alone (i.e., without the warning line system) is not permitted on roofs more than 50 feet (15.25 m) in width. (see Appendix A of this subdivision)
 - (3) The employer shall designate a competent person to monitor the safety of other employees and the employer shall ensure that the safety monitor complies with the following requirements:
 - (i) The safety monitor shall be competent to recognize fall hazards;
 - (ii) The safety monitor shall warn the employee when it appears that the employee is unaware of a fall hazard or is acting in an unsafe manner;
 - (iii) The safety monitor shall be on the same walking/working surface and within visual sighting distance of the employee being monitored;
 - (iv) The safety monitor shall be close enough to communicate orally with the employee; and
 - (v) The safety monitor shall not have other responsibilities which could take the monitor's attention from the monitoring function.

- (4) Mechanical equipment shall not be used or stored in areas where safety monitoring systems are being used to monitor employees engaged in roofing operations.
- (5) No employee, other than an employee engaged in roofing work shall be allowed in an area where an employee is being protected by a safety monitoring system.
- (7) **The fall protection plan shall identify each location where conventional fall protection methods cannot be used. These locations shall then be designated controlled access zones and the employer must comply with criteria in paragraph (g) of this section.**
- (8) **Where no other alternative measure has been implemented, the employer shall implement a safety monitoring system in conformance with §1926.502 (h).**

Slide Guard Systems.

- (1) **Slide Guard Systems.** Slide guard systems, and their use, shall comply with the following provisions:
 - (i) Slide guard systems shall be installed under the supervision of a competent person.
 - (ii) Slide guards shall not be used on roofs with a ground-to-eave height greater than 25 feet.
 - (iii) Slide guards shall not be used as a fall protection system on roofs with a slope less than 3:12 nor greater than 8:12.
 - (A) On roofs with slopes greater than or equal to 3:12 up to and including 6:12, at least one slide guard shall be placed below the work area, no closer than 6 inches from the eave.
 - (B) On roofs with slopes greater than 6:12 and not more than 8:12, multiple slide guards shall be used, spaced no more than eight feet apart, vertically. The lower slide guard shall be no closer than 6 inches from the eave.
 - (iv) Installation of the lowest slide guard shall be perpendicular (90 degrees) to the roof surface. When multiple slide guards are used, the angle of installation for the upper slide guards shall not be less than 60 degrees to the roof surface.
 - (v) Slide guards shall be continuous below all walking or working areas.
 - (vi) Personnel shall not be allowed to ascend or descend the roof slope within six feet of the rake edge except where that limitation would prevent the performance of work.
 - (vii) Supplies and materials shall not be stored within 6 feet of the rake edge, or three feet where tile roof systems are being installed.
- (2) **Manufactured roof brackets.** Manufactured roof brackets shall meet, or exceed the following minimum safety standards:
 - (i) Roof brackets shall be installed according to the manufacturer's specifications.
 - (ii) Minimum 6 inch brackets shall be used.
 - (iii) All brackets shall bear on a solid surface.
 - (iv) Brackets shall not be spaced greater than 8 feet apart horizontally, or according to the manufacturer's specifications, whichever is less.
 - (v) Nominal 2 inch by 6 inch material shall be used for slide guards, and shall be secured to the brackets or otherwise protected against cantilevering and failure due to material flex.
 - (vi) The manufacturer's specifications shall be available for review.
- (3) **Job-made slide guards** shall meet or exceed the following minimum safety standards:
 - (i) Nominal 2 inch by 6 inch material for both vertical and horizontal members shall be used. Vertical members shall be backed to the horizontal (flat) members.
 - (ii) Horizontal (flat) members shall be anchored with two "16 penny" (16d) common nails or the equivalent, every 4 feet, to solid bearing surfaces. Vertical members shall be anchored to the horizontal members with one "16 penny" (16d) common nail or the equivalent, every 2 feet.
 - (iii) The vertical member shall be provided with full support bracing every eight feet, horizontally.
 - (iv) Engineering specifications shall be available for review whenever design and/or installation

(i) Covers. Covers for holes in floors, roofs, and other walking/working surfaces shall meet the following requirements:

- (1) Covers located in roadways and vehicular aisles shall be capable of supporting, without failure, at least twice the maximum axle load of the largest vehicle expected to cross over the cover.
- (2) All other covers shall be capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.
- (3) All covers shall be secured when installed so as to prevent accidental displacement by the wind, equipment, or employees.
- (4) All covers shall be color coded or they shall be marked with the word "HOLE" or "COVER" to provide warning of the hazard.

NOTE: This provision does not apply to cast iron manhole covers or steel grates used on streets or roadways.

(j) Protection from falling objects. Falling object protection shall comply with the following provisions:

- (1)** Toeboards, when used as falling object protection, shall be erected along the edge of the overhead walking/working surface for a distance sufficient to protect employees below.
- (2)** Toeboards shall be capable of withstanding, without failure, a force of at least 50 pounds (222 N) applied in any downward or outward direction at any point along the toeboard.
- (3)** Toeboards shall be a minimum of 3 1/2 inches (9 cm) in vertical height from their top edge to the level of the walking/working surface. They shall have not more than 1/4 inch (0.6 cm) clearance above the walking/working surface. They shall be solid or have openings not over 1 inch (2.5 cm) in greatest dimension.
- (4)** Where tools, equipment, or materials are piled higher than the top edge of a toeboard, paneling or screening shall be erected from the walking/working surface or toeboard to the top of a guardrail system's top rail or midrail, for a distance sufficient to protect employees below.
- (5)** Guardrail systems, when used as falling object protection, shall have all openings small enough to prevent passage of potential falling objects.
- (6)** During the performance of overhand bricklaying and related work:
 - (i)** No materials or equipment except masonry and mortar shall be stored within 4 feet (1.2 m) of the working edge.
 - (ii)** Excess mortar, broken or scattered masonry units, and all other materials and debris shall be kept clear from the work area by removal at regular intervals.
- (7)** During the performance of roofing work:
 - (i)** Materials and equipment shall not be stored within 6 feet (1.8 m) of a roof edge unless guardrails are erected at the edge.
 - (ii)** Materials which are piled, grouped, or stacked near a roof edge shall be stable and self-supporting.
- (8)** Canopies, when used as falling object protection, shall be strong enough to prevent collapse and to prevent penetration by any objects which may fall onto the canopy.

§1926.503 — Training requirements.

(a) Training Program.

- (1) The employer shall provide a training program for each employee who might be exposed to fall hazards. The program shall enable each employee to recognize the hazards of falling and shall train each employee in the procedures to be followed in order to minimize these hazards.**
- (2)** The employer shall assure that each employee has been trained, as necessary, by a competent person qualified in the following areas:
 - (i)** The nature of fall hazards in the work area;
 - (ii)** The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used;
 - (iii)** The use and operation of guardrail systems, personal fall arrest systems, safety net systems, warning line systems, safety monitoring systems, personal fall restraint systems, slide guard systems, positioning devices, and other protection to be used;
 - (iv)** The role of each employee in the safety monitoring system when this system is used;
 - (v)** The limitations on the use of mechanical equipment during the performance of roofing work;
 - (vi)** The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection; and
 - (vii)** The role of employees in the fall protection work plan;
 - (viii)** The standards contained in this subpart.

(b) Certification of training.

- (1) The employer shall verify compliance with paragraph (a) of this section by preparing a written certification record. The written certification record shall contain the name or other identity of the employee trained, the date(s) of the training, and the signature of the person who conducted the training or the signature of the employer. If the employer relies on training conducted by another employer or completed prior to the effective date of this section, the certification record shall indicate the date the employer determined the prior training was adequate rather than the date of actual training.**
- (2) The latest training certification shall be maintained.**

(c) Retraining. When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by paragraph (a) of this section, the employer shall retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where:

- (1) Changes in the workplace render previous training obsolete; or**
- (2) Changes in the types of fall protection systems or equipment to be used render previous training obsolete; or**
- (3) Inadequacies in an affected employee's knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill.**

Chapter 15

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Fire Protection

Cain's Pipeline & Industrial Services, LLC. has adopted this program for the prevention of employee exposure to fire hazards from the following OSHA regulations:

§1926.150 – Fire Protection

§1910.157 – Portable Fire Extinguishers – Fire Protection and Prevention

Cain's Pipeline & Industrial Services, LLC. has implemented this policy to ensure that proper safe work practices and procedures are followed for the protection of our employees against fire/explosion hazards. **Brent Messina** is designated as the supervisor to manage the Fire Prevention Program. The following work practices, procedures, and engineering controls will be enforced as an integral part of our Company safety policy:

- *Brent Messina* will ensure that all employees are trained in the proper operation of fire extinguishers provided by the company.
- All employees will be trained in the hazards involved in incipient stage fire fighting. Employees are instructed to ensure emergency response service (fire dept.) is notified before attempting to extinguish any fire, and that if a fire is not immediately extinguished, or the fire recurs to evacuate immediately.
- Personnel are trained in emergency evacuation plans for all areas of work.
- Safe assembly areas are designated for all work areas in the event of evacuation.
- Training will be required on initial hiring and annually thereafter.
- All fire extinguishers will be inspected by *Brent Messina* on a monthly basis, this inspection will be documented to be recorded with the annual maintenance check. Records of inspection will be kept in the office.

§1910.157 PORTABLE FIRE EXTINGUISHERS.

(a) Scope and application. The requirements of this section apply to the placement, use, maintenance, and testing of portable fire extinguishers provided for the use of employees. Paragraph (d) of this section does not apply to extinguishers provided for employee use on the outside of workplace buildings or structures. Where extinguishers are provided but are not intended for employee use and the employer has an emergency action plan and a fire prevention plan which meet the requirements of §1910.38, then only the requirements of paragraphs (e) and (f) of this section apply.

(b) Exemptions.

(1) Where the employer has established and implemented a written fire safety policy which requires the immediate and total evacuation of employees from the workplace upon the sounding of a fire alarm signal and which includes an emergency action plan and a fire prevention plan which meet the requirements of §1910.38, and when extinguishers are not available in the workplace, the employer is exempt from all requirements of this section unless a specific standard in Part 1910 requires that a portable fire extinguisher be provided.

(2) Where the employer has an emergency action plan meeting the requirements of §1910.38 which designates certain employees to be the only employees authorized to use the available portable fire extinguishers, and which requires all other employees in the fire area to immediately evacuate the affected work area upon the sounding of the fire alarm, the employer is exempt from the distribution requirements in paragraph (d) of this section.

(c) General requirements.

(1) The employer shall provide portable fire extinguishers and shall mount, locate and identify them so that they are readily accessible to employees without subjecting the employees to possible injury.

(2) Only approved portable fire extinguishers shall be used to meet the requirements of this section.

(3) The employer shall not provide or make available in the workplace portable fire extinguishers using carbon tetrachloride or chlorobromomethane extinguishing agents.

(4) The employer shall assure that portable fire extinguishers are maintained in a fully charged and operable condition and kept in their designated places at all times except during use.

(5) The employer shall remove from service all soldered or riveted shell self-generating soda acid or self-generating foam or gas cartridge water type portable fire extinguishers which are operated by inverting the extinguisher to rupture the cartridge or to initiate an uncontrollable pressure generating chemical reaction to expel the agent.

(d) Selection and distribution.

(1) Portable fire extinguishers shall be provided for employee use and selected and distributed based on the classes of anticipated workplace fires and on the size and degree of hazard which would affect their use.

(2) The employer shall distribute portable fire extinguishers for use by employees on Class A fires so that the travel distance for employees to any extinguisher is 75 feet (22.9 m) or less.

(3) The employer may use uniformly spaced standpipe systems or hose stations connected to a sprinkler system installed for emergency use by employees instead of Class A portable fire extinguishers, provided that such systems meet the respective requirements of §1910.158 or §1910.159, that they provide total coverage of the area to be protected, and that employees are trained at least annually in their use.

(4) The employer shall distribute portable fire extinguishers for use by employees on Class B fires so that the travel distance from the Class B hazard area to any extinguisher is 50 feet (15.2 m) or less.

(5) The employer shall distribute portable fire extinguishers used for Class C hazards on the basis of the appropriate pattern for the existing Class A or Class B hazards.

(6) The employer shall distribute portable fire extinguishers or other containers of Class D extinguishing agent for use by employees so that the travel distance from the combustible metal working area to any extinguishing agent is 75 feet (22.9 m) or less. Portable fire extinguishers for Class D hazards are required in those combustible metal working areas where combustible metal powders, flakes, shavings, or similarly sized products are generated at least once every two weeks.

(e) Inspection, maintenance and testing.

(1) The employer shall be responsible for the inspection, maintenance and testing of all portable fire extinguishers in the workplace.

(2) Portable extinguishers or hose used in lieu thereof under paragraph (d)(3) of this section shall be visually inspected monthly.

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

(4) The employer shall assure that stored pressure dry chemical extinguishers that require a 12-year hydrostatic test are emptied and subjected to applicable maintenance procedures every 6 years. Dry

chemical extinguishers having non-refillable disposable containers are exempt from this requirement. When recharging or hydrostatic testing is performed, the 6-year requirement begins from that date.

(5) The employer shall assure that alternate equivalent protection is provided when portable fire extinguishers are removed from service for maintenance and recharging.

(f) Hydrostatic testing. (Not Applicable)

(g) Training and education.

(1) Where the employer has provided portable fire extinguishers for employee use in the workplace, the employer shall also provide an educational program to familiarize employees with the general principles of fire extinguisher use and the hazards involved with incipient stage fire fighting.

(2) The employer shall provide the education required in paragraph (g)(1) of this section upon initial employment and at least annually thereafter.

(3) The employer shall provide employees who have been designated to use fire fighting equipment as part of an emergency action plan with training in the use of the appropriate equipment.

(4) The employer shall provide the training required in paragraph (g)(3) of this section upon initial assignment to the designated group of employees and at least annually thereafter.

§1926.150 — FIRE PROTECTION.

(a) General requirements.

(1) The employer shall be responsible for the development of a fire protection program to be followed throughout all phases of the construction and demolition work, and he shall provide for the firefighting equipment as specified in this subpart. As fire hazards occur, there shall be no delay in providing the necessary equipment.

(2) Access to all available firefighting equipment shall be maintained at all times.

(3) All firefighting equipment, provided by the employer, shall be conspicuously located.

(4) All firefighting equipment shall be periodically inspected and maintained in operating condition. Defective equipment shall be immediately replaced.

(5) As warranted by the project, the employer shall provide a trained and equipped firefighting organization (Fire Brigade) to assure adequate protection to life.

(b) Water supply.

(1) A temporary or permanent water supply, of sufficient volume, duration, and pressure, required to properly operate the firefighting equipment shall be made available as soon as combustible materials accumulate.

(2) Where underground water mains are to be provided, they shall be installed, completed, and made available for use as soon as practicable.

(c) Portable firefighting equipment.

(1) Fire extinguishers and small hose lines.

(i) A fire extinguisher, rated not less than 2A, shall be provided for each 3,000 square feet of the protected building area, or major fraction thereof. Travel distance from any point of the protected area to the nearest fire extinguisher shall not exceed 100 feet.

(ii) One 55-gallon open drum of water with two fire pails may be substituted for a fire extinguisher having a 2A rating.

(iii) A 1/2-inch diameter garden-type hose line, not to exceed 100 feet in length and equipped with a nozzle, may be substituted for a 2A-rated fire extinguisher, providing it is capable of discharging a minimum of 5 gallons per minute with a minimum hose stream range of 30 feet horizontally. The garden-type hose lines shall be mounted on conventional racks or reels. The number and location of hose racks or reels shall be such that at least one hose stream can be applied to all points in the area.

(iv) One or more fire extinguishers, rated not less than 2A, shall be provided on each floor. In multistory buildings, at least one fire extinguisher shall be located adjacent to stairway.

(v) Extinguishers and water drums, subject to freezing, shall be protected from freezing.

(vi) A fire extinguisher, rated not less than 10B, shall be provided within 50 feet of wherever more than 5 gallons of flammable or combustible liquids or 5 pounds of flammable gas are being used on the jobsite. This requirement does not apply to the integral fuel tanks of motor vehicles.

(vii) Carbon tetrachloride and other toxic vaporizing liquid fire extinguishers are prohibited.

(viii) Portable fire extinguishers shall be inspected periodically and maintained in accordance with Maintenance and Use of Portable Fire Extinguishers, NFPA No. 10A-1970.

(ix) Fire extinguishers which have been listed or approved by a nationally recognized testing laboratory, shall be used to meet the requirements of this subpart.

(x) Table F-1 may be used as a guide for selecting the appropriate portable fire extinguishers.

(2) Fire hose and connections.

(i) One hundred feet, or less, of 1-1/2-inch hose, with a nozzle capable of discharging water at 25 gallons or more per minute, may be substituted for a fire extinguisher rated not more than 2A in the designated area provided that the hose line can reach all points in the area.

(ii) If fire hose connections are not compatible with local firefighting equipment, the contractor shall provide adapters, or equivalent, to permit connections.

(iii) During demolition involving combustible materials, charged hose lines, supplied by hydrants, water tank trucks with pumps, or equivalent, shall be made available.

(d) Fixed firefighting equipment.

(1) Sprinkler protection.

(i) If the facility being constructed includes the installation of automatic sprinkler protection, the installation shall closely follow the construction and be placed in service as soon as applicable laws permit following completion of each story.

(ii) During demolition or alterations, existing automatic sprinkler installations shall be retained in service as long as reasonable. The operation of sprinkler control valves shall be permitted only by properly authorized persons. Modification of sprinkler systems to permit alterations or additional demolition should be expedited so that the automatic protection may be returned to service as quickly as possible. Sprinkler control valves shall be checked daily at close of work to ascertain that the protection is in service.

(2) Standpipes. In all structures in which standpipes are required, or where standpipes exist in structures being altered, they shall be brought up as soon as applicable laws permit, and shall be maintained as construction progresses in such a manner that they are always ready for fire protection use. The standpipes shall be provided with Siamese fire department connections on the outside of the structure, at the street level, which shall be conspicuously marked. There shall be at least one standard hose outlet at each floor.

(e) Fire alarm devices.

(1) An alarm system, e.g., telephone system, siren, etc., shall be established by the employer whereby employees on the site and the local fire department can be alerted for an emergency.

(2) The alarm code and reporting instructions shall be conspicuously posted at phones and at employee entrances.

(f) Fire cutoffs.

(1) Fire walls and exit stairways, required for the completed buildings, shall be given construction priority. Fire doors, with automatic closing devices, shall be hung on openings as soon as practicable.

(2) Fire cutoffs shall be retained in buildings undergoing alterations or demolition until operations necessitate their removal.

Chapter 16

Cain's Pipeline & Industrial Services, LLC.

Company Policy for First Aid & CPR

Cain's Pipeline & Industrial Services, LLC. Medical Services and First Aid Policy is adopted from the following OSHA regulations:

§1926.50 – Medical Services and First Aid

It is the policy of *Cain's Pipeline & Industrial Services, LLC.* that training in first aid response is not a requirement for employment, but that local Emergency Medical Services are utilized for emergency medical care. ***Brent Messina*** is designated as the administrator of the Medical Services Program.

- Medical services for employee evaluations, employment requirements, and special conditions of work are provided to employees at no cost as specified in OSHA requirements.
- A person(s) who has a valid certificate in first aid training, the American Red Cross, or equivalent will be available at work sites to render emergency first aid.
- Provisions will be made prior to commencement of a project for prompt medical attention in case of serious injury.
- First aid supplies will be easily accessible when required.
- Proper equipment for prompt transportation of the injured person to a physician or hospital or a communication system for contacting necessary ambulance service will be provided.
- ***Brent Messina*** is the designated first aid provider and certified in CPR and is responsible for rendering first aid in the event of an injury requiring immediate response when emergency medical services are not available, and will also be responsible for first aid training of any employee required.
- Injured employees are to be transported to medical facilities by emergency medical services. If emergency medical service is not available in a timely manner, the injured employee will be transported to the nearest medical service in a company vehicle by the job foreman.
- In areas where 911 service is not available employees will be notified of phone numbers to contact local emergency response medical services. ***Brent Messina*** will be responsible for posting of emergency phone numbers at all jobsites. The phone numbers will be conspicuously posted in all work locations.
- ***Brent Messina*** is responsible for the accessibility of First Aid Kits and for checking the contents of all First Aid Kits before being sent out to each job and at least weekly on each job to ensure that the expended items are replaced.
- First aid kits are readily available in all company vehicles and in the company office. First aid kits will consist of appropriate items and stored in a weather proof container with individual sealed packages of each type of item and will stock a minimum of the following items:

● PPE for First Aid: ■ 3-Pair latex gloves ■ Surgical masks ■ Clear eye protection or Face Shield ■ Dust Masks or other needed Face Protection ■ Mouth-to-mouth barrier for CPR ● Large, sterile gauze pads (6 each: 2X2's, 3X3's, and 4X4's) ● Compress Dressings (4X8), 3 each ● Rolled gauze bandages: 2" and 3" wide, 3 each ● Large box assorted "band-aids" ● Two elastic wrap bandages (ace) ● Cotton balls and Q-tips ● Surgical or athletic tape; 1" & 2" wide,	● Antiseptics & Ointments: ■ Alcohol ■ burn gel or cream ■ alcohol swabs ■ peroxide ■ antiseptic spray and ointment ■ pain relief tabs ■ 6 burn treatment single-use packages, 0.5 g. application ● Good quality eye-wash solution, with eye cup ● 1 eye covering bandages (for two eyes) ● Self-activating cold packs, 4x5 inches ● Liquid antiseptic hand soap ● Blunt-nose surgical scissors ● Forceps, Tweezers & safety pins
- * General First-aid Guidebook, textbook, or manual will be readily available, but not necessarily inside of the first-aid kit.**

- Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities will be provided within the work area for quick drenching or flushing of eyes or body.
- Eye wash bottles are available wherever eye wash stations are not available, for any employee required to work in an environment where exposure to eye hazards may exist. Wash facilities or drench barrels are available at each jobsite for employees.
- **Procedure for flushing eyes** — Eye membranes absorb chemicals quickly. This can lead to eye damage within minutes. Flood the eye with lukewarm (never hot) water poured from a large glass two to three inches from the eye. Continue for 15 minutes. Blink the eye as much as possible during the flooding. Do not force the eyelid open and do not allow the eyes to be rubbed. If lukewarm water is not available, rinse the eye quickly using a gentle stream from a hose for at least 15 minutes.
- **Procedure for drenching skin** — If poisons come in contact with the skin, they must be removed as quickly as possible. Remove contaminated clothing and flood the skin area with water for 10 minutes. Then gently wash the skin area with soap and water and rinse. Later, destroy contaminated clothing. For a chemical skin burn, rinse the area with lots of water, remove the clothes and cover with a soft, clean cloth. Do not apply grease or ointments.
- It is the policy of *Cain's Pipeline & Industrial Services, LLC*. that all of the requirements of OSHA §1926.50 will be met.

§1926.50 — MEDICAL SERVICES AND FIRST AID.

- (a) The employer shall insure the availability of medical personnel for advice and consultation on matters of occupational health.
- (b) Provisions shall be made prior to commencement of the project for prompt medical attention in case of serious injury.
- (c) In the absence of an infirmary, clinic, hospital, or physician, that is reasonably accessible in terms of time and distance to the worksite, which is available for the treatment of injured employees, a person who has a valid certificate in first aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training that can be verified by documentary evidence, shall be available at the worksite to render first aid.
- (d)
 - (1) First aid supplies shall be easily accessible when required.
 - (2) The contents of the first aid kit shall be placed in a weatherproof container with individual sealed packages for each type of item, and shall be checked by the employer before being sent out on each job and at least weekly on each job to ensure that the expended items are replaced.
- (e) Proper equipment for prompt transportation of the injured person to a physician or hospital, or a communication system for contacting necessary ambulance service, shall be provided.
- (f) In areas where 911 is not available, the telephone numbers of the physicians, hospitals, or ambulances shall be conspicuously posted.
- (g) Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable facilities for the quick drenching or flushing of the eyes and body shall be provided within the work area for immediate emergency use.

APPENDIX A – First Aid Kit & Supplies

Every job site shall have access to at least one first-aid kit in a weatherproof container. The first-aid kit will be inspected regularly to ensure that it is well stocked, in sanitary condition, and any used items are promptly replaced. The contents of the first-aid kit shall be arranged to be quickly found and remain sanitary. First-aid dressings shall be sterile and in individually sealed packages. The following minimum first-aid supplies shall be kept:

Dressings in adequate quantities consisting of:

Adhesive dressings	Triangular bandages
Adhesive tape rolls, 1-inch wide	Safety pins
Eye dressing packet	Tweezers and scissors
1-inch gauze bandage roll or compress	Cotton-tipped applicators
2-inch gauze bandage roll or compress	Forceps
4-inch gauze bandage roll or compress	Tongue depressors
Sterile gauze pads, 2-inch square	Petroleum jelly
Sterile gauze pads, 4-inch square	Antibiotic ointment
Sterile surgical pads suitable for pressure dressings	Aspirin

First-aid textbook, manual, or equivalent to be readily available but not necessarily within the first-aid kit.

Notes:

Handwriting practice lines consisting of 20 horizontal dashed lines.

Chapter 17

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Forklifts (Powered Industrial Trucks)

This program for the prevention of employee accident/injuries while operating industrial trucks (forklifts) has been adopted by ***Cain's Pipeline & Industrial Services, LLC.*** from the following OSHA regulations:

§1910.178 – Powered Industrial Trucks

Cain's Pipeline & Industrial Services, LLC. will ensure that each powered industrial truck operator is competent to operate a powered industrial truck safely, as demonstrated by the successful completion of our training and evaluation as specified below:

- Only trained and certified operators, including supervisors, are allowed to operate Powered Industrial Trucks (Forklifts). *Cain's Pipeline & Industrial Services, LLC.* will certify all authorized employees regarding competency on all types of equipment that may be utilized.
- *Brent Messina* is designated as the Company administrator for training of forklift operators for *Cain's Pipeline & Industrial Services, LLC.*, and will ensure that all trainers are knowledgeable, experienced, and capable of operator competency evaluations. The written training program will include lecture, discussion, written material, and hands-on training and evaluations.
- Formal instruction includes lecture, discussion, interactive computer learning, videos, and written materials. Practical training involves instructor demonstrations and trainee exercises. Operator evaluation - critiques will be conducted. Training program content will include, but not be limited to the following prescribed topics:

Truck-related topics:

- Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate.
- Differences between the truck and the automobile.
- Truck controls and instrumentation: where they are located, what they do, and how they work.
- Engine or motor operation.
- Steering and maneuvering.
- Visibility (including restrictions due to loading).
- Fork and attachment adaptation, operation, and use limitations.
- Vehicle capacity.
- Vehicle stability.
- Any vehicle inspection and maintenance that the operator will be required to perform.
- Refueling and/or charging and recharging of batteries.
- Operating limitations.

- Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of vehicle that the employee is being trained to operate.

Workplace-related topics:

- Surface conditions where the vehicle will be operated.
 - Composition of loads to be carried and load stability.
 - Load manipulation, stacking, and unstacking.
 - Pedestrian traffic in areas where the vehicle will be operated.
 - Narrow aisles and other restricted places where the vehicle will be operated.
 - Hazardous (classified) locations where the vehicle will be operated.
 - Ramps and other sloped surfaces that could affect the vehicle's stability.
 - Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust.
 - Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.
- Refresher training in relevant topics will be required for operators when:
 - The operator has been observed to operate the vehicle in an unsafe manner.
 - The operator has been involved in an accident or near-miss incident.
 - The operator has received an evaluation that reveals that the operator is not operating the truck safely.
 - The operator is assigned to drive a different type of truck.
 - A condition in the workplace changes in a manner that could affect safe operation of the truck.
 - Forklift operators at *Cain's Pipeline & Industrial Services, LLC.* are required to be evaluated and recertified every three years
 - An example of the operator certification is shown on page 6 of this section.
 - Forklift operators are required to do an inspection of the equipment to be operated and the condition of the workplace environment in which the forklift will be operated prior to operations of the vehicle. An example of the inspection sheets are provided on pages 4 and 5 of this section.
 - Operators will verify trailer chocks, supports, and dock plates prior to loading or unloading. The condition and securing of dockplates and boarding ramps must be inspected prior to use.
 - The brakes of highway trucks must be set and wheel chocks placed under the rear wheels by the operator to prevent the trucks from rolling while they are boarded with forklifts.

Performance Evaluation for Forklift Operators

Employee: _____ Date: _____ Time: _____

Evaluator: _____ Equipment Type: _____

YES NO

☐	☐	Shows familiarity with truck controls.
☐	☐	Gave proper signals when turning.
☐	☐	Slowed down at intersections.
☐	☐	Sounded horn at intersections.
☐	☐	Obedied signs.
☐	☐	Kept a clear view of direction of travel.
☐	☐	Turned comers correctly - was aware of rear end swing.
☐	☐	Yielded to pedestrians.
☐	☐	Drove under control and within proper traffic aisles.
☐	☐	Approached load properly.
☐	☐	Lifted load properly.
☐	☐	Maneuvered properly.
☐	☐	Traveled with load at proper height.
☐	☐	Lowered load smoothly/slowly.
☐	☐	Stops smoothly/completely.
☐	☐	Load balanced properly.
☐	☐	Forks under load all the way.
☐	☐	Carried parts/stock in approved containers.
☐	☐	Checked bridge-plates/ramps.
☐	☐	Did place loads within marked area.
☐	☐	Did stack loads evenly and neatly.
☐	☐	Did drive backward when required.
☐	☐	Did check load weights.
☐	☐	Did place forks on the floor when parked, controls neutralized, brake on set, power off.
☐	☐	Followed proper instructions for maintenance - checked both at beginning and end.

Comments: _____

Total Rating: ☐ Excellent ☐ Good ☐ Fair ☐ Poor ☐ Fail

Evaluator's Signature

Date

Operator's Signature

Date

DAILY INSPECTION CHECKLIST

Construction/Yard Forklift Truck

KEY OFF Procedures

The vehicle inspection

- ☐ Overhead guard
- ☐ Hydraulic cylinders
- ☐ Mast assembly
- ☐ Lift chains and rollers
- ☐ Forks
- ☐ Tires
- ☐ Gas gauge
- ☐ Check the engine oil level
- ☐ Examine the battery
- ☐ Inspect the hydraulic fluid level
- ☐ Check the engine coolant level

KEY ON Procedures

Test the standard equipment

- ☐ Front, tail, and brake lights
- ☐ Fuel gauge (if diesel)
- ☐ Windshield wiper
- ☐ Heater

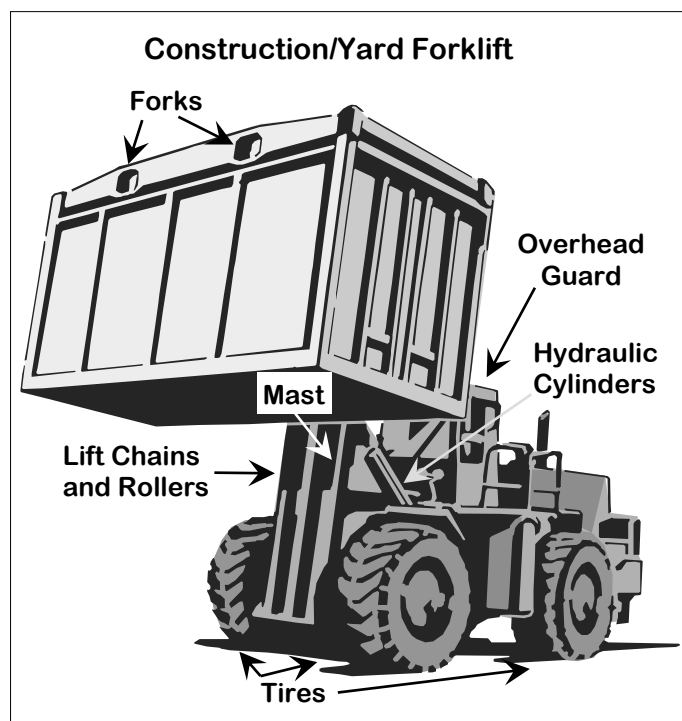
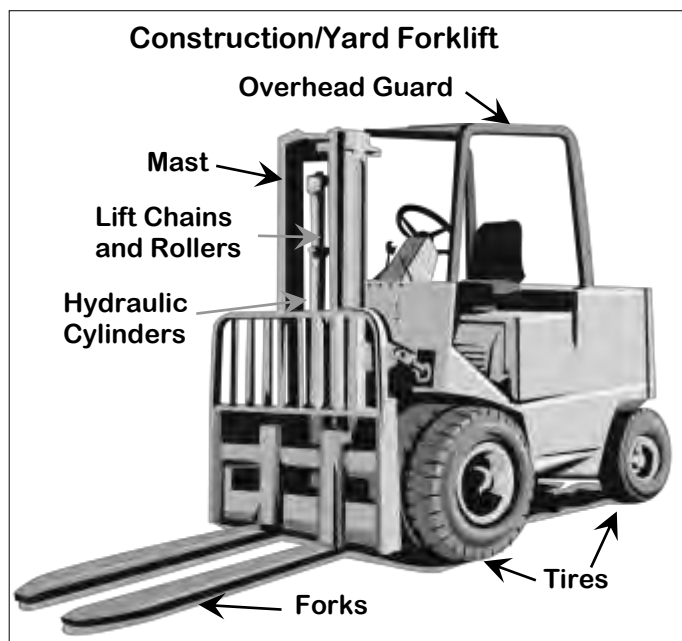
ENGINE RUNNING Procedures

Check the gauges

- ☐ Oil pressure indicator lamp
- ☐ Ammeter indicator lamp
- ☐ Ammeter
- ☐ Hour Meter
- ☐ Water Temperature Gauge

Test the standard equipment

- ☐ Steering
- ☐ Brakes
- ☐ Horn
- ☐ Safety seat (if equipped)
- ☐ Check the transmission fluid level
- ☐ Check the operation of load-handling attachments



GENERAL DAILY FORKLIFT CHECKLIST

YES NO

- ☐ ☐ **Overhead Guard** - Are there broken welds, missing bolts, or damaged areas?
- ☐ ☐ **Hydraulic Cylinders** - Is there leakage or damage on the lift, tilt, and attachment functions of the cylinders?
- ☐ ☐ **Mast Assembly** - Are there broken welds, cracked or bent areas, and worn or missing stops?

Lift Chains and Rollers

- ☐ ☐ Is there wear or damage or kinks, signs of rust, or any sign that lubrication is required?
- ☐ ☐ Is there squeaking?

Forks

- ☐ ☐ Are they cracked or bent, worn, or mismatched?
- ☐ ☐ Is there excessive oil or water on the forks?

Tires - What do the tires look like?

- ☐ ☐ Are there large cuts that go around the circumference of the tire?
- ☐ ☐ Are there large pieces of rubber missing or separated from the rim?
- ☐ ☐ Are there missing lugs?
- ☐ ☐ Is there bond separation that may cause slippage?

Battery Check

- ☐ ☐ Are the cell caps and terminal covers in place?
- ☐ ☐ Are the cables missing insulation?
- ☐ ☐ **Hydraulic Fluid** - Check level?
- ☐ ☐ **Gauges** - Are they all working properly?

Steering

- ☐ ☐ If power steering, is the pump working?
- ☐ ☐ Is there excessive free play?

Comments/Observations: _____

Printed name and signature of person(s) conducting inspection

Date

Printed name and signature of person(s) conducting inspection

Date

YES NO

Brakes

- ☐ ☐ If pedal goes all the way to the floor when you apply the service brake, that is the first indicator that the brakes are bad. Brakes should also work in reverse.
- ☐ ☐ Does the parking brake work? The truck should not be capable of movement when the parking brake is engaged.
- ☐ ☐ **Lights** - If equipped with lights, are they working properly?
- ☐ ☐ **Horn** - Does the horn work?
- ☐ ☐ **Safety Seat** - If the truck is equipped with a safety seat is it working?

Load Handling Attachments

- ☐ ☐ Is there hesitation when hoisting or lowering the forks, when using the forward or backward tilt, or the lateral travel on the side shift?
- ☐ ☐ Is there excessive oil on the cylinders?
- ☐ ☐ **Engine Oil** - Check levels.
- ☐ ☐ **Engine Coolant** - Visually check the level. Note: Never remove the radiator cap to check the coolant level when the engine is running or while the engine is hot. Stand to the side and turn your face away. Always use a glove or rag to protect your hand.
- ☐ ☐ **Transmission Fluid** - Check levels?
- ☐ ☐ **Windshield Wipers** - Do they work properly?
- ☐ ☐ **Seat Belts** - Do they work?
- ☐ ☐ **Control Lever** - Does the lever operate properly?

Cain's Pipeline & Industrial Services, LLC.
Certification of Operator Training for Forklifts

Cain's Pipeline & Industrial Services, LLC. certifies that the following employee has been trained and has demonstrated competence in the following areas of powered industrial truck operations:

Truck-related topics:

- Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate.
- Differences between the truck and an automobile.
- Truck controls and instrumentation: where they are located, what they do, and how they work.
- Engine or motor operation.
- Steering and maneuvering.
- Visibility (including restrictions due to loading).
- Fork and attachment adaptation, operation, and use limitations.
- Vehicle capacity
- Vehicle stability
- Any vehicle inspection and maintenance that the operator will be required to perform.
- Refueling and/or charging and recharging of batteries.
- Operating limitations
- Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of vehicle that the employee is being trained to operate.

Workplace-related topics:

- Surface conditions where the vehicle will be operated.
- Composition of loads to be carried and load stability.
- Load manipulation, stacking, and un-stacking.
- Pedestrian traffic in areas where the vehicle will be operated.
- Narrow aisles and restricted areas that the vehicle will be operated.
- Hazardous (classified) locations where the vehicle will be operated.
- Ramps and sloped surfaces that could affect the vehicle's stability.
- Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust.
- Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.

Employee Name: _____

Name of Trainer: _____

Signature of Trainer: _____

Date of Training: ____ / ____ / ____ **Date of Evaluation:** ____ / ____ / ____

§1910.178 — Powered Industrial Trucks

(k) Trucks and railroad cars.

- (1)** The brakes of highway trucks shall be set and wheel chocks placed under the rear wheels to prevent the trucks from rolling while they are boarded with powered industrial trucks.
- (2)** Wheel stops or other recognized positive protection shall be provided to prevent railroad cars from moving during loading or unloading operations.
- (3)** Fixed jacks may be necessary to support a semitrailer and prevent upending during the loading or unloading when the trailer is not coupled to a tractor.
- (4)** Positive protection shall be provided to prevent railroad cars from being moved while dockboards or bridge plates are in position.

(l) Operator training

(1) Safe operation.

- (i)** The employer shall ensure that each powered industrial truck operator is competent to operate a powered industrial truck safely, as demonstrated by the successful completion of the training and evaluation specified in this paragraph (l).
- (ii)** Prior to permitting an employee to operate a powered industrial truck (except for training purposes), the employer shall ensure that each operator has successfully completed the training required by this paragraph (l), except as permitted by paragraph (l)(5).

(2) Training program implementation.

(i) Trainees may operate a powered industrial truck only:

- [A]** Under the direct supervision of persons who have the knowledge, training, and experience to train operators and evaluate their competence; and
- [B]** Where such operation does not endanger the trainee or other employees.

(ii) Training shall consist of a combination of formal instruction (e.g., lecture, discussion, interactive computer learning, video tape, written material), practical training (demonstrations performed by the trainer and practical exercises performed by the trainee), and evaluation of the operator's performance in the workplace.

(iii) All operator training and evaluation shall be conducted by persons who have the knowledge, training, and experience to train powered industrial truck operators and evaluate their competence.

(3) Training program content. Powered industrial truck operators shall receive initial training in the following topics, except in topics which the employer can demonstrate are not applicable to safe operation of the truck in the employer's workplace.

(i) Truck-related topics:

- [A]** Operating instructions, warnings, and precautions for the types of truck the operator will be authorized to operate;
- [B]** Differences between the truck and the automobile;
- [C]** Truck controls and instrumentation: where they are located, what they do, and how they work;
- [D]** Engine or motor operation;
- [E]** Steering and maneuvering;
- [F]** Visibility (including restrictions due to loading);
- [G]** Fork and attachment adaptation, operation, and use limitations;
- [H]** Vehicle capacity;
- [I]** Vehicle stability;
- [J]** Any vehicle inspection and maintenance that the operator will be required to perform;
- [K]** Refueling and/or charging and recharging of batteries;
- [L]** Operating limitations;
- [M]** Any other operating instructions, warnings, or precautions listed in the operator's manual for the types of vehicle that the employee is being trained to operate.

(ii) Workplace-related topics:

- [A]** Surface conditions where the vehicle will be operated;
- [B]** Composition of loads to be carried and load stability;
- [C]** Load manipulation, stacking, and unstacking;
- [D]** Pedestrian traffic in areas where the vehicle will be operated;
- [E]** Narrow aisles and other restricted places where the vehicle will be operated;
- [F]** Hazardous (classified) locations where the vehicle will be operated;

[G] Ramps and other sloped surfaces that could affect the vehicle's stability;

[H] Closed environments and other areas where insufficient ventilation or poor vehicle maintenance could cause a buildup of carbon monoxide or diesel exhaust;

[I] Other unique or potentially hazardous environmental conditions in the workplace that could affect safe operation.

(iii) The requirements of this section.

(4) Refresher training and evaluation.

(i) Refresher training, including an evaluation of the effectiveness of that training, shall be conducted as required by paragraph (l)(4)(ii) to ensure that the operator has the knowledge and skills needed to operate the powered industrial truck safely.

(ii) Refresher training in relevant topics shall be provided to the operator when:

[A] The operator has been observed to operate the vehicle in an unsafe manner;

[B] The operator has been involved in an accident or near-miss incident;

[C] The operator has received an evaluation that reveals that the operator is not operating the truck safely;

[D] The operator is assigned to drive a different type of truck; or

[E] A condition in the workplace changes in a manner that could affect safe operation of the truck.

(iii) An evaluation of each powered industrial truck operator's performance shall be conducted at least once every three years.

(5) Avoidance of duplicative training. If an operator has previously received training in a topic specified in paragraph (l)(3) of this section, and such training is appropriate to the truck and working conditions encountered, additional training in that topic is not required if the operator has been evaluated and found competent to operate the truck safely.

(6) Certification. The employer shall certify that each operator has been trained and evaluated as required by this paragraph (l). The certification shall include the name of the operator, the date of the training, the date of the evaluation, and the identity of the person(s) performing the training or evaluation.

(7) Dates. The employer shall ensure that operators of powered industrial trucks are trained, as appropriate, by the dates shown in the following table.

If the employee was hired:	The initial training and evaluation of that employee must be completed:
Before December 1, 1999	By December 1, 1999.
After December 1, 1999	Before the employee is assigned to operate a powered industrial truck.

(8) Appendix A to this section provides non-mandatory guidance to assist employers in implementing this paragraph (l). This appendix does not add to, alter, or reduce the requirements of this section.

Chapter 18

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Hand and Portable Powered Tools

Cain's Pipeline & Industrial Services, LLC. has adopted this safety program for Hand and Portable Powered Tools from the following OSHA regulations:

§1910.241 – Hand and Portable Powered Tools and Other Hand-Held Equipment

§1926.300 – Tools - Hand and Power

Cain's Pipeline & Industrial Services, LLC. has implemented this policy to ensure that no employee is exposed hazards caused by improper or unsafe use of hand and portable powered tools. *Cain's Pipeline & Industrial Services, LLC.* will provide instruction and training by a Competent Person for each employee using any such tool. The program will enable each employee to recognize hazards related to hand and portable powered tool use and will train each employee in the procedures to be followed to minimize these hazards. **Brent Messina** is the supervisor responsible for ensuring the following instruction, training, and safe work practices are enforced:

Brent Messina will ensure that each employee has been trained or instructed by a competent person in the following areas, as applicable:

- All hand and power tools and similar equipment, whether furnished by *Cain's Pipeline & Industrial Services, LLC.* or the employee, will be maintained in a safe condition.
- Any tool not in compliance with any applicable OSHA requirements is prohibited. Such tools will either be identified as unsafe by tagging or locking the controls to render them inoperable, or the defective tool will be physically removed from its place of operation.
- When power operated tools are designed to accommodate guards, they will be equipped with such guards when in use.
- Guards shall be in place and operable at all times while the tool is in use. The guard may not be manipulated in such way that will compromise its integrity or compromise the protection in which intended. Guarding shall meet the requirements set forth in ANSI B15.1.
- Employees using hand and power tools and exposed to the hazard of falling, flying, abrasive, and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases will be provided with the appropriate PPE necessary to protect them from the hazard.
- Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or moving parts of equipment will be guarded if such parts are exposed to contact by employees or otherwise create a hazard.
- One or more methods of machine guarding will be provided to protect the operator and other employees in the machine area from hazards such as those created by point of operation, ingoing nip points, rotating parts, flying chips, and sparks. The point of operation of machines whose operation exposes an employee to injury, will be guarded.

- All fuel powered tools will be stopped while being refueled, serviced, or maintained. When fuel powered tools are used in enclosed spaces, the applicable PPE requirements for hazardous atmospheres will apply.
- *Cain's Pipeline & Industrial Services, LLC.* employees are required to follow these general requirements for safe hand-held power tool use:

General Power Tool Use

- Do not allow anyone to use power tools that has not been properly instructed and approved in the processes of safe operation.
- Be familiar with your power tools. When using a new tool, or one that is foreign to you, take some time to "test-run" it and get a feel for its performance. Read and understand the operator's manual and follow its instructions. Prior to its use, do a visual and operational inspection to ensure safe mechanical function.
- Eye protection is extremely important and must always be worn when using power tools. When operations present potential eye injuries, adequate and appropriate protection must be selected. Use a face shield, protective goggles, or approved safety glasses depending on the job performed.
- Hearing protection is required due to the extreme noise levels generated, especially during extended operating sessions.
- Depending on the material being cut, gloves can be helpful and a respirator or dust mask may be required.
- Wear clothing appropriate for power tools use; avoid long, loose shirtsleeves, neckwear, or untied long hair.
- Check that the electrical circuit to be used is of the proper rating and that cords, plugs, and fittings are intact and secure. All power tools must be grounded unless they are double insulated.
- Use only extension cords that are free of splices, taps, bare wires, or frayed and deteriorated insulation. Use 3-prong adaptors.
- Ensure all power tools are equipped with proper shields and guards, as recommended by the manufacturer. The guards are designed and engineered for the operator's safety.
- Operate only properly maintained equipment. Check that spring-loaded on/off trigger switch functions properly.
- If any operational problems are noted, remove the power tools from service and get it repaired immediately.
- When repairing tools, or changing blades, bits and/or cutters, always disconnect the power source.
- Remove chuck-keys or arbor wrenches before using the tool.
- When possible, always secure your work on a stable platform using clamps or vices.
- Unsafe practices and inadequate housekeeping create potentially dangerous work-zones; keep the work area free of trip hazards such as tangled power cords, cluttered material, scraps, bricks, or other obstacles and obstructions.
- Be aware of your surroundings and always on the lookout for hazards. Avoid using power tools in a wet environment.
- Always use the proper tool for the job. When not in use, store tools in a dry, secure location.

Powder-Actuated Tools

Cain's Pipeline & Industrial Services, LLC. employees are required to follow these general requirements for safe powder-actuated tool use:

- Operators and assistants using tools must use eye, head, and face protection as required by working conditions.
- Inspect the tool before use to ensure that it is clean, that all moving parts are free, and that the barrel is free of debris or obstructions.
- The muzzle end of the tool must have a guard at least 3 ½" in diameter to confine any flying fragments that might create a hazard.
- If a tool is defective, it must be taken out of use until it is properly repaired.
- Tools are to remain unloaded until they are to be used.
- Never point a tool loaded, or unloaded at anyone.
- In case of a misfire, the tool must be held in the operating position for at least 30 seconds, tried a second time, then wait another 30 seconds before unloading in strict accordance with manufacturer's instructions.
- Never leave a tool unattended where it would be available to unauthorized personnel.
- Fasteners must not be driven into exceptionally hard materials such as cast iron, glazed tile, hardened steel, glass block, or rock.
- A backing must be used on soft materials to prevent fastener from passing completely through and becoming a flying hazard.
- Fasteners must not be driven through an existing hole unless means of positive alignment is available.
- Fasteners may not be driven into a cracked or fractured area caused by a previous fastener.
- Tools must not be used in an explosive or flammable atmosphere.
- Requirements for loads and fasteners:
 - There must be a standard means of identifying the power level of loads being used in the powder actuated tools.
 - No load may be used in excess of design specifications for a low velocity tool.
 - Fasteners used in tools must be only those designed to be used in such tools.

Circular Saws

Cain's Pipeline & Industrial Services, LLC. employees are required to follow these safety guidelines when using a circular saw:

- Eye protection is extremely important and must always be worn when using circular saws. When operations present potential eye injuries, adequate and appropriate protection must be selected. Use a face shield, protective goggles, or approved safety glasses depending on the job to be performed.
- Hearing protection may be required due to the extreme noise levels generated, especially during extended use.
- A respirator or dust mask may be required, depending on the material being cut.
- Do not wear loose clothing, long-sleeves, or gloves while operating a circular saw.

- Check that the electrical circuit to be used is of the proper rating and that cords, plugs, and fittings are intact and secure. All circular saws must be grounded unless they are double insulated.
- Use only extension cords that are free of splices, taps, bare wires, or frayed and deteriorated insulation. Do not use extensions over 100 ft. long due to the power drop.
- Operate only properly maintained equipment. Check that the spring-loaded on/off trigger switch functions properly. If any operational problems are noted, remove the circular saw from service and get it repaired immediately.
- Be aware of your surroundings and always on the lookout for hazards. Avoid using circular saws in a wet environment.
- Always cut material on an elevated work platform. Never attempt to cut any material lying on the ground or by simply holding the material in your opposite hand.
- Be aware of the position of the cord. Always clear the cord before making the cut.
- Inspect all material prior to cutting. Look for defects such as knots in the wood, nails and screws, or any obstruction that may impede the cut.
- Always inspect the saw prior to operation, ensuring the blade is tight and guards are fully functional.
- Never pin back or otherwise disable the retractable guard.
- Unplug the saw when changing blades or making adjustments for depth or angle.
- After tightening the blade or making other adjustments, be sure to remove wrench before operating the circular saw.
- Maintain the saw and use only sharp blades or non-defective abrasive wheels free of distortion, cracks, or heat damage. A ring test will be performed on blades prior to installation to determine soundness.
- Always store and discard saw blades in a safe responsible manner.
- When the saw is not in use unplug the saw and place the saw out of the way with the blade facing down.
- Always use the proper tool for the job. When not in use, store circular saws in a dry, secure location.

Miter Saws

Cain's Pipeline & Industrial Services, LLC. employees are required to follow these safety guidelines when using a miter cut-off (chop) saw:

- Do not ever, under any circumstances, allow anyone to use a chop saw that has not been properly instructed and approved in the processes of its safe operation.
- Prior to its use, do a visual and operational inspection to ensure safe mechanical function of the saw:
 - Make certain all blade guards are in place and working smoothly. Removing or pinning back guards is not only extremely hazardous; it is considered a serious safety violation.
 - Check the blade to be sure that it is straight and the arbor bolt is tight.
 - Ensure the "constant-pressure" trigger switch operates properly.
 - Check that the electrical cords, plugs, and fittings are intact and secure. Frayed cords are not permissible.

- Be sure that arbor wrenches or keys were not inadvertently left behind on the machine during a blade change.
- When setting-up the cutting station, it is important that the saw is positioned in a manner that the work piece's point of contact with the cutting edge can be easily viewed without straining or stooping.
- Make sure the work-zone is level and free of trip hazards such as tangled power cords, cluttered material piles, scraps, stones, bricks, or other obstacles and obstructions. Avoid unsafe distractions by setting up away from high traffic areas.
- Ensure the saw's table or platform being used is stable and does not wobble. Be sure that accessory benches (for cutting long stock) are steady and sturdy; get assistance when needed.
- During cuts, keep blade speeds at recommended levels; over-pressure on cuts will create hazardous situations.
- Hearing protection is required due to the extreme sonic and acoustical levels generated, especially during extended cutting.
- Eye protection must always be worn when using a chop saw.
- Depending on the material being cut, a dust mask may be required.
- Wear clothing appropriate with chop saw use; avoid long, loose shirtsleeves, neckwear, or untied long hair.
- If any operational problems are noted, remove the saw from service and get it repaired immediately.
- Proper care and maintenance should always be given the saw. Damage usually occurs during careless transport, handling, and storage of the tool.
- Allow only qualified personnel to make repairs to the saw.

Drills

Cain's Pipeline & Industrial Services, LLC. employees are required to follow these safety guidelines when using drills:

- Do not allow anyone to use an electric drill that has not been properly trained in the processes of safe portable drilling operations.
- Operate only properly maintained equipment. Before use, carefully inspect the machine for obvious defects that could cause malfunctions. Ensure the tool's power cord is secure and intact, the trigger switch functions properly, and that all fasteners and attachments are tight and correctly fitted. When possible, operate the tool using both hands and follow the manufacturer's operating instructions.
- Eye protection is extremely important and must always be worn when doing overhead operations. When operations present potential eye injuries, appropriate protection must be selected. Depending on the task, use a face shield, protective goggles, or approved safety glasses.
- Be familiar with the power drill being used. When using a new or unfamiliar tool, take time to "test-run" it and get a feel for its performance.

- Wear clothing appropriate for drilling or boring; avoid long, loose shirtsleeves, neckwear, or untied long hair.
- Check that the electrical circuit to be used is of the proper rating and that cords, plugs, and fittings are intact and secure.
- Use only extension cords that are free of splices, taps, bare wires, or frayed and deteriorated insulation. Use 3-prong adaptors.
- Select the correct drill and bit for the job and mount it securely in the chuck. Avoid using bits that are dull or bent.
- When possible, always secure your work on a stable platform using clamps or vices. The work-piece must be secured so it does not move.
- Prior to beginning drilling operations, inspect each work piece for nails, knots, or flaws that could cause the tool to buck or jump.
- Turn on the switch for a moment to see if the bit is properly centered and running true.
- With the switch off, place the point of the bit in the punched layout or pilot hole.
- Hold the drill firmly in one or both hands and at the correct drilling angle.
- Turn on the switch and feed the drill into the work-piece. The pressure required will vary with the size of the drill, the diameter of the drill bit, and the kind of material being drilled.
- During operation, keep the drill aligned with the direction of the hole. Keep your free hand away from point of operation.
- If any operational problems are noted, remove the drill from service and get it repaired immediately.
- When repairing tools or changing bits, always disconnect the power source.
- Unsafe practices and inadequate housekeeping create potentially dangerous work-zones; keep the work area free of trip hazards such as tangled power cords, cluttered material, scraps, stones, bricks, or other obstacles and obstructions.
- Be aware of your surroundings and always on the lookout for hazards. Avoid using electric drills in a wet environment.

Portable Abrasive Wheels

Cain's Pipeline & Industrial Services, LLC. employees are required to follow these safety guidelines when using handheld grinders or other portable abrasive wheels:

- Employees using grinding tools and/or are exposed to the hazards of falling, flying, abrasive, and splashing objects, or exposed to harmful dusts, fumes, or vapors will be provide with, and compelled to use, the particular personal protective equipment necessary to protect them from the hazard. This equipment includes eye and face, respiratory, hearing, and hand protection and will be properly maintained to meet all applicable standards.
- All power grinding tools will be maintained in a safe condition. When these tools are designed to accommodate guards, they will be in place when the tool is in use. Safety guards will be strong enough to retain flying fragments and withstand the effects of a bursting wheel.
- All grinding machines will be supplied with sufficient power to maintain safe spindle speeds under normal operating conditions.
- All abrasive wheels will be carefully inspected and "ring-tested" before mounting to ensure that they are free from cracks or defects. To perform a sound or ring

test, wheels should be tapped gently with a light, non-metallic instrument. If they sound cracked or dead, they could fly apart during operations and should be discarded. An intact, undamaged wheel will give a clear metallic tone or “ring”.

- Only portable grinders with wheels 2 inches in diameter or less may be equipped with a positive on/off control switch. Grinders with wheels greater than 2 inches in diameter will be equipped with a momentary contact on/off switch and may have a lock-on control.
- Grinders will be used on a 3-wire grounded circuit or be of the approved double insulated type. Using the tool’s power cord for hoisting or lowering will not be permitted.
- All grinding/cutting wheels will fit freely on the spindle and must not be forced on. The spindle nut will be tightened only enough to hold the wheel in place.
- When grinding metal, it is easy to leave razor-sharp edges; be sure you take them off before walking away from a work piece.

Pneumatic Nailers and Staplers

Cain's Pipeline & Industrial Services, LLC. employees are required to follow these safety guidelines while operating pneumatic nailers and staplers:

- Never allow anyone to operate these tools without first being properly instructed in their safe use
- Appropriate Personal Protective Equipment must be worn at all times when using compressed air tools and equipment.
- Pneumatic powered tools must be secured to the hose by some positive means to prevent the tool from becoming accidentally disconnected
- All pneumatically powered nailers, staplers, or other similar equipment with automatic feed, that operate at over 100 psi at the tool, must have a safety device on the muzzle to prevent the tool from cycling and ejecting fasteners, unless the muzzle is in contact with the work surface.
- Compressed air must not be used to clean except where pressure is reduced to less than 30 psi. The 30 psi rule does not apply to concrete forms, mill scale, and similar cleaning purposes.
- The manufacturer’s safe operating pressure for hoses, pipes, valves, filters, and other fittings must not be exceeded.
- Avoid horseplay when using “air guns”. Accidentally discharged fasteners can easily penetrate flesh and bone.
- Safety features should be left intact or you could nail your foot to the deck—it does happen.
- Always wear appropriate eye protection when using any air gun.
- Hearing protection is often required depending on the noise level.
- Read the owners manual and operate the tool according to manufacturer’s guidelines.

- Ensure that tools are properly maintained and are in good working condition.
- Never exceed manufacturer's recommended working pressures and never use more pressure than necessary (seldom more than 90 – 95 psi). Excessive pressure exerts more force, causing harder cycles. It is hard on tools and generates more flying debris.
- Always keep the nose of the tool pointed toward the work-piece or downward when air charged. Never point the tool towards yourself or others.
- During use, hold the nose of the gun firmly against the work-piece.
- Ensure all safety features are intact and operational. Make sure they are not disabled and are functioning properly.
- Always disconnect tool from air supply when clearing a jam or when not in use. Keep hoses and fittings in good condition.
- Never carry an air-gun with your finger on the trigger. Accidental discharge and injury may result.
- Tie-off and secure the air hose when working on a roof or scaffold to prevent the tool from falling on others.
- Always move forward when working a nailer or stapler on a roof so you do not inadvertently trip or fall from the roof.
- Never use volatile bottled gas to operate pneumatic fasteners or operate air guns around flammables; sparks may cause a fire.
- Keep your free hand clear of air gun's nose during use.
- Safety clips or retainers must be securely installed and maintained on pneumatic impact (percussion) tools to prevent attachments from being accidentally expelled.

Air Compressors

Cain's Pipeline & Industrial Services, LLC. employees are required to follow these safety guidelines while operating air compressors:

- Every air receiver must be equipped with a pressure indicator gauge with one or more spring loaded safety valves.
- Pressure gauges must be located so as to be readily visible.
- The pressure relief safety valves may not exceed the rated working pressure of the air receiving tank.
- No valve of any type may be placed between the safety valve and the air receiver.
- Safety valves, pressure gauges, regulators, and other controlling devices must be designed and installed so that they cannot be easily rendered inoperative by any means, including weather elements.
- All safety valves must be tested at frequent intervals to determine proper operating condition.
- A drainpipe and valve must be installed at the lowest point of any air receiver to provide for the frequent and complete removal of accumulated oil and water.
- Never install compressors on an unrated air tank. The air receiver tank must be rated equal to or higher than original equipment.

- If pressure gauges or pressure relief valves are damaged, replace them with compatible equipment before using the compressor.
- If a compressed air storage tank is dented, deeply gouged, or badly rusted, compressor must be removed from service.
- Do not use compressed air to pressurize barrels, pipes, or other containers not designed or intended as pressure vessels.
- If an air receiver is equipped with a quick connect/release fitting, make sure the lock collar is fully engaged when hose is connected. When the hose is released from the fitting, firmly grasp the hose close to the fitting before releasing the lock collar.
- Before servicing a compressor, disconnect it from the power source and bleed the pressure from the tank. (Use appropriate LOTO)
- Pulleys and belts on compressor motors and pumps must be properly guarded.
- If using a gas powered compressor, engine must be shut off before refueling.
- If an electric powered compressor, check power cord for cuts and abrasions, if the cord, plug, or any components are damaged, replace before use.

Hand Tools

Cain's Pipeline & Industrial Services, LLC. employees are required to follow these safety guidelines when using hand tools:

- General Tools: Always wear Personal Protective Equipment that is appropriate for the hand tool being used.
- Damaged, worn-out, or defective tools should be tagged and removed from service. Do not perform "make-shift" repairs to tools.
- Never use a tool if its handle has splinters, burrs, cracks, splits or if the head of the tool is loose.
- Do not use impact tools such as hammers, chisels, punches or steel stakes that have mushroomed heads.
- When handing a tool to another person, direct sharp points and cutting edges down and away from yourself and the other person.
- Carry all sharp tools in a sheath or holster. Do not carry sharp or pointed hand tools such as screwdrivers, scribes, snips, scrapers, chisels or files in your pocket unless the tool is sheathed. Transport hand tools only in toolboxes or tool belts.
- Use tied off containers to keep tools from falling off scaffolds and other elevated work platforms.
- Avoid carrying tools in your hand when you are climbing. Carry tools in tool belts or hoist the tools to the work area using a hand line.
- Do not throw tools from one location to another or from one employee to another.
- Hammers: Do not use a hammer if your hands are oily, greasy or wet.
 - Never strike another hardened steel tool or surface, such as a cold chisel, with a claw hammer.
 - Avoid striking nails or other objects with the "cheek" of the hammer.
 - Do not strike one hammer against another hammer.
 - Never use a hammer as a wedge or a pry bar.

- Hand Saws: When using a handsaw, hold the work-piece firmly against the work table.
 - Do not use an adjustable blade saw, such as a hacksaw or a coping saw, if the blade is not taut.
 - Avoid using any saw with a dull blade; always keep blades clean and sharp.
 - Keep hands and fingers away from the point of cut when using any saw.
 - Never carry a hand saw by the blade.
- Screwdrivers: Do not use a screwdriver if your hands are wet, oily or greasy.
 - Always match the size and type of screwdriver blade to fit the head of the screw.
 - Never hold the work-piece against your body while using a screwdriver.
 - Avoid putting your fingers near the blade of the screwdriver when tightening a screw.
 - Use a drill, nail, or an awl to make a starting or pilot hole for screws.
 - Do not force a screwdriver by using a hammer or pliers on it.
 - Never use a screwdriver as a punch, chisel, pry bar, or nail puller.
 - When performing electrical work, ensure the screwdriver has a properly insulated handle.
- Pliers: Do not use pliers that are cracked, broken or sprung.
 - Never use pliers as a wrench or a hammer.
 - Do not attempt to force pliers by using a hammer on them.
 - When you are performing electrical work, use pliers that have properly insulated handles.
 - When using diagonal cutting pliers, shield the loose pieces of cut material from flying into the air.

Wrenches

Cain's Pipeline & Industrial Services, LLC. employees are required to follow these safety guidelines when using wrenches:

- Inspect the wrench carefully before use and do not use if damaged.
- Discard any wrench that has spread, nicked or battered jaws, or if the handle is loose, broken or bent.
- Always use the proper size wrench for the job. A slipping wrench can damage bolt heads and nuts and cause personal injury. Do not use a shim to make a wrench fit the fastener.
- Use a wrench that gives a straight, clean pull. If you must push the wrench, use the heel of your hand; do not wrap your fingers around the tool.
- Do not cock the wrench in a manner that puts a strain on the points of contact; this can lead to tool failure. Keep the wrench flush with bolt head.
- Avoid using a pipe or other "cheater bars" to extend the length of a wrench. Under excessive force, the wrench or bolt can slip or break.
- Do not use a hammer with a wrench unless the wrench has been specifically designed for this purpose.

- Replace cracked, worn, or “tweaked” wrenches.
- Do not attempt to straighten a bent wrench. It will only weaken it further.
- Do not substitute slip-joint pliers for a wrench; the pliers can slip and damage the bolt heads and nuts and cause hand injuries.
- Sockets designed for use with hand wrenches should not be interchanged on air or impact wrenches; this can result in damage or injury.
- When using air impact or other air wrenches, wear eye protection to safeguard against blowing debris. Use only heavy-duty hardened sockets.
- Use a torque wrench for tightening only. Never use torque wrenches to break nuts or bolts loose; they are designed to measure tightness.
- Be sure the jaws on you pipe wrenches are still sharp as unexpected slippage can cause injury.

Jacks - lever and ratchet, screw, and hydraulic

Cain's Pipeline & Industrial Services, LLC. employees are required to follow these safety guidelines when using jacks:

- The manufacturer's rated capacity will be legibly marked on all jacks and will not be exceeded.
- All jacks will have a positive stop to prevent overtravel.
- When it is necessary to provide a firm foundation, the base of the jack will be blocked or cribbed. Where there is a possibility of slippage of the metal cap of the jack, a wood block will be placed between the cap and the load.
- After the load has been raised, it will be cribbed, blocked, or otherwise secured at once.
- Hydraulic jacks exposed to freezing temperatures will be supplied with an adequate antifreeze liquid.
- All jacks will be properly lubricated at regular intervals.
- Each jack will be thoroughly inspected at times which depend upon the service conditions. Inspections will be not less frequent than the following:
 - For constant or intermittent use at one locality, once every 6 months,
 - For jacks sent out of shop for special work, when sent out and when returned,
 - For a jack subjected to abnormal load or shock, immediately before and immediately thereafter.
- Repair or replacement parts will be examined for possible defects.
- Jacks which are out of order will be tagged accordingly, and will not be used until repairs are made.

Notes:

Handwriting practice lines consisting of 20 sets of three horizontal lines (top, middle, and bottom) for letter formation.

Chapter 19

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Hazard Communication

Cain's Pipeline & Industrial Services, LLC. has adopted this policy for Hazard Communication from OSHA regulation:

§1910.1200 – Hazard Communication

Cain's Pipeline & Industrial Services, LLC. has implemented this program to ensure that employees are informed of any chemical hazards and hazardous or toxic substances in their workplace:

Brent Messina is the administrator of the Company Hazard Communication Program, and will document all necessary training of employees. *Cain's Pipeline & Industrial Services, LLC.* will provide employees and new hires at their initial assignment effective information and training on hazardous chemicals in their work area that will include:

- Requirements of this program.
 - Any operations in their work area where hazardous chemicals are present.
 - Location of written hazard communication program, listing of hazardous chemicals present & MSDS.
 - Methods and/or observations that may be used to detect the presence or release of hazardous chemicals by use of monitoring devices, visual appearance, or odor.
 - The physical & health hazards of chemicals in the work area.
 - Protection measures to be utilized to prevent exposure, appropriate work practices, emergency procedures, and proper PPE to be used.
 - Details of the hazard communication program, explanation of the labeling system and the MSDS and how employees can obtain & use the appropriate hazard information.
- *Cain's Pipeline & Industrial Services, LLC.* will develop, implement, and maintain at each workplace a written hazard communication program that describes how labels and other forms of warning, material safety data sheets, and employee information will be accomplished.
 - Employees will be notified of any hazardous substances used by any company other than *Cain's Pipeline & Industrial Services, LLC.* in the workplace, and make MSDS available to employees.
 - All containers used on the job will be labeled for content, and precautions if substance contained is hazardous. Materials will be left in their manufacturer's container, returned to the container immediately after use, or any unused portion disposed of properly. If labels become illegible for any reason, a new label will be affixed containing all required precautionary information, or the material disposed of properly. ***See examples of precautionary labeling on pages 9 and 18 of this section.***

- A list of all chemicals known to be used at the workplace by Company employees will be available for review at the jobsite and in the office. MSDS for all chemicals used in the workplace by *Cain's Pipeline & Industrial Services, LLC.* are available to employees at the worksite from the job foreman or in the office. Following is a list of all known hazardous chemicals used by *Cain's Pipeline & Industrial Services, LLC.* personnel in the workplace:

<i>Brand Name:</i>	<i>Hazardous Ingredient:</i>

- *Brent Messina* will ensure that each container of hazardous chemicals in the workplace is labeled, tagged, or marked with the following information:
 - Identity of the hazardous chemical(s) contained therein.
 - Appropriate hazard warnings, or alternatively, words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under this Hazard Communication Program. Employees will be provided with the specific information regarding the physical and health hazards of the hazardous chemical.
 - Name and address of the chemical manufacturer, importer, or other responsible party.
- *Brent Messina* will ensure that labels or other forms of warning in English, are legible, and prominently displayed on the container, or readily available in the work area throughout each work shift.
- When *Cain's Pipeline & Industrial Services, LLC.* has employees who are non-English speaking, information shall be presented in their language as well.
- Changes of job assignments, changes in materials used, or any non-routine tasks involving hazardous substances or conditions will require notification and/or retraining of effected employees. *Brent Messina* will inform or retrain employees of any new or additional hazards, detail methods of hazard abatement or elimination, and provide proper personal protective equipment or engineering controls necessary for the job. Notifications and retraining will be documented as to name of employee, date, description of action taken, and verification by *Brent Messina*.
- A copy of the Company's Hazard Communication Program is available to all employees, and will be kept at each jobsite by the foreman in charge, or in the office. Translations of the hazard communication program are available to non-English speaking employees upon request from *Brent Messina*.

Company Hazard Communication Plan & Program Follows This Page

Company Hazard Communication Plan & Program

General Policy Statement

The management of ***Cain's Pipeline & Industrial Services, LLC.*** is committed to preventing accidents and ensuring the safety and health of our employees. We will comply with all applicable federal and state health and safety rules and provide a safe, healthful environment for all our employees. This written hazard-communication plan is available at the following location for review by all employees:

Cain's Pipeline & Industrial Services, LLC. Company Office

7663 1st St

Addis, LA 70710-2127

Container Labeling

- All hazardous chemical containers used at this workplace will clearly identify the chemical on the label, and include an appropriate hazard warning and the manufacturer's name and address.
- All containers used on the job must be labeled for content and precautions if substance contained is hazardous. Materials will be left in their manufacturer's container where possible. When hazardous materials are transferred to other containers for ease of use, the container will be clearly marked for content, and any remaining material returned to its original manufacturer's container immediately after use.
- If labels become illegible for any reason, a new label must be affixed containing all required information, or the material disposed of properly.
- No container will be released for use until this information is verified. *Brent Messina* will ensure that all containers are labeled with a copy of the original manufacturer's label or a label that has the appropriate identification and hazard warning.

Material Safety Data Sheets

Material safety data sheets are readily available to all employees of *Cain's Pipeline & Industrial Services, LLC.* Employees can review material safety data sheets for all hazardous chemicals used at this workplace. MSDS are kept with the hazard communication plan at the office location listed above. The material safety data sheets are updated and managed by *Brent Messina*. If a material safety data sheet is not available for a hazardous chemical, before use, notify *Brent Messina*, and a MSDS will be obtained for the chemical to be used.

Employee Training

Before they start their jobs, new employees will receive hazard communication training that covers the following topics:

- An overview of the requirements in OSHA's CFR 29 1910.1200 hazard communication rules.
- Hazardous chemicals present in their workplace.
- The written hazard-communication plan, and where it may be reviewed.
- Physical and health effects of the hazardous chemicals.

- Methods used to determine the presence or release of hazardous chemicals in the work area.
- How to reduce or prevent exposure to these hazardous chemicals through use of control/work practices and personal protective equipment.
- Steps we have taken to reduce or prevent exposure to these chemicals.
- Emergency procedures to follow if an employee is exposed to these chemicals.
- How to read labels and review material safety data sheets.

After attending the training, each employee will sign a company training form verifying that they understand the above topics and how the topics are related to our hazard-communication plan.

Hazardous Chemicals List

The following list identifies all hazardous chemicals used at this workplace. Detailed information about the physical and health effects of each chemical is included in a material safety data sheet; the identity of each chemical on the list matches the identity of the chemical on its material safety data sheet. Material safety data sheets are readily available to employees in their work areas.

<i>Product or Brand Name</i>	<i>Manufacturer</i>	<i>Hazardous Ingredient</i>

Hazardous Non-Routine Tasks

Before employees perform non-routine tasks that may expose them to hazardous chemicals, they will be informed by their supervisors about the chemicals' hazards. Their supervisors also will inform them about the safe work practices necessary to control exposure and what to do in an emergency. Examples of non-routine tasks that may expose employees to hazardous chemicals include the following:

<i>Task:</i>	<i>Hazard:</i>

Hazardous Chemicals in Pipes, Closed, or Hidden Systems

Before working in areas where hazardous chemicals are transferred through pipes or where pipes are insulated with asbestos-containing material, employees will contact _____ for the following information:

- The chemicals in the pipes.
- The physical or health effects of the chemicals or the asbestos insulation.
- The safe work practices to prevent exposure.

Notification of Contractors

It is the responsibility of the assigned job foreman to provide any workplace associated contractors and their employees with the following information if they may be exposed to hazardous chemicals in our workplace:

- The identity of the chemicals, how to review material safety data sheets, and an explanation of the container and pipe labeling system.
- Safe work practices to prevent exposure.

This person will also obtain a material safety data sheet for any hazardous chemical a contractor brings into the workplace to which an employee of *Cain's Pipeline & Industrial Services, LLC*. may be exposed.

Hazard Communication in the Workplace

The essence of hazard communication is a warning. We use thousands of chemical products throughout our lives, at home and at work. However, most of us would be hard-pressed to distinguish safe products from hazardous ones without a warning – the familiar skull-and-crossbones, for example. The warning tells us the product is hazardous, that it can harm us if we use it improperly.

In the workplace, hazard communication ensures that workers who may be exposed to hazardous chemicals know about the chemicals' hazards and understand how to protect themselves from exposure.

The Hazard Communication Process

Hazard communication begins when chemical manufacturers and importers evaluate their products to determine each product's chemical hazards. Next, they prepare a *Material Safety Data Sheet* – known by the abbreviation MSDS – for each product. An MSDS includes detailed information about the product's hazards. Manufacturers and importers must include an MSDS and a warning label with each container of product that they ship to a customer.

The part of the process that affects your workplace is the "*Written Hazard-Communication Plan*." The plan identifies hazardous chemicals at your workplace and describes how you will use material safety data sheets, warning labels, and training to protect employees and keep informed about the product's chemical hazards.

Definition of a Hazardous Chemical

OSHA's hazard-communication rule, 1910.1200, defines a hazardous chemical as "any element, chemical compound, or mixture that is a physical hazard or a health hazard."

Chemicals that are physical hazards

Chemicals that are physical hazards are unstable and, when handled improperly, can cause fires or explosions. A chemical that is a physical hazard has one of the following characteristics:

- Is a combustible liquid.
- Is a compressed gas.
- Is explosive.
- Is flammable.
- Is water-reactive.
- It starts or promotes combustion in other materials.
- It can ignite spontaneously in air.

Chemicals that are health hazards

Chemicals that are health hazards can damage an exposed person's tissue, vital organs, or internal systems. Generally, the higher the chemical's toxicity the lower the amount or dose necessary for it to have harmful effects. The effects vary from person to person, ranging from temporary discomfort to permanent damage, depending on the dose, the toxicity, and the duration of exposure to the chemical.

Health effects range from short-duration symptoms that often appear immediately (acute effects) to persistent symptoms that usually appear after longer exposures (chronic effects). Health effects can be classified by how they affect tissue, vital organs, or internal systems:

- Agents that damage the lungs, skin, eyes, or mucous membranes
- Carcinogens cause cancer
- Corrosives damage living tissue
- Hematopoietic agents affect the blood system
- Hepatotoxins cause liver damage
- Sensitizers cause allergic reactions & Irritants cause inflammation of living tissue
- Nephrotoxins damage cells or tissues of the kidneys
- Neurotoxins damage tissues of the nervous system
- Reproductive toxins damage reproductive systems, endocrine systems, or a developing fetus

How to determine if a chemical is hazardous

A chemical is hazardous if it is listed in one of the following documents:

- OSHA Division 2, Subdivision Z safety and health rules, Toxic and Hazardous Substances; Division 3, Subdivision Z, Toxic and Hazardous Substances (Construction); Division 4, Subdivision Z, Chemical/Toxins (Agriculture)
- Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment (latest edition). Published by the American Conference of Industrial Hygienists (ACGIH)
- The Registry of Toxic Effects of Chemical Substances, published by the National Institute for Occupational Safety and Health (NIOSH)
- The container label of the product will issue a warning of hazardous effects.

Commonly used hazardous chemicals

Listed below are chemicals among those most commonly used in U.S. workplaces.

<i>Hazardous Chemical</i>	<i>Harmful Effects</i>
1,1,1-Trichloroethane	May cause mutations in cells; can irritate the skin and eyes and cause unconsciousness and death. High exposures may damage the liver and kidneys.
Acetone	Can irritate the skin, eyes, nose, and throat. High concentrations can cause dizziness and loss of consciousness.
Aluminum oxide	Can irritate the eyes, nose, and throat. Repeated high exposure can cause scarring of the lungs and shortness of breath.
Ammonia	Can irritate the lungs and burn the eyes and skin. Long-term exposure can cause irritation of the eyes, nose, mouth, and throat.
Benzene	A cancer-causing agent that has been shown to cause leukemia. May also cause headaches and irritation of the eyes, nose, and throat. High exposure can cause convulsions and death.
Ethylbenzene	Can irritate the eyes, nose, and throat. Repeated contact can cause drying and scaling of skin and may cause liver damage. High concentrations may cause dizziness and loss of consciousness.
Ethylene glycol	Can irritate the eyes, nose, or throat and cause nausea, vomiting, and headaches. Repeated or high exposure levels can cause kidney damage or stones and brain damage. May cause birth defects.
Freon 113	May cause skin irritation and rashes as well as drowsiness.
Glycol ethers	Can irritate the eyes, nose, and throat and may cause birth defects. Repeated or high exposure can cause kidney damage or stones. Brain damage also may occur.
Hydrochloric acid	Can irritate the lungs. High exposure can cause buildup of fluid in the lungs, which can cause death.
Lead	Can cause weakness and insomnia. Higher exposure can result in damage to the nervous and reproductive systems.
Methanol	Irritates the eyes, nose, mouth, and throat and can cause liver damage.
Methyl ethyl ketone	Can cause dizziness, headaches, blurred vision, and loss of consciousness. May cause birth defects.
Methyl isobutyl ketone	Irritates the skin, eyes, nose, and throat, and may cause dizziness, nausea, diarrhea, and loss of consciousness. Long-term exposure may damage the liver and kidneys.
Phenol	Can irritate the mouth, nose, throat, and eyes. Long-term exposure may damage the liver and kidneys and lead to genetic damage. May be a cancer risk. Major skin contact or inhaling it can cause death.
Sodium hydroxide	Breathing the dust or droplets can irritate and burn the lungs. Contact can cause severe skin burns.
Sulfuric acid	Can severely burn the skin and eyes. Repeated long-term exposure can cause bronchitis, shortness of breath, and emphysema.
Tetrachloroethylene	A suspected human carcinogen that has caused liver cancer in animals. It may damage the liver and kidneys after low but repeated exposure. It can cause dizziness and loss of consciousness.
Xylene	Can irritate the eyes, nose, and throat; high levels can cause loss of consciousness and death. It may damage fetuses. Repeated exposure may damage bone marrow and eyes and cause stomach problems.

Using Material Safety Data Sheets

A material safety data sheet contains detailed information about a hazardous chemical product's health effects, physical and chemical characteristics, and safe practices for using it.

Responsibilities of chemical manufacturers, importers, and distributors

Chemical manufacturers and importers must prepare a material safety data sheet for each hazardous chemical product they produce. Distributors are responsible for ensuring that you have a material safety data sheet for each hazardous chemical product they sell to you.

What to do if you use hazardous chemical products at your workplace

You must have a current material safety data sheet for each product. Employees must be able to review material safety data sheets in their work area at any time. You can keep material safety data sheets in a notebook or on a computer; however, employees must be able to obtain the information immediately in an emergency. One person should be responsible for managing all the material safety data sheets at your workplace. The person should ensure that the list of hazardous chemicals is current, that the identity of each chemical on the list matches its identity on its material safety data sheet, and that incoming hazardous-chemical containers have material safety data sheets.

What to do when you no longer use a hazardous chemical at your workplace

When you no longer use a hazardous chemical, you do not need to keep its material safety data sheet. However, you do need to keep a record of the chemical's identity, the locations, and the calendar years it was used in your workplace, for at least 30 years. For more information about record-keeping requirements, see 1910.1020(d)(ii)(B), "Access to employee exposure and medical records."

Information required on Material Safety Data Sheets

Chemical manufacturers and importers must prepare a material safety data sheet for each hazardous chemical product they ship to you. The following information must appear on each sheet.

<i>Required Information</i>	<i>Description</i>
Identity of the chemical	Typically, a common chemical name. (The identify of the chemical on a material safety data sheet must match its identity on the container label.)
Physical & chemical characteristics	For example: vapor pressure, flashpoint, and solubility.
Physical hazards	For example: potential for fire, explosion, or reaction with water or other chemicals.
Health hazards	For example: signs and symptoms of exposure, and medical conditions that might be aggravated by exposure.
Primary routes of chemical entry	How the chemical enters the body.
Permissible Exposure limit (PEL)	The maximum amount of the chemical that one can be exposed to during an eight-hour work shift.
Carcinogenicity	Based on findings in the National Toxicology Program Annual Report on Carcinogens or the International Agency for Research on Cancer Monographs (latest editions).
Precautions for safe use	How to handle the chemical safely, hygiene and protective practices, and clean-up procedures for spills and leaks.
Control measures	The engineering controls, safe work practices, and personal protective equipment necessary to control exposure.
Emergency and first aid procedures	How to respond to spills, leaks, contamination, and overexposure.
Preparation date	The date the material safety data sheet was prepared or updated.
Name, address, and phone number	Who to contact for more information on the chemical's hazards and emergency-response procedures.

Using container warning labels

The purpose of a container warning label is to warn employees about the container's contents and to refer employees to an appropriate material safety data sheet for more information about the chemical's physical and health hazards. Manufacturers, importers, and distributors must ensure that each hazardous chemical product sold to you has a label that includes the chemical's identity, a hazard warning, and a name and address for additional information about the product. If you use hazardous chemicals at your workplace, you must ensure that each hazardous chemical container has a legible label, in English, that identifies the chemical and warns of its hazards.

Containers that must be labeled

Original containers of hazardous chemicals from a manufacturer, importer, or distributor must have warning labels. Do not remove or deface them. If you transfer a hazardous chemical from a labeled container to an unlabeled container, label the container.

An exception for portable containers

You do not need to put a *warning* label on a portable container if you use it to transfer a hazardous chemical from a labeled container. However, the chemical in the container must be for immediate use. This means *"the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred."* See 1910.1200 (c), Definitions.

Content of a warning label

A warning label must identify the chemical – a common chemical name or a code name is acceptable – and display a hazard warning such as **DANGER** or the familiar skull and crossbones.

- The identify of the chemical on the label, on its material safety data sheet, and on your hazardous chemical list must match.
- If you are not sure that a hazardous chemical container is properly labeled, contact the manufacturer or supplier.
- Make someone at your workplace responsible for ensuring that all hazardous-chemical containers are properly labeled.

Examples of container labels for acetone

If you use hazardous chemicals at your workplace, you must ensure that each hazardous chemical container has a legible label, in English, that identifies the chemical and warns of its hazards. This illustration shows acetone warning labels on an original container, an unlabeled (secondary) container, and a portable container.

Original container



Identity of the chemical

Hazard warning



Label the container with the identity of the chemical

Add an appropriate Hazard warning

If you transfer a hazardous chemical from a labeled container to an unlabeled container, you must label the container with the identity of the chemical and include an appropriate hazard warning.

Portable containers are intended for immediate use of a hazardous chemical by the person who makes the transfer.

Suggestion: Mark the container with the identity of the chemical; a warning label is not necessary.

Portable container



Training Employees

Required hazard-communication training

If you have employees who may be exposed to hazardous chemicals, you must inform them about the chemicals and train them when they are hired and whenever they are exposed to a new chemical hazard or a process change. Required employee training:

- Where to find and how to read the hazard-communication plan, the list of hazardous chemicals, and material safety data sheets.
- The operations in which hazardous chemicals are used.
- The physical and health hazards of hazardous chemicals used by employees.
- The meaning of warning labels on hazardous-chemical containers and on pipes that contain hazardous substances.
- How to recognize emergencies involving hazardous chemicals.
- How to use personal protective equipment.

Who can train employees?

Choose a person who understands the above topics and has the skills to conduct the training. What is important is that employees are taught which hazardous chemicals they may be exposed to and understand how to use the information on container warning labels and material safety data sheets to protect themselves.

OSHA's hazard-communication rules affect all workplaces that have employees who may be exposed to hazardous chemicals. Following are rules that affect general industry and construction workplaces.

Hazard Communication §1910.1200 – General Industry, §1926.59 – Construction

- Requires chemical manufacturers or importers to assess the hazards of the chemical products they produce or import and to prepare container warning labels and material safety data sheets for hazardous chemical products they ship to customers.
- Requires distributors to ensure that each container of a hazardous chemical product is properly labeled before it is shipped to a customer and to ensure that a material safety data sheet for each product is included in the customer's initial shipment.
- Requires employers to inform their employees about the hazardous chemicals to which they may be exposed through a written hazard communication plan, container warning labels, material safety data sheets, and training.

To be kept in employee's personal records file

Employee Name: _____

Employee Job Description: _____

[illegible]

Cain's Pipeline & Industrial Services, LLC.
Confirmation of Employee's Hazard Communication Training

I, _____, have been informed about
(Employee Name)
the hazardous chemicals that I may be exposed to during my work and I have received training on the following topics:

- An overview of the requirements in OSHA's hazard communication rules.
- Hazardous chemicals present in the workplace.
- The written hazard-communication plan.
- Physical and health effects of the hazardous chemicals.
- Methods to determine the presence or release of hazardous chemicals in the work area.
- How to reduce or prevent exposure to these hazardous chemicals through use
- of exposure controls/work practices and personal protective equipment.
- Steps we have taken to reduce or prevent exposure to these chemicals.
- Emergency procedures to follow if exposed to these chemicals.
- How to read labels and review material safety data sheets.

Note to employee:

This form becomes part of your personnel file; read and understand it before signing.

By signing below I attest and verify that I have received training in the above areas of hazard communication, and that I understand the content of that training.

Employee: _____ Date: _____

Trainer: _____ Date: _____

§1910.1200 — HAZARD COMMUNICATION

(a) Purpose.

(1) The purpose of this section is to ensure that the hazards of all chemicals produced or imported are evaluated, and that information concerning their hazards is transmitted to employers and employees. This transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, material safety data sheets and employee training.

(2) This occupational safety and health standard is intended to address comprehensively the issue of evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, and to preempt any legal requirements of a state, or political subdivision of a state, pertaining to this subject. Evaluating the potential hazards of chemicals, and communicating information concerning hazards and appropriate protective measures to employees, may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of material safety data sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of chemicals and protective measures. Under section 18 of the Act, no state or political subdivision of a state may adopt or enforce, through any court or agency, any requirement relating to the issue addressed by this Federal standard, except pursuant to a Federally-approved state plan.

(b) Scope and application.

(1) This section requires chemical manufacturers or importers to assess the hazards of chemicals which they produce or import, and all employers to provide information to their employees about the hazardous chemicals to which they are exposed, by means of a hazard communication program, labels and other forms of warning, material safety data sheets, and information and training. In addition, this section requires distributors to transmit the required information to employers.

(Employers who do not produce or import chemicals need only focus on those parts of this rule that deal with establishing a workplace program and communicating information to their workers. Appendix E of this section is a general guide for such employers to help them determine their compliance obligations under the rule.)

(2) This section applies to any chemical which is known to be present in the workplace in such a manner that employees may be exposed under normal conditions of use or in a foreseeable emergency.

(c) Definitions. (See Definitions at the end of this section)

(e) Written hazard communication program.

(1) Employers shall develop, implement, and maintain at each workplace, a written hazard communication program which at least describes how the criteria specified in paragraphs (f), (g), and (h) of this section for labels and other forms of warning, material safety data sheets, and employee information and training will be met, and which also includes the following:

(i) A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate material safety data sheet (the list may be compiled for the workplace as a whole or for individual work areas); and,

(ii) The methods the employer will use to inform employees of the hazards of non-routine tasks (for example, the cleaning of reactor vessels), and the hazards associated with chemicals contained in unlabeled pipes in their work areas.

(2) Multi-employer workplaces. Employers who produce, use, or store hazardous chemicals at a workplace in such a way that the employees of other employer(s) may be exposed (for example, employees of a construction contractor working on-site) shall additionally ensure that the hazard communication programs developed and implemented under this paragraph (e) include the following:

(i) The methods the employer will use to provide the other employer(s) on-site access to material safety data sheets for each hazardous chemical the other employer(s)' employees may be exposed to while working;

(ii) The methods the employer will use to inform the other employer(s) of any precautionary measures that need to be taken to protect employees during the workplace's normal operating conditions and in foreseeable emergencies; and,

(iii) The methods the employer will use to inform the other employer(s) of the labeling system used in the workplace.

(3) The employer may rely on an existing hazard communication program to comply with these requirements, provided that it meets the criteria established in this paragraph (e).

(4) The employer shall make the written hazard communication program available, upon request, to employees, their designated representatives, the Assistant Secretary and the Director, in accordance with the requirements of 29 CFR 1910.20(e).

(5) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the written hazard communication program may be kept at the primary workplace facility.

(f) Labels and other forms of warning.

(1) The chemical manufacturer, importer, or distributor shall ensure that each container of hazardous chemicals leaving the workplace is labeled, tagged or marked with the following information:

- (i) Identity of the hazardous chemical(s);
- (ii) Appropriate hazard warnings; and
- (iii) Name and address of the chemical manufacturer, importer, or other responsible party.

(5) Except as provided in paragraphs (f)(6) and (f)(7) of this section, the employer shall ensure that each container of hazardous chemicals in the workplace is labeled, tagged or marked with the following information:

- (i) Identity of the hazardous chemical(s) contained therein; and,
- (ii) Appropriate hazard warnings, or alternatively, words, pictures, symbols, or combination thereof, which provide at least general information regarding the hazards of the chemicals, and which, in conjunction with the other information immediately available to employees under the hazard communication program, will provide employees with the specific information regarding the physical and health hazards of the hazardous chemical.

(8) The employer shall not remove or deface existing labels on incoming containers of hazardous chemicals, unless the container is immediately marked with the required information.

(9) The employer shall ensure that labels or other forms of warning are legible, in English, and prominently displayed on the container, or readily available in the work area throughout each work shift. Employers having employees who speak other languages may add the information in their language to the material presented, as long as the information is presented in English as well.

(g) Material safety data sheets.

(1) Chemical manufacturers and importers shall obtain or develop a material safety data sheet for each hazardous chemical they produce or import. Employers shall have a material safety data sheet in the workplace for each hazardous chemical which they use.

(8) The employer shall maintain in the workplace copies of the required material safety data sheets for each hazardous chemical, and shall ensure that they are readily accessible during each work shift to employees when they are in their work area(s). (Electronic access, microfiche, and other alternatives to maintaining paper copies of the material safety data sheets are permitted as long as no barriers to immediate employee access in each workplace are created by such options.)

(9) Where employees must travel between workplaces during a workshift, i.e., their work is carried out at more than one geographical location, the material safety data sheets may be kept at the primary workplace facility. In this situation, the employer shall ensure that employees can immediately obtain the required information in an emergency.

(10) Material safety data sheets may be kept in any form, including operating procedures, and may be designed to cover groups of hazardous chemicals in a work area where it may be more appropriate to address the hazards of a process rather than individual hazardous chemicals. However, the employer shall ensure that in all cases the required information is provided for each hazardous chemical, and is readily accessible during each work shift to employees when they are in their work area(s).

(h) Employee information and training.

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

(2) Information. Employees shall be informed of:

- (i) The requirements of this section;
- (ii) Any operations in their work area where hazardous chemicals are present; and,

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

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

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

(ii) The physical and health hazards of the chemicals in the work area;

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

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

Definitions

“Article” means a manufactured item other than a fluid or particle:

(i) Which is formed to a specific shape or design during manufacture;

(ii) Which has end use function(s) dependent in whole or in part upon its shape or design during end use;

(iii) Which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

“Assistant Secretary” means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

“Chemical” means any element, chemical compound or mixture of elements and/or compounds.

“Chemical manufacturer” means an employer with a workplace where chemical(s) are produced for use or distribution.

“Chemical name” means the scientific designation of a chemical in accordance with the nomenclature system developed by the International Union of Pure and Applied Chemistry (IUPAC) or the Chemical Abstracts Service (CAS) rules of nomenclature, or a name which will clearly identify the chemical for the purpose of conducting a hazard evaluation.

“Combustible liquid” means any liquid having a flashpoint at or above 100° F (37.8° C), but below 200° F (93.3° C), except any mixture having components with flashpoints of 200° F (93.3° C), or higher, the total volume of which make up 99 percent or more of the total volume of the mixture.

“Commercial account” means an arrangement whereby a retail distributor sells hazardous chemicals to an employer, generally in large quantities over time and/or at costs that are below the regular retail price.

“Common name” means any designation or identification such as code name, code number, trade name, brand name or generic name used to identify a chemical other than by its chemical name.

“Compressed gas” means:

(i) A gas or mixture of gases having, in a container, an absolute pressure exceeding 40 psi at 70° F (21.1° C)

(ii) A gas or mixture of gases having, in a container, an absolute pressure exceeding 104 psi at 130° F (54.4° C) regardless of the pressure at 70° F (21.1° C); or

(iii) A liquid having a vapor pressure exceeding 40 psi at 100° F (37.8° C) as determined by ASTM D-323-72.

“Container” means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For purposes of this section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

“Designated representative” means any individual or organization to whom an employee gives written authorization to exercise such employee's rights under this section. A recognized or certified collective bargaining agent shall be treated automatically as a designated representative without regard to written employee authorization.

“Director” means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

“Distributor” means a business, other than a chemical manufacturer or importer, which supplies hazardous chemicals to other distributors or to employers.

“Employee” means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers or bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.

“Employer” means a person engaged in a business where chemicals are either used, distributed, or are produced for use or distribution, including a contractor or subcontractor.

“Explosive” means a chemical that causes a sudden, almost instantaneous release of pressure, gas, and heat when subjected to sudden shock, pressure, or high temperature.

“Exposure” or **“exposed”** means that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential (e.g. accidental or possible) exposure. “Subjected” in terms of health hazards includes any route of entry (e.g. inhalation, ingestion, skin contact or absorption).

“Flammable” means a chemical that falls into one of the following categories:

(i) **“Aerosol, flammable”** means an aerosol that, when tested by the method described in 16 CFR 1500.45, yields a flame projection exceeding 18 inches at full valve opening, or a flashback (a flame extending back to the valve) at any degree of valve opening;

(ii) **“Gas, flammable”** means:

(A) A gas that, at ambient temperature and pressure, forms a flammable mixture with air at a concentration of thirteen (13) percent by volume or less; or

(B) A gas that, at ambient temperature and pressure, forms a range of flammable mixtures with air wider than twelve (12) percent by volume, regardless of the lower limit;

(iii) **“Liquid, flammable”** means any liquid having a flashpoint below 100° F (37.8° C), except any mixture having components with flashpoints of 100° F (37.8° C) or higher, the total of which make up 99 percent or more of the total volume of the mixture.

(iv) **“Solid, flammable”** means a solid, other than a blasting agent or explosive as defined in §1910.109(a), that is liable to cause fire through friction, absorption of moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which can be ignited readily and when ignited burns so vigorously and persistently as to create a serious hazard. A chemical shall be considered to be a flammable solid if, when tested by the method described in 16 CFR 1500.44, it ignites and burns with a self-sustained flame at a rate greater than one-tenth of an inch per second along its major axis.

“Flashpoint” means the minimum temperature at which a liquid gives off a vapor in sufficient concentration to ignite when tested as follows:

(i) Tagliabue Closed Tester (See American National Standard Method of Test for Flash Point by Tag Closed Tester, Z11.24-1979 (ASTM D 56-79)) for liquids with a viscosity of less than 45 Saybolt Universal Seconds (SUS) at 100° F (37.8° C), that do not contain suspended solids and do not have a tendency to form a surface film under test; or

(ii) Pensky-Martens Closed Tester (See American National Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, Z11.7-1979 (ASTM D 93-79)) for liquids with a viscosity equal to or greater than 45 SUS at 100° F (37.8° C), or that contain suspended solids, or that have a tendency to form a surface film under test; or

(iii) Setaflash Closed Tester (see American National Standard Method of Test for Flash Point by Setaflash Closed Tester (ASTM D 3278-78)). Organic peroxides, which undergo auto-accelerating thermal decomposition, are excluded from any of the flashpoint determination methods specified above.

“Foreseeable emergency” means any potential occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment which could result in an uncontrolled release of a hazardous chemical into the workplace.

“Hazardous chemical” means any chemical which is a physical hazard or a health hazard.

“Hazard warning” means any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the specific physical and health hazard(s), including target organ effects, of the chemical(s) in the container(s). (See the definitions for “physical hazard” and “health hazard” to determine the hazards which must be covered.)

“Health hazard” means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term “health hazard” includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes. Appendix A provides further definitions and explanations of the scope of health hazards covered by this section, and Appendix B describes the criteria to be used to determine whether or not a chemical is to be considered hazardous for purposes of this standard.

“Identity” means any chemical or common name which is indicated on the material safety data sheet (MSDS) for the chemical. The identity used shall permit cross references to be made among the required list of hazardous chemicals, the label and the MSDS.

“Immediate use” means that the hazardous chemical will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

“Importer” means the first business with employees within the Customs Territory of the United States which receives hazardous chemicals produced in other countries for the purpose of supplying them to distributors or employers within the United States.

“Label” means any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals.

“Material safety data sheet (MSDS)” means written or printed material concerning a hazardous chemical which is prepared in accordance with paragraph (g) of this section.

“Mixture” means any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction.

“Organic peroxide” means an organic compound that contains the bivalent -O-O-structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms has been replaced by an organic radical.

“Oxidizer” means a chemical other than a blasting agent or explosive as defined in §1910.109(a), that initiates or promotes combustion in other materials, thereby causing fire either of itself or through the release of oxygen or other gases.

“Physical hazard” means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

“Produce” means to manufacture, process, blend, extract, generate, emit, formulate, or repackage.

“Pyrophoric” means a chemical that will ignite spontaneously in air at a temperature of 130° F (54.4° C) or below.

“Responsible party” means someone who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

“Specific chemical identity” means the chemical name, Chemical Abstracts Service (CAS) Registry Number, or any other information that reveals the precise chemical designation of the substance.

“Trade secret” means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix D sets out the criteria to be used in evaluating trade secrets.

“Unstable (reactive)” means a chemical which in the pure state, or as produced or transported, will vigorously polymerize, decompose, condense, or will become selfreactive under conditions of shocks, pressure or temperature.

“Use” means to package, handle, react, emit, extract, generate as a byproduct, or transfer.

“Water-reactive” means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

“Work area” means a room or defined space in a workplace where hazardous chemicals are produced or used, and where employees are present.

“Workplace” means an establishment, job site, or project, at one geographical location containing one or more work areas.

Hazardous Material Container Labels

All containers used on the job must be labeled for content and precautions if the substance contained is hazardous. Labels must contain the following information:

- Identity of hazardous chemicals
- Appropriate hazard warnings
- Name & address of the chemical manufacturer, importer, or distributor

Labels may use words, pictures, symbols, or a combination of these to indicate that a hazardous substance is contained. Following are examples of hazardous substance label warning information:



WARNING: CONTENTS ARE
EXTREMELY CORROSIVE
INGREDIENTS: Hydrochloric Acid



CAUTION: CONTAINS
RADIOACTIVE MATERIALS
CONTENTS: BARIUM



DANGER: CONTENTS ARE
HIGHLY FLAMMABLE
CONTAINS ETHANOL



DANGER: CONTENTS ARE TOXIC
AND MAY BE HAZARDOUS TO
YOUR HEALTH HARMFUL OR
FATAL IF SWALLOWED

WARNING: contents are under pressure
DO NOT puncture can or expose to high heat.

ECHOLAB Great Reflection <i>Ultra High Wear Floor Finish</i>		NET CONTENTS: 5 U.S. Gallons (18.9 liters)
PRECAUCION: SI NO PUEDE LEER INGLES, PREGUNTE A SU SUPERVISOR SOBRE LAS INSTRUCCIONES DU USO APROPRIADAS ANTES DE TRABAJAR CON ESTE PRODUCTO		
CAUTION: Contains Methyl Carbitol, Overexposure may cause eye and skin irritation. If swallowed can cause irritation, nausea and stomach distress. KEEP OUT OF REACH OF CHILDREN For additional information see material safety data sheet (MSDS)		
FIRST AID EXTERNAL: Flush skin with plenty of cool running water for at least 15 minutes. EYES: Immediately flush with plenty of cool running water. Remove contacts if applicable. Continue flushing for at least 15 minutes, holding eyelids apart. INTERNAL: If swallowed, DO NOT induce vomiting. Rinse mouth, then immediately drink 1 to 2 large glasses of water or milk. Never give anything by mouth to an unconscious person. INHALATION: Immediately move to fresh air.		
CALL A POISON CONTROL CENTER OR PHYSICIAN IMMEDIATELY FOR EMERGENCY MEDICAL INFORMATION, CALL TOLL FREE: 1-800-327-2205		
FORMULA CONTAINS NO PHOSPHOROUS		ECHOLAB Institutional Division Echolab Inc., Echolab Center
Contains:		
CAS# 113-8-7 Mixture Mixture 7783-2-0	Ingredients Diethylene Glycol Methyl Ether Polyethylene Emulsion Polyacrylic Emulsion Water	

Chapter 20

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Toxic and Hazardous Materials

Hexavalent Chromium or Chromium VI

Cain's Pipeline & Industrial Services, LLC. has adopted this policy for the prevention of employee exposure to hazardous levels of Hexavalent Chromium substances in accordance with the following OSHA regulation:

§1910.1026 – Chromium VI (*Chromium VI or Hexavalent Chromium, means Chromium with a valence of positive six, in any form and in any compound.*)

Cain's Pipeline & Industrial Services, LLC. has implemented this policy to ensure that no employee is exposed to Chromium VI at levels in excess of Permissible Exposure Limits (PEL), which for Chromium VI will be 5 micrograms per cubic meter of air ($5\mu\text{g}/\text{m}^3$) at an 8 hour Time Weighted Average (TWA). If exposures are above the "Action Level", engineering controls, work practices, or PPE will be required to reduce exposure levels. Action Level means employee exposure, without regard to the use of respirators, to an airborne concentration of Chromium VI of 2.5 micrograms per cubic meter of air ($2.5\mu\text{g}/\text{m}^3$) averaged over an 8-hour period.

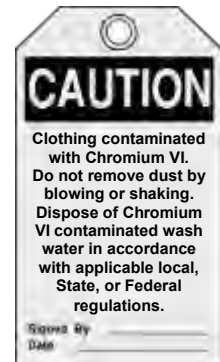
Brent Messina is the assigned supervisor responsible for ensuring the following administrative controls, engineering controls, and work practices are enforced:

- ***Cain's Pipeline & Industrial Services, LLC.*** will provide information and training for each employee who has potential exposure to Chromium VI that includes the following required elements:
 - Provide a training program for, and assures the participation of, all employees who are subject to exposure to Chromium VI at or above the action level or for whom the possibility of skin or eye irritation exists.
 - Provide initial training prior to the time of initial job assignment.
 - Provide training that is understandable and ensure each employee can demonstrate knowledge of the health hazards associated with Hexavalent Chromium exposure.
 - The training program will be repeated annually for each employee.
 - All affected employees are required to attend training programs.
 - Employees will be informed of the specific nature of the operations which could result in exposure to Chromium VI such as: location, manner of use, and release of Chromium VI above the action level in the workplace.
 - Employees will be informed of the purpose, proper selection, fitting, proper use, and limitations of respirators and protective clothing, emergency procedures, and measures employees can take to protect themselves from exposure.
 - Employees will be informed of the engineering controls and work practice controls being used.
 - The employees will be informed of the purpose and a description of the Medical Surveillance Program.

- *Cain's Pipeline & Industrial Services, LLC.* will make a copy of the OSHA §1910.1026 – Chromium VI standard readily available without cost to all affected employees.
- All training will be documented. *Brent Messina* will certify that the necessary employee training has been conducted by preparing a record that includes:
 - Identity of employee trained.
 - The signature and title of the person who conducted the training.
 - The type and date of the training.
 - Records will be kept a minimum of 1 year.
- *Cain's Pipeline & Industrial Services, LLC.* will ensure that no employee is exposed to an airborne concentration of Chromium VI in excess of 5 micrograms per cubic meter of air (5 µg/m³), calculated as an 8-hour time-weighted average (TWA).
- Initial monitoring will be performed to determine the 8-hour TWA exposure for each employee on the basis of a sufficient number of personal breathing zone air samples to accurately characterize full shift exposure on each shift, for each job classification, in each work area. Where representative sampling is done instead of sampling all employees in order to meet this requirement, the employee(s) expected to have the highest Chromium VI exposures will be sampled.
- If initial monitoring indicates that employee exposures are below the action level, monitoring may be discontinued for those employees whose exposures are represented by such monitoring.
- If monitoring reveals employee exposures to be at or above the action level, periodic monitoring will be performed at least every six months.
- If monitoring reveals employee exposures to be above the PEL, periodic monitoring will be performed at least every three months.
- If periodic monitoring indicates that employee exposures are below the action level, and the result is confirmed by the result of another monitoring taken at least seven days later, the monitoring may be discontinued for those employees whose exposures are represented by such monitoring.
- Additional monitoring will be performed when there has been any change in the production process, raw materials, equipment, personnel, work practices, or control methods that may result in new or additional exposures to Chromium VI, or when there is any reason to believe that new or additional exposures have occurred.
- The 8-hour TWA exposure will be determined for each employee on the basis of any combination of air monitoring data, historical monitoring data, or objective data sufficient to accurately characterize employee exposure to Chromium VI.
 - Where the exposure determination indicates that employee exposure exceeds the PEL, within 15 working days the results will be posted either in an appropriate location that is accessible to all affected employees or will notify each affected employee individually in writing of the results.
 - Whenever the exposure determination indicates that employee exposure is above the PEL, the written notification will describe the corrective action being taken to reduce employee exposure to or below the PEL.

- Where air monitoring is performed, a method of monitoring and analysis will be used that can measure Chromium VI to within an accuracy of plus or minus 25 percent (+/- 25%) and can produce accurate measurements to within a statistical confidence level of 95 percent for airborne concentrations at or above the action level.
 - Where air monitoring is performed, affected employees or their designated representatives will be provided an opportunity to observe any monitoring of employee exposure to Chromium VI.
 - When observation of monitoring requires entry into an area where the use of protective clothing or equipment is required, the observer will be provided with clothing and equipment and will be required to use such clothing and equipment and complies with all other applicable safety and health procedures.
- A regulated area will be established wherever an employee's exposure to airborne concentrations of Chromium VI is, or can reasonably be expected to be, in excess of the PEL.
- Regulated areas will be demarcated from the rest of the workplace in a manner that adequately establishes and alerts employees of the boundaries of the regulated area.
- Access to regulated areas will be limited to:
 - Persons authorized and required by work duties to be present in the regulated area.
 - Any person entering such an area as a designated representative of employees for the purpose of exercising the right to observe monitoring procedures.
 - Any person authorized by OSHA or regulations issued by OSHA to be in a regulated area.
- Engineering and work practice controls will be used to reduce and maintain employee exposure to Chromium VI to or below the PEL unless it can be demonstrated that such controls are not feasible. Wherever feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PEL, these controls will be used to reduce employee exposure to the lowest levels achievable, and will supplement them by the use of respiratory protection that complies with OSHA regulations.
- Where it can be demonstrated that a process or task does not result in any employee exposure to Chromium VI above the PEL for 30 or more days per year (12 consecutive months), the requirement to implement engineering and work practice controls to achieve the PEL does not apply to that process or task.
- Employees will not be rotated to different jobs to achieve PEL compliance.
- Respiratory protection will be provided for employees during:
 - Periods necessary to install or implement feasible engineering and work practice controls.
 - Work operations, such as maintenance and repair activities, for which engineering and work practice controls are not feasible.
 - Work operations for which all feasible engineering and work practice controls have been implemented and such controls are not sufficient to reduce exposures to or below the PEL.

- Work operations where employees are exposed above the PEL for fewer than 30 days per year, and it has been elected not to implement engineering and work practice controls to achieve the PEL.
 - Emergencies. Emergency means any occurrence that results, or is likely to result, in an uncontrolled release of Chromium VI. If an incidental release of Chromium VI can be controlled at the time of release by employees in the immediate release area, or by maintenance personnel, it is not an emergency.
- Where respirator use is required, a Respiratory Protection Program in compliance with §1910.134 will be instituted. (See Respiratory Section)
- Where a hazard is present or is likely to be present from skin or eye contact with Chromium VI, appropriate personal protective clothing and equipment such as respirators, gloves, aprons, coveralls, goggles, foot covers, etc. will be provided at no cost to employees, and employees will be required to use such clothing and equipment.
 - Employees will be required to remove all protective clothing and equipment contaminated with Chromium VI at the end of the work shift or at the completion of their tasks involving Chromium VI exposure, whichever comes first.
 - Employees will not be allowed to remove Chromium VI-contaminated protective clothing or equipment from the workplace, except for those employees whose job it is to launder, clean, maintain, or dispose of such clothing or equipment.
 - When contaminated protective clothing or equipment is removed for laundering, cleaning, maintenance, or disposal, *Brent Messina* will ensure that it is stored and transported in sealed, impermeable bags or other closed, impermeable containers.
 - Bags or containers of contaminated protective clothing or equipment that are removed from change rooms for laundering, cleaning, maintenance, or disposal will be labeled in accordance with the requirements of the Hazard Communication Standard, 29 CFR 1910.1200.
- All required protective clothing and equipment will be cleaned, laundered, repaired, or replaced as needed to maintain its effectiveness.
- Removal of Chromium VI from protective clothing and equipment by blowing, shaking, or any other means that disperses Chromium VI into the air or onto an employee's body is prohibited.
- Any person who launders or cleans protective clothing or equipment contaminated with Chromium VI will be informed of the potentially harmful effects of exposure to Chromium VI and that the clothing and equipment should be laundered or cleaned in a manner that minimizes skin or eye contact with Chromium VI and effectively prevents the release of airborne Chromium VI in excess of the PEL.
- Change rooms will be provided, in conformance with §1910.141, where protective clothing and equipment is required. Where skin contact with Chromium VI occurs, washing facilities in conformance with §1910.141 will be provided. Eating and drinking areas, also be in conformance with §1910.141, will be provided.



- *Cain's Pipeline & Industrial Services, LLC.* will ensure that:
 - Change rooms are equipped with separate storage facilities for protective clothing and equipment and for street clothes, and that these facilities prevent cross-contamination.
 - Readily accessible washing facilities are provided that are capable of removing Chromium VI from the skin, and will ensure that affected employees use these facilities when necessary.
 - Employees who have skin contact with Chromium VI wash their hands and faces at the end of the work shift and prior to eating, drinking, smoking, chewing tobacco or gum, applying cosmetics, or using the toilet.
 - When employees are allowed to consume food or beverages at a worksite where Chromium VI is present, that eating and drinking areas and surfaces are maintained as free as practicable of Chromium VI.
 - Employees do not enter eating and drinking areas with protective work clothing or equipment unless surface Chromium VI has been removed from the clothing and equipment by methods that do not disperse Chromium VI into the air or onto an employee's body.
 - Employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas, or in areas where skin or eye contact with Chromium VI occurs; or carry the products associated with these activities, or store such products in these areas.
 - All surfaces are maintained as free as practicable of accumulations of Chromium VI and that all spills and releases of Chromium VI containing material are cleaned up promptly.
 - Surfaces contaminated with Chromium VI are cleaned by HEPA-filter vacuuming or other methods that minimize the likelihood of exposure to Chromium VI.
- Dry shoveling, dry sweeping, and dry brushing may be used only where HEPA-filtered vacuuming or other methods that minimize the likelihood of exposure to Chromium VI have been tried and found not to be effective.
- Compressed air use is prohibited to remove Chromium VI from any surface unless the compressed air is used in conjunction with a ventilation system designed to capture the dust cloud created by the compressed air or no alternative method is feasible.
- Cleaning equipment will be handled in a manner that minimizes the reentry of Chromium VI into the workplace.
- Waste, scrap, debris, and any other materials contaminated with Chromium VI and consigned for disposal will be collected and disposed of in sealed, impermeable bags or other closed, impermeable containers and will be labeled in accordance with the requirements of the Hazard Communication Standard, §1910.1200.
- Medical surveillance will be made available at no cost and at a reasonable time and place for all employees who are or may be occupationally exposed to Chromium VI at or above the action level for 30 or more days a year, or experiencing signs or symptoms of the adverse health effects (dermatitis, asthma, bronchitis, etc.) associated with Chromium VI exposure, or are exposed in an emergency.



- All required medical examinations and procedures will be performed by or under the supervision of a PLHCP (Physician or other licensed health care professional). A PLHCP is an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide or be delegated the responsibility to provide some or all of the particular health care services required by this section.
- Medical examinations will be provided:
 - Within 30 days after initial assignment, unless the employee has received a Chromium VI-related medical examination that meets the requirements of this section within the last twelve months.
 - Annually.
 - Within 30 days after a PLHCP's written medical opinion recommends an additional examination.
 - Whenever an employee shows signs or symptoms of the adverse health effects associated with Chromium VI exposure.
 - Within 30 days after exposure during an emergency which results in an uncontrolled release of Chromium VI.
 - At the termination of employment, unless the last examination that satisfied the requirements of this section was less than six months prior to the date of termination.
- A medical examination will consist of:
 - A medical and work history, with emphasis on: Past, present, and anticipated future exposure to Chromium VI; any history of respiratory system dysfunction; any history of asthma, dermatitis, skin ulceration, or nasal septum perforation; and smoking status and history.
 - A physical examination of the skin and respiratory tract.
 - Any additional tests deemed appropriate by the examining PLHCP.
- The examining PLHCP will be provided a copy of the §1910.1026 – Chromium VI standard and the following information:
 - A description of the affected employee's former, current, and anticipated duties as they relate to the employee's occupational exposure to Chromium VI.
 - The employee's former, current, and anticipated levels of occupational exposure to Chromium VI.
 - A description of any personal protective equipment used or to be used by the employee, including when and for how long the employee has used that equipment.
 - Information from records of employment-related medical examinations previously provided to the affected employee, currently within the control of *Cain's Pipeline & Industrial Services, LLC.*
- A written medical opinion will be obtained from the PLHCP, within 30 days for each medical examination performed on each employee, which contains:
 - The PLHCP's opinion as to whether the employee has any detected medical condition(s) that would place the employee at increased risk of material impairment to health from further exposure to Chromium VI.
 - Any recommended limitations upon the employee's exposure to Chromium VI or upon the use of personal protective equipment such as respirators.

- A statement that the PLHCP has explained to the employee the results of the medical examination, including any medical conditions related to Chromium VI exposure that require further evaluation or treatment, and any special provisions for use of protective clothing or equipment.
- The PLHCP will not reveal any specific findings or diagnoses unrelated to occupational exposure to Chromium VI.
- A copy of the PLHCP's written medical opinion will be provided to the examined employee within two weeks after receiving it.
- Each employee will be required to demonstrate knowledge of at least the contents of this section and the purpose and a description of the required Medical Surveillance Program required by this section. A copy of this section will be made readily available without cost to all affected employees.
- An accurate record will be maintained of all air monitoring conducted required for compliance. This record will include at least the following information:
 - The date of measurement for each sample taken.
 - The operation involving exposure to Chromium VI that is being monitored.
 - Sampling and analytical methods used and evidence of their accuracy.
 - Number, duration, and the results of samples taken.
 - Type of personal protective equipment, such as respirators worn.
 - Name, social security number, and job classification of all employees represented by the monitoring, indicating which employees were actually monitored.
- An accurate record will be established and maintained where historical monitoring data has been relied upon to determine exposure to Chromium VI. The record will include information that reflects the following conditions:
 - The data were collected using methods that meet accuracy requirements.
 - The processes and work practices that were in use when the historical monitoring data were obtained are essentially the same as those to be used during the job for which exposure is being determined.
 - The characteristics of the Chromium VI containing material being handled when the historical monitoring data were obtained are the same as those on the job for which exposure is being determined.
 - Environmental conditions prevailing when the historical monitoring data were obtained are the same as those on the job for which exposure is being determined.
 - Other data relevant to the operations, materials, processing, or employee exposures covered by the exception.
- An accurate record will be established and maintained for all objective data relied upon to meet compliance requirements. This record will include at least the following information:
 - The Chromium containing material in question.
 - The source of the objective data.
 - The testing protocol and results of testing, or analysis of the material for the release of Chromium VI.
 - A description of the process, operation, or activity and how the data support the determination.
 - Other data relevant to the process, operation, activity, material, or employee exposures.

- An accurate record will be established and maintained for each employee covered by medical surveillance requirements. The record will include the following information about the employee:
 - Name and social security number.
 - A copy of the PLHCP's written opinions.
 - A copy of the required information provided to the PLHCP.
- *Cain's Pipeline & Industrial Services, LLC.* will ensure that historical exposure records, exposure records, objective data, and medical records are maintained and made available in accordance with 29 CFR 1910.1020.
- All appropriate signs and labels will be posted in areas of potential exposure to Chromium VI.
- All containers or materials containing Chromium VI will be appropriately labeled to indicate the contents and the hazards of the contents.
- A description of each operation in which Chromium VI is emitted will be maintained to include:

■ Machinery used	■ Employee job responsibilities
■ Material processed	■ Operating procedures
■ Controls in place	■ Maintenance practices
■ Crew size	
- Specific means that will be employed to achieve compliance include:
 - Engineering plans and studies used to determine methods selected for controlling exposure to Chromium VI.
 - The necessary use of appropriate respiratory protection to achieve PEL.
- MSDS for Chromium VI and all hazardous materials at *Cain's Pipeline & Industrial Services, LLC.* are available to employees at the company office.
- This Program will be provided for examination and copying upon request of affected employees, their representatives, and OSHA.
- The written program will be reviewed and updated annually or more often to reflect significant changes in workplace conditions.

TRAINING INFORMATION for CHROMIUM VI or HEXAVALENT CHROMIUM

A Hexavalent Chromium compound: *Chromium VI, Chrome Six, Cr-VI, Cr-6 (chromates and chromic acid are some examples)*

Chromium VI or Hexavalent Chromium compounds are those which contain the element chromium in the +6 oxidation state. Chromates are often used as pigments for photography, and in pyrotechnics, dyes, paints, inks, and plastics. They can also be used for stainless steel production, textile dyes, wood preservation, leather tanning, and as anti-corrosion and conversion coatings. They are used as corrosion inhibitors, however, due to their toxicity they are being replaced by alternatives.

Chromium VI is recognized as a human carcinogen. Workers in many different occupations are exposed to Chromium VI. Occupational exposures occur mainly among workers who:

- Handle dry chromate-containing pigments.
- Spray chromate-containing paints and coatings.
- Operate chrome plating baths.
- Weld, cut, or grind chromium-containing metals such as stainless steel.

Toxicity – Chromium VI in contact with skin acts as both sensitizer and irritant.

After entering the organism, it gets reduced to trivalent chromium, which then binds to proteins and creates haptens (*compounds which, when coupled with a protein or other molecule, can cause the formation of antibodies*) which trigger immune system reaction. Once developed, chrome sensitivity becomes fairly persistent; in such cases, even contact with chromate-dyed textiles or wearing of chromate-tanned leather shoes can cause or exacerbate contact dermatitis.

Chromium VI compounds are carcinogens. Chronic inhalation of such compounds increases risk of lung cancer. Zinc chromate is the strongest carcinogen of the chromates used in industry. Soluble compounds, like chromic acid, are much weaker carcinogens.

Chromium VI is genotoxic. It appears that the mechanism of genotoxicity relies on pentavalent or trivalent chromium, an intracellular reduction product of Chromium VI after its penetration into the cell. According to some researchers, the damage is caused by hydroxyl radicals, produced during reoxidation of pentavalent chromium by hydrogen peroxide molecules present in the cell.

In an organism, Chromium VI undergoes reduction, first to metastable pentavalent chromium, then to trivalent chromium. Pentavalent chromium is a known carcinogen. If the material gets lodged in tissues (lungs are especially vulnerable here, followed by fine capillaries in kidneys and intestines), its long-term action may lead to cancerous growth. In some parts of Russia, pentavalent chromium was reported as one of the factors of incidence of premature senility.

Chromium VI is the substance against which Erin Brockovich campaigned. It was found in drinking water in the Southern California town of Hinkley.

Subjects Based on OSHA Regulations

- *Chromium in the Workplace*
- *How Chromium Enters the Body*
- *How Chromium Affects the Body*
- *Tests for Exposure Or Medical Effects*
- *Sources of Chromium Exposure*
- *How to Control Chromium Exposure*
- *Special Control Measures for Spraying, Welding, and Plating*
- *Legal Exposure Limits*
- *Right to Know*

Chromium VI causes lung cancer in humans. Evaluations by the U.S. Environmental Protection Agency, the U.S. Agency for Toxic Substances and Disease Registry, and the California Department of Health Services indicate that the risk of lung cancer to exposed workers is extremely high. The best estimate of the excess risk of lung cancer from exposure to Chromium VI compounds at OSHA's current Permissible Exposure Limit, every working day for 40 years, is 8 cases of lung cancer in every 100 workers exposed. This information is provided to warn employers, workers, worker representatives, and others about the serious risk of lung cancer and to provide these groups with information on how to control exposures.

Chromium in the Workplace

Chromium is a metal. It exists in several different forms: divalent, trivalent, and hexavalent. Only Chromium VI is recognized as a human carcinogen. Only Chromium VI is discussed here.

Chromium VI has many uses. It is used as a pigment in paints, inks, and plastics; as an anti-corrosion agent in protective coatings; and in chrome plating. See the table on page 12 for the names of some common Chromium VI compounds and their uses. Workers in many different occupations are exposed to Chromium VI. Occupational exposures in the United States occur mainly among workers who:

- Handle dry chromate-containing pigments.
- Spray chromate-containing paints and coatings.
- Operate chrome plating baths.
- Weld or cut chromium-containing metals such as stainless steel.

How Chromium Enters the Body

Chromium VI enters the body in two ways: by being inhaled or by being swallowed. Chromium can be inhaled when chromium dust, mist, or fumes are in the air. Chromium dust can also get on cigarettes. If contaminated cigarettes are smoked, the smoker inhales additional chromium along with the tobacco smoke.

Particles of chromium can be swallowed if the dust gets on hands, clothing, beard, or in food or beverages.

How Chromium Affects the Body

Cancer: Chromium VI causes lung cancer in humans. Workers exposed to Chromium VI in workplace air had much higher rates of lung cancer than workers who were not exposed. Studies of workers in the chromate production and pigment industries consistently show increased rates of lung cancer. Studies of chrome platers also generally show increased rates.

Studies of stainless steel welders are inconclusive, but stainless steel welders have not been studied adequately. Evaluations by the U.S. Environmental Protection Agency

(EPA) and the California Department of Health Services indicate that the risk for workers is extremely high. The best estimate of the excess risk of lung cancer from exposure to Chromium VI compounds at the current Permissible Exposure Limit (PEL), every working day for 40 years, is 8 cases of cancer in every 100 workers exposed. An individual worker's actual risk depends on how much Chromium VI is in the workplace air and how long the exposure goes on. The lower and briefer the exposure, the less the risk of lung cancer. That is why it is important to take steps to reduce worker exposure immediately.

Respiratory Tract: Chromium VI can irritate the nose, throat, and lungs. Repeated or prolonged exposure can damage the mucous membranes of the nasal passages and cause ulcers to form. In some cases, the damage is so severe that the septum (the wall separating the nasal passages) develops a hole in it.

Skin: Chromium VI is very irritating to the skin. Prolonged contact can cause ulcers to form. Some workers develop an allergic sensitization to chromium. In sensitized workers, contact with even very tiny amounts can cause a serious skin rash.

Eyes: Chromium VI is an eye irritant. Direct eye contact with chromic acid or chromate dusts can cause permanent eye damage.

Tests for Exposure or Medical Effects

There are no routine medical tests to measure the amount of Chromium VI that has been absorbed into the body. Excreted chromium can be measured in urine. However, this test is only useful for measuring recent exposure to stainless steel welding fumes. In most situations, air monitoring gives the best measure of worker exposure. Therefore, measuring Chromium VI in blood or urine is not recommended or legally required. However, employers are required to provide workers who will be exposed to Chromium VI a complete physical examination at no cost to employees. Medical examinations must be provided:

- Within 30 days after initial assignment, unless the employee has received a Chromium VI related medical examination that meets the requirements of this paragraph within the last twelve months.
- Annually.
- Within 30 days after a PLHCP's (Physician or other licensed health care professional) written medical opinion recommends an additional examination.
- Whenever an employee shows signs or symptoms of the adverse health effects associated with Chromium VI exposure.
- Within 30 days after exposure during an emergency which results in an uncontrolled release of Chromium VI.
- At the termination of employment, unless the last examination that satisfied OSHA regulations was less than six months prior to the date of termination.

A medical examination must consist of:

- A medical and work history, with emphasis on: Past, present, and anticipated future exposure to Chromium VI; any history of respiratory system dysfunction; any history of asthma, dermatitis, skin ulceration, or nasal septum perforation; and smoking status and history.
- A physical examination of the skin and respiratory tract.
- Any additional tests deemed appropriate by the examining PLHCP.

Sources of Chromium Exposure

Chromium VI materials are used in many jobs, but three jobs in particular involve frequent and/or heavy chromium exposure. These jobs are spraying anti-corrosion coatings, welding and cutting stainless steel, and chrome plating.

Spraying: In spraying anti-corrosion coatings, a liquid that contains zinc chromate or lead chromate is applied to metal surfaces through a high-pressure spray rig. The spray nozzle creates a mist that can be inhaled. Spraying coatings without adequate control measures can lead to exposure more than twenty times above the legal exposure limit.

Plating: In chrome plating, metal parts are immersed in a liquid solution of chromic acid through which an electric current flows. The electroplating process creates gases that bubble to the tank surface and carry liquid particles of chromic acid solution into the air. This mist can be inhaled.

Hard chrome plating, which uses a stronger electric current and a higher tank temperature than bright chrome plating, creates the most chromic acid mist. Hard chrome plating without adequate control measures can lead to exposure several times above the legal exposure limit.

Welding: In welding or cutting, the intense heat of the arc or flame vaporizes the base metal and/or the electrode coating. This vaporized metal condenses into tiny particles called fumes. These fume particles can be inhaled. Chromium fumes are created by welding or cutting on stainless steel or metals that are coated with a chromium material. Welding on stainless steel without adequate control measures can lead to exposure at least several times above the legal exposure limit.

Where Hexavalent Chromium or Chromium VI is Found

<i>USES</i>	<i>TYPES OF HEXAVALENT CHROMIUM CHEMICALS</i>
Pigments for paints, inks, and plastics	Lead chromate (chrome yellow, chrome green, molybdenum orange), zinc chromate, barium chromate, calcium chromate, potassium dichromate, and sodium chromate
Anti-corrosion coatings (chrome plating, spray coatings)	Chromic trioxide (chromic acid), zinc chromate, barium chromate, calcium chromate, sodium chromate, and strontium chromate
Stainless steel	Chromium VI is given off when stainless steel is cast, welded, or torch cut
Textile dyes	Ammonium dichromate, potassium chromate, potassium dichromate, and sodium chromate
Wood preservation	Chromium trioxide
Leather tanning	Ammonium dichromate

How to Control Chromium Exposure

The two best ways to prevent inhaling or ingesting chromium-containing particles are substituting chromium-free materials and using local exhaust ventilation. If a substitute cannot be found, a mechanically powered local exhaust hood should be placed at the point where chromium is released into the air, or the entire process should be contained within the hood. Properly designed and maintained local exhaust ventilation draws off most of the chromium before it can be inhaled.

Using local exhaust is far better than relying on dilution of chromium-contaminated air by natural ventilation through open windows and doors, or general ventilation with fresh air brought in through a duct. With the dilution approach, overexposure can still occur at the point of chromium release into the air, or if the dilution air does not mix well with the room air.

Wearing an air-purifying respirator such as a paper mask or rubber mask with screw-in filters is the least effective way to control exposure. In fact, the OSHA Respirator Standard allows respirator use to prevent overexposure only as the last resort. This restriction exists because the use of respirators is complex and prone to error, often resulting in inadequate protection.

First, the respirator must be approved for the type of particles in the air; for example, a paper dust mask designed for removing powder particles will not remove the fume particles created by welding. Next, the respirator must be fit-tested to ensure that it fits the wearer's face, and the respirator must be kept in good condition. The fit should be regularly checked. Workers must also be medically examined for their ability to wear a respirator. Even when these and other requirements are met, leakage of contaminated air into the respirator may still occur.

Special Control Measures for Spraying, Welding, and Plating

OSHA enforces standards to control workplace exposures to hazardous substances. OSHA has developed special standards for some workplace processes, including spraying, welding, and plating. These standards are designed to control worker exposure to toxic substances, including chromium. If the provisions of these standards are followed, workers' exposure to chromium will be reduced substantially.

Spraying: OSHA standards require that spray coating operations be confined to properly designed and ventilated spray booths or spray rooms whenever possible, and sets minimum inward air velocities at the spray booth faces. If you must work in a large spray booth downstream from the part being sprayed, an approved respirator must also be worn.

For large-scale spraying of chromium-containing coatings that involve a lot of back-spray, or that is done outside of a spray booth as in construction work, wearing an approved positive-pressure airline respirator with a full facepiece provides the best protection. This respirator delivers fresh air through a high-pressure hose to a tightly-fitting rubber facepiece that seals from the hairline to under the chin. Some airline respirators replace the facepiece with a loose-fitting hood that covers the entire head; however, these hooded respirators tend to allow some inward leakage of contaminated air.

Plating: OSHA standards set minimum air control velocities for local exhaust ventilation systems for chrome plating tanks. Although any chrome plating tank should be equipped with local exhaust ventilation, chromium exposure can be further reduced by placing full or partial covers over the tank. Although covers must be removed to load and unload the parts being plated, covers improve the function of the local exhaust hood. For example, covers prevent strong drafts from windows or fans from carrying chromic acid mist off the tank surface away from the local exhaust hood. Using covers is an effective way to reduce chromium exposure in chrome plating.

Welding: OSHA standards require the use of local exhaust ventilation where possible for all "indoor" welding and cutting operations. Further, if stainless steel welding or cutting is done in an "enclosed space" where using local exhaust ventilation is impractical, approved airline respirators must be worn. For "outdoor" stainless steel welding or cutting, approved respirators must be worn; again, an airline respirator rather than an air-purifying fume respirator provides the best protection.

OSHA Construction Standards also regulate the welding and cutting of metals coated with toxic substances, including chromium. The chromium coating must be stripped for at least four inches from the area of heat application before welding or cutting. If the coating is not stripped, approved airline respirators must be worn.

Legal Exposure Limits

OSHA's current Permissible Exposure Limit (PEL) for water-soluble and certain water-insoluble Chromium VI compounds is 5 micrograms of chromium per cubic meter of air ($5\mu\text{g}/\text{m}^3$). The Action Level is $2.5\mu\text{g}/\text{m}^3$, half of the PEL. Action Level means employee exposure, without regard to the use of respirators, to an airborne concentration of Chromium VI of 2.5 micrograms per cubic meter of air ($2.5\mu\text{g}/\text{m}^3$) averaged over an 8-hour period. The PEL for zinc chromate is ($1\mu\text{g}/\text{m}^3$). The PEL for chromyl chloride is ($15\mu\text{g}/\text{m}^3$).

Legally, exposure may be above the PEL at times, but only if it is below the PEL at other times, so that the average exposure for any 8-hour workshift is no greater than the PEL. Measuring the amount of Chromium VI in the air is the only reliable way to determine the exposure level. The current Permissible Exposure Limit does not adequately protect against lung cancer. It is recommended that the amount of Chromium VI in the air a worker breathes be kept as low as possible.

If a worker thinks that he may be overexposed, he should talk to his supervisor and/or union representative. If any worker might be exposed to a substance at more than the legal exposure limit, *Cain's Pipeline & Industrial Services, LLC* must measure the amount of the chemical in the air in the work area. Workers have the right to see the results of monitoring relevant to their exposure. Workers also have the right to see and copy their own medical records and records of their exposure to toxic substances. These records are important in determining whether a worker's health has been affected by the job. Employers who have such records must keep them and make them available to employees for at least 30 years after the end of employment.

Right to Know

The Hazard Communication Standard (HAZCOM) requires employers to provide workers with information about the hazardous substances to which they may be exposed and to train them to use these substances safely. Employers are also required to have a Material Safety Data Sheet (MSDS) for any workplace product that contains a hazardous substance, and must make the MSDS available to workers or to a treating physician on request. An MSDS is a standard form that lists the chemical contents of a product, describes its health and safety hazards, and gives methods for using and storing it safely. This information is an excellent aid for employee training programs.

1910.1026 – Toxic and Hazardous Substances – Chromium (VI)(a) Scope.

- (1) This standard applies to occupational exposures to chromium (VI) in all forms and compounds in general industry, except:
- (2) Exposures that occur in the application of pesticides regulated by the Environmental Protection Agency or another Federal government agency (e.g., the treatment of wood with preservatives);
- (3) Exposures to Portland cement; or
- (4) Where the employer has objective data demonstrating that a material containing chromium or a specific process, operation, or activity involving chromium cannot release dusts, fumes, or mists of chromium (VI) in concentrations at or above $0.5\mu\text{g}/\text{m}^3$ as an 8-hour time-weighted average (TWA) under any expected conditions of use.

(b) Definitions. For the purposes of this section the following definitions apply:

Action level means a concentration of airborne chromium (VI) of 2.5 micrograms per cubic meter of air ($2.5\mu\text{g}/\text{m}^3$) calculated as an 8-hour time-weighted average (TWA).

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

Chromium (VI) [hexavalent chromium or Cr(VI)] means chromium with a valence of positive six, in any form and in any compound.

Director means the Director of the National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health and Human Services, or designee.

Emergency means any occurrence that results, or is likely to result, in an uncontrolled release of chromium (VI). If an incidental release of chromium (VI) can be controlled at the time of release by employees in the immediate release area, or by maintenance personnel, it is not an emergency.

Employee exposure means the exposure to airborne chromium (VI) that would occur if the employee were not using a respirator.

High-efficiency particulate air [HEPA] filter means a filter that is at least 99.97 percent efficient in removing mono-dispersed particles of 0.3 micrometers in diameter or larger.

Historical monitoring data means data from chromium (VI) monitoring conducted prior to May 30, 2006, obtained during work operations conducted under workplace conditions closely resembling the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.

Objective data means information such as air monitoring data from industry-wide surveys or calculations based on the composition or chemical and physical properties of a substance demonstrating the employee exposure to chromium (VI) associated with a particular product or material or a specific process, operation, or activity. The data must reflect workplace conditions closely resembling the processes, types of material, control methods, work practices, and environmental conditions in the employer's current operations.

Physician or other licensed health care professional [PLHCP] is an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide or be delegated the responsibility to provide some or all of the particular health care services required by paragraph (k) of this section.

Regulated area means an area, demarcated by the employer, where an employee's exposure to airborne concentrations of chromium (VI) exceeds, or can reasonably be expected to exceed, the PEL.

This section means this § 1910.1026 chromium (VI) standard.

(c) Permissible Exposure Limit (PEL). The employer shall ensure that no employee is exposed to an airborne concentration of chromium (VI) in excess of 5 micrograms per cubic meter of air ($5 \mu\text{g}/\text{m}^3$), calculated as an 8-hour time-weighted average (TWA).

(d) Exposure determination.

(1) General. Each employer who has a workplace or work operation covered by this section shall determine the 8-hour TWA exposure for each employee exposed to chromium (VI). This determination shall be made in accordance with either paragraph (d)(2) or paragraph (d)(3) of this section.

(2) Scheduled monitoring option.

(i) The employer shall perform initial monitoring to determine the 8-hour TWA exposure for each employee on the basis of a sufficient number of personal breathing zone air samples to accurately characterize full shift exposure on each shift, for each job classification, in each work area. Where an employer does representative sampling instead of sampling all employees in order to meet this requirement, the employer shall sample the employee(s) expected to have the highest chromium (VI) exposures.

(ii) If initial monitoring indicates that employee exposures are below the action level, the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring.

(iii) If monitoring reveals employee exposures to be at or above the action level, the employer shall perform periodic monitoring at least every six months.

(iv) If monitoring reveals employee exposures to be above the PEL, the employer shall perform periodic monitoring at least every three months.

(v) If periodic monitoring indicates that employee exposures are below the action level, and the result is confirmed by the result of another monitoring taken at least seven days later, the employer may discontinue the monitoring for those employees whose exposures are represented by such monitoring.

(vi) The employer shall perform additional monitoring when there has been any change in the production process, raw materials, equipment, personnel, work practices, or control methods that may result in new or additional exposures to chromium (VI), or when the employer has any reason to believe that new or additional exposures have occurred.

(3) Performance-oriented option. The employer shall determine the 8-hour TWA exposure for each employee on the basis of any combination of air monitoring data, historical monitoring data, or objective data sufficient to accurately characterize employee exposure to chromium (VI).

(4) Employee notification of determination results.

(i) Where the exposure determination indicates that employee exposure exceeds the PEL, within 15 working days the employer shall either post the results in an appropriate location that is accessible to all affected employees or shall notify each affected employee individually in writing of the results.

(ii) Whenever the exposure determination indicates that employee exposure is above the PEL, the employer shall describe in the written notification the corrective action being taken to reduce employee exposure to or below the PEL.

(5) Accuracy of measurement. Where air monitoring is performed to comply with the requirements of this section, the employer shall use a method of monitoring and analysis that can measure chromium (VI) to within an accuracy of plus or minus 25 percent (+/- 25%) and can produce accurate measurements to within a statistical confidence level of 95 percent for airborne concentrations at or above the action level.

(6) Observation of monitoring.

(i) Where air monitoring is performed to comply with the requirements of this section, the employer shall provide affected employees or their designated representatives an opportunity to observe any monitoring of employee exposure to chromium (VI).

(ii) When observation of monitoring requires entry into an area where the use of protective clothing or equipment is required, the employer shall provide the observer with clothing and equipment and shall assure that the observer uses such clothing and equipment and complies with all other applicable safety and health procedures.

(e) Regulated areas.

(1) Establishment. The employer shall establish a regulated area wherever an employee's exposure to airborne concentrations of chromium (VI) is, or can reasonably be expected to be, in excess of the PEL.

(2) Demarcation. The employer shall ensure that regulated areas are demarcated from the rest of the workplace in a manner that adequately establishes and alerts employees of the boundaries of the regulated area.

(3) Access. The employer shall limit access to regulated areas to:

(i) Persons authorized by the employer and required by work duties to be present in the regulated area;

(ii) Any person entering such an area as a designated representative of employees for the purpose of exercising the right to observe monitoring procedures under paragraph (d) of this section; or

(iii) Any person authorized by the Occupational Safety and Health Act or regulations issued under it to be in a regulated area.

(f) Methods of compliance.

(1) Engineering and work practice controls.

(i) Except as permitted in paragraph (f)(1)(ii) and paragraph (f)(1)(iii) of this section, the employer shall use engineering and work practice controls to reduce and maintain employee exposure to chromium (VI) to or below the PEL unless the employer can demonstrate that such controls are not feasible. Wherever feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PEL, the employer shall use them to reduce employee exposure to the lowest levels achievable, and shall supplement them by the use of respiratory protection that complies with the requirements of paragraph (g) of this section.

(ii) Where painting of aircraft or large aircraft parts is performed in the aerospace industry, the employer shall use engineering and work practice controls to reduce and maintain employee exposure to chromium (VI) to or below 25 µg/m³ unless the employer can demonstrate that such controls are not feasible. The employer shall supplement such engineering and work practice controls with the use of respiratory protection that complies with the requirements of paragraph (g) of this section to achieve the PEL.

(iii) Where the employer can demonstrate that a process or task does not result in any employee exposure to chromium (VI) above the PEL for 30 or more days per year (12 consecutive months), the requirement to implement engineering and work practice controls to achieve the PEL does not apply to that process or task.

(2) Prohibition of rotation. The employer shall not rotate employees to different jobs to achieve compliance with the PEL.

(g) Respiratory protection.

(1) General. The employer shall provide respiratory protection for employees during:

(i) Periods necessary to install or implement feasible engineering and work practice controls;

(ii) Work operations, such as maintenance and repair activities, for which engineering and work practice controls are not feasible;

(iii) Work operations for which an employer has implemented all feasible engineering and work practice controls and such controls are not sufficient to reduce exposures to or below the PEL;

(iv) Work operations where employees are exposed above the PEL for fewer than 30 days per year, and the employer has elected not to implement engineering and work practice controls to achieve the PEL; or

(v) Emergencies.

(2) Respiratory protection program. Where respirator use is required by this section, the employer shall institute a respiratory protection program in accordance with 29 CFR 1910.134.

(h) Protective work clothing and equipment.

(1) Provision and use. Where a hazard is present or is likely to be present from skin or eye contact with chromium (VI), the employer shall provide appropriate personal protective clothing and equipment at no cost to employees, and shall ensure that employees use such clothing and equipment.

(2) Removal and storage.

(i) The employer shall ensure that employees remove all protective clothing and equipment contaminated with chromium (VI) at the end of the work shift or at the completion of their tasks involving chromium (VI) exposure, whichever comes first.

(ii) The employer shall ensure that no employee removes chromium (VI)-contaminated protective clothing or equipment from the workplace, except for those employees whose job it is to launder, clean, maintain, or dispose of such clothing or equipment.

(iii) When contaminated protective clothing or equipment is removed for laundering, cleaning, maintenance, or disposal, the employer shall ensure that it is stored and transported in sealed, impermeable bags or other closed, impermeable containers.

(iv) Bags or containers of contaminated protective clothing or equipment that are removed from change rooms for laundering, cleaning, maintenance, or disposal shall be labeled in accordance with the requirements of the Hazard Communication Standard, 29 CFR 1910.1200.

(3) Cleaning and replacement.

(i) The employer shall clean, launder, repair and replace all protective clothing and equipment required by this section as needed to maintain its effectiveness.

(ii) The employer shall prohibit the removal of chromium (VI) from protective clothing and equipment by blowing, shaking, or any other means that disperses chromium (VI) into the air or onto an employee's body.

(iii) The employer shall inform any person who launders or cleans protective clothing or equipment contaminated with chromium (VI) of the potentially harmful effects of exposure to chromium (VI) and that the clothing and equipment should be laundered or cleaned in a manner that minimizes skin or eye contact with chromium (VI) and effectively prevents the release of airborne chromium (VI) in excess of the PEL.

(i) Hygiene areas and practices.

(1) General. Where protective clothing and equipment is required, the employer shall provide change rooms in conformance with 29 CFR 1910.141. Where skin contact with chromium (VI) occurs, the employer shall provide washing facilities in conformance with 29 CFR 1910.141. Eating and drinking areas provided by the employer shall also be in conformance with § 1910.141.

(2) Change rooms. The employer shall assure that change rooms are equipped with separate storage facilities for protective clothing and equipment and for street clothes, and that these facilities prevent cross-contamination.

(3) Washing facilities.

(i) The employer shall provide readily accessible washing facilities capable of removing chromium (VI) from the skin, and shall ensure that affected employees use these facilities when necessary.

(ii) The employer shall ensure that employees who have skin contact with chromium (VI) wash their hands and faces at the end of the work shift and prior to eating, drinking, smoking, chewing tobacco or gum, applying cosmetics, or using the toilet.

(4) Eating and drinking areas.

(i) Whenever the employer allows employees to consume food or beverages at a worksite where chromium (VI) is present, the employer shall ensure that eating and drinking areas and surfaces are maintained as free as practicable of chromium (VI).

(ii) The employer shall ensure that employees do not enter eating and drinking areas with protective work clothing or equipment unless surface chromium (VI) has been removed from the clothing and equipment by methods that do not disperse chromium (VI) into the air or onto an employee's body.

(5) Prohibited activities. The employer shall ensure that employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in regulated areas, or in areas where skin or eye contact with

chromium (VI) occurs; or carry the products associated with these activities, or store such products in these areas.

(j) Housekeeping.

(1) General. The employer shall ensure that:

- (i) All surfaces are maintained as free as practicable of accumulations of chromium (VI).
- (ii) All spills and releases of chromium (VI) containing material are cleaned up promptly.

(2) Cleaning methods.

- (i) The employer shall ensure that surfaces contaminated with chromium (VI) are cleaned by HEPA-filter vacuuming or other methods that minimize the likelihood of exposure to chromium (VI).
- (ii) Dry shoveling, dry sweeping, and dry brushing may be used only where HEPA-filtered vacuuming or other methods that minimize the likelihood of exposure to chromium (VI) have been tried and found not to be effective.
- (iii) The employer shall not allow compressed air to be used to remove chromium (VI) from any surface unless:
 - (A) The compressed air is used in conjunction with a ventilation system designed to capture the dust cloud created by the compressed air; or
 - (B) No alternative method is feasible.
- (iv) The employer shall ensure that cleaning equipment is handled in a manner that minimizes the reentry of chromium (VI) into the workplace.

(3) Disposal. The employer shall ensure that:

- (i) Waste, scrap, debris, and any other materials contaminated with chromium (VI) and consigned for disposal are collected and disposed of in sealed, impermeable bags or other closed, impermeable containers.
- (ii) Bags or containers of waste, scrap, debris, and any other materials contaminated with chromium (VI) that are consigned for disposal are labeled in accordance with the requirements of the Hazard Communication Standard, 29 CFR 1910.1200.

(k) Medical surveillance.

(1) General.

- (i) The employer shall make medical surveillance available at no cost to the employee, and at a reasonable time and place, for all employees:
 - (A) Who are or may be occupationally exposed to chromium (VI) at or above the action level for 30 or more days a year;
 - (B) Experiencing signs or symptoms of the adverse health effects associated with chromium (VI) exposure; or
 - (C) Exposed in an emergency.
- (ii) The employer shall assure that all medical examinations and procedures required by this section are performed by or under the supervision of a PLHCP.

(2) Frequency. The employer shall provide a medical examination:

- (i) Within 30 days after initial assignment, unless the employee has received a chromium (VI) related medical examination that meets the requirements of this paragraph within the last twelve months;
- (ii) Annually;
- (iii) Within 30 days after a PLHCP's written medical opinion recommends an additional examination;
- (iv) Whenever an employee shows signs or symptoms of the adverse health effects associated with chromium (VI) exposure;
- (v) Within 30 days after exposure during an emergency which results in an uncontrolled release of chromium (VI); or
- (vi) At the termination of employment, unless the last examination that satisfied the requirements of paragraph (k) of this section was less than six months prior to the date of termination.

(3) Contents of examination. A medical examination consists of:

- (i) A medical and work history, with emphasis on: Past, present, and anticipated future exposure to chromium (VI); any history of respiratory system dysfunction; any history of asthma, dermatitis, skin ulceration, or nasal septum perforation; and smoking status and history;
- (ii) A physical examination of the skin and respiratory tract; and
- (iii) Any additional tests deemed appropriate by the examining PLHCP.

(4) Information provided to the PLHCP. The employer shall ensure that the examining PLHCP has a copy of this standard, and shall provide the following information:

- (i)** A description of the affected employee's former, current, and anticipated duties as they relate to the employee's occupational exposure to chromium (VI);
- (ii)** The employee's former, current, and anticipated levels of occupational exposure to chromium (VI);
- (iii)** A description of any personal protective equipment used or to be used by the employee, including when and for how long the employee has used that equipment; and
- (iv)** Information from records of employment-related medical examinations previously provided to the affected employee, currently within the control of the employer.

(5) PLHCP's written medical opinion.

(i) The employer shall obtain a written medical opinion from the PLHCP, within 30 days for each medical examination performed on each employee, which contains:

- (A)** The PLHCP's opinion as to whether the employee has any detected medical condition(s) that would place the employee at increased risk of material impairment to health from further exposure to chromium (VI);
- (B)** Any recommended limitations upon the employee's exposure to chromium (VI) or upon the use of personal protective equipment such as respirators;
- (C)** A statement that the PLHCP has explained to the employee the results of the medical examination, including any medical conditions related to chromium (VI) exposure that require further evaluation or treatment, and any special provisions for use of protective clothing or equipment.

(ii) The PLHCP shall not reveal to the employer specific findings or diagnoses unrelated to occupational exposure to chromium (VI).

(iii) The employer shall provide a copy of the PLHCP's written medical opinion to the examined employee within two weeks after receiving it.

(l) Communication of chromium (VI) hazards to employees.

(1) General. In addition to the requirements of the Hazard Communication Standard, 29 CFR 1910.1200, employers shall comply with the following requirements.

(2) Employee information and training.

(i) The employer shall ensure that each employee can demonstrate knowledge of at least the following:

- (A)** The contents of this section; and
- (B)** The purpose and a description of the medical surveillance program required by paragraph (k) of this section.

(ii) The employer shall make a copy of this section readily available without cost to all affected employees.

(m) Recordkeeping.

(1) Air monitoring data.

(i) The employer shall maintain an accurate record of all air monitoring conducted to comply with the requirements of this section.

(ii) This record shall include at least the following information:

- (A)** The date of measurement for each sample taken;
- (B)** The operation involving exposure to chromium (VI) that is being monitored;
- (C)** Sampling and analytical methods used and evidence of their accuracy;
- (D)** Number, duration, and the results of samples taken;
- (E)** Type of personal protective equipment, such as respirators worn; and
- (F)** Name, social security number, and job classification of all employees represented by the monitoring, indicating which employees were actually monitored.

(iii) The employer shall ensure that exposure records are maintained and made available in accordance with 29 CFR 1910.1020.

(2) Historical monitoring data.

(i) Where the employer has relied on historical monitoring data to determine exposure to chromium (VI), the employer shall establish and maintain an accurate record of the historical monitoring data relied upon.

(ii) The record shall include information that reflects the following conditions:

- (A)** The data were collected using methods that meet the accuracy requirements of paragraph (d)(5) of this section;

(B) The processes and work practices that were in use when the historical monitoring data were obtained are essentially the same as those to be used during the job for which exposure is being determined;

(C) The characteristics of the chromium (VI) containing material being handled when the historical monitoring data were obtained are the same as those on the job for which exposure is being determined;

(D) Environmental conditions prevailing when the historical monitoring data were obtained are the same as those on the job for which exposure is being determined; and

(E) Other data relevant to the operations, materials, processing, or employee exposures covered by the exception.

(iii) The employer shall ensure that historical exposure records are maintained and made available in accordance with 29 CFR 1910.1020.

(3) Objective data.

(i) The employer shall maintain an accurate record of all objective data relied upon to comply with the requirements of this section.

(ii) This record shall include at least the following information:

(A) The chromium containing material in question;

(B) The source of the objective data;

(C) The testing protocol and results of testing, or analysis of the material for the release of chromium (VI);

(D) A description of the process, operation, or activity and how the data support the determination; and

(E) Other data relevant to the process, operation, activity, material, or employee exposures.

(iii) The employer shall ensure that objective data are maintained and made available in accordance with 29 CFR 1910.1020.

(4) Medical surveillance.

(i) The employer shall establish and maintain an accurate record for each employee covered by medical surveillance under paragraph (k) of this section.

(ii) The record shall include the following information about the employee:

(A) Name and social security number;

(B) A copy of the PLHCP's written opinions;

(C) A copy of the information provided to the PLHCP as required by paragraph (k)(4) of this section.

(iii) The employer shall ensure that medical records are maintained and made available in accordance with 29 CFR 1910.1020.

(n) Dates.

(1) For employers with 20 or more employees, all obligations of this section, except engineering controls required by paragraph (f) of this section, commence November 27, 2006.

(2) For employers with 19 or fewer employees, all obligations of this section, except engineering controls required by paragraph (f) of this section, commence May 30, 2007.

(3) Except as provided in (n)(4), for all employers, engineering controls required by paragraph (f) of this section shall be implemented no later than May 31, 2010.

[71 FR 10374, Feb. 28, 2006; 71 FR 63242, Oct. 30, 2006]

Chapter 21

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Hydrogen Sulfide Specific Training

This policy for the prevention of hazardous employee exposure to Hydrogen Sulfide (H₂S) is adopted by ***Cain's Pipeline & Industrial Services, LLC.*** in accordance with the following OSHA regulations:

§1910.1200 – Hazard Communication Standards for Employers

§1910.134 – Respiratory Protection

Cain's Pipeline & Industrial Services, LLC. has implemented this policy to ensure that no employee is exposed to Hydrogen Sulfide (H₂S) at levels in excess of the PEL (permissible exposure limit is 20 PPM). This policy is available to all employees request. *Brent Messina* is the assigned supervisor responsible for ensuring the following engineering controls and work practices are enforced:

- *Brent Messina* will provide employees with information and training at the time of their initial assignment to a work area where H₂S is present. Training will address characteristics and health effects of H₂S. If exposures are above the action level, employees will be provided with information and training at least annually thereafter. Necessary employee training will be documented to include:
 - Identity of the employee trained.
 - The signature and title of the employee trainer.
 - The date of the training.
- Employees will be informed of all regulated areas and will be properly trained in entrance procedures, safety requirements, and practices while in regulated areas.

Characteristics of Hydrogen Sulfide include:

- H₂S is a colorless, extremely poisonous gas that has the characteristic odor of rotten eggs. The sense of smell becomes rapidly fatigued and can NOT be relied upon to warn of the continuous presence of H₂S. Large amounts of H₂S are obtained in the removal of sulfur from petroleum.

Hydrogen Sulfide is:

- Extremely toxic. 100 ppm is the IDLH (Immediately Dangerous to Life or Health concentration.)
- Colorless
- Solubility in water at 68 °F is 0.4% by weight.
- Flammable Gas
- Incompatible and reacts with strong oxidizers, strong nitric acid, and metals.
- UEL (upper explosive [flammable] limit in air) is 44.0% by volume (at room temperature)
- LEL (lower explosive [flammable] limit in air) is 4.0% by volume (at room temperature)

- Contact and exposure occurs through inhalation, skin and/or eye contact.
- Target organs are the eyes, respiratory system, and central nervous system.
- Health affects and symptoms include: Irritation of the eyes and respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation (blisters); dizziness, headache, lassitude (weakness, exhaustion), irritability, insomnia; gastrointestinal disturbance. Affects the nerve centers of the brain which control breathing.
- Potential employee exposure to Hydrogen Sulfide includes:
 - Drilling Operations.
 - 1.** Recycled Drilling Mud.
 - 2.** Water from sour crude wells.
 - 3.** Blowouts.
 - Tank Gauging (tanks at producing, pipeline, and refining operations).
 - Field Maintenance.
 - 4.** Tank batteries and wells, etc.

Respiratory Protection Requirements

- The Respiratory Protection Program, in compliance with OSHA §1910.134, and respiratory protective equipment is provided at no cost for all employees with potential for exposure to H₂S.
- The following NIOSH respirator recommendations with their APF (assigned protection factors) will be used under these hazardous conditions:
 - H₂S Concentrations up to 100 ppm:
 - ☑ Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern/(APF = 50).
 - ☑ Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 10).
 - ☑ Any supplied-air respirator/(APF = 50).
 - ☑ Any self-contained breathing apparatus with a full facepiece
 - Emergency or planned entry into unknown H₂S concentrations or IDLH conditions:
 - ☑ Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000).
 - ☑ Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

■ Escape:

- ✓ Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus/(APF = 50).

- In the event of an emergency where H₂S is released at hazardous levels, employees not wearing sufficient PPE for the situation will be immediately evacuated to a safe area until the hazard is contained.
- Adequate ventilation will be ensured in all enclosed work areas. Employees engaged in maintenance of ventilation systems, including filter changes, are required to use proper PPE for the task.
- Regular monitoring of air quality in work areas will be provided to ensure that PEL of H₂S are not being exceeded. Records of all monitoring tests will be kept available at the Company office.
- Employees working at job-sites where there is a potential for exposure to an H₂S hazardous atmospheres will be supplied with personal monitoring equipment which must be carried outside of clothing on the worker at all times when in the work area.
- The supplied monitors will be capable of sensing a minimum of 10 ppm of H₂S in the atmosphere; and will activate audible and visual alarms when the concentration of H₂S in the atmosphere reaches 10 ppm. When monitor alarms sound, employees will vacate the area and will not re-enter without proper respiratory protection.
- In the event that PEL of H₂S are exceeded within any facility where employees are contracted to work, all work will be stopped and employees evacuated until the facility's management can ensure that H₂S levels are brought down to an acceptable level for safe work.
- The management of any facility where *Cain's Pipeline & Industrial Services, LLC.* contracts to work must provide a list of all operations in the facility where H₂S is emitted. Facility management will provide a copy of the facility's contingency plan provisions.
- Special precautions will be taken when employees are working inside tanks or vessels. Employees will adhere to the *Cain's Pipeline & Industrial Services, LLC.* written Confined Space Program per §1910.146 and employees will be trained under §1910.146(g).
- The medical surveillance program for employees who potentially may be exposed to H₂S at or above the action level or PEL will be provided under the supervision of a licensed physician at no cost to the employee.
- Employees must wear proper Personal Protective Equipment (PPE) at all times while in work areas where H₂S is present. This PPE will include proper eye/face protection in accordance with §1910.133 where appropriate.
- All required signs and labels will be posted in areas of potential exposure to H₂S.
- All containers or materials containing H₂S will be appropriately labeled to indicate the contents and the hazards of the contents.
- MSDS for H₂S and all hazardous materials at *Cain's Pipeline & Industrial Services, LLC.* are available to employees at the Company office upon request.

Hazards of Hydrogen Sulfide (H₂S)

Hydrogen Sulfide (H₂S) presents a potential hazard to workers at the work site. It usually occurs as an unwanted by-product and can result in worker exposure in many different industries or occupations. To ensure protection against exposure to H₂S, both workers and employers must be aware of its properties, how it affects the body, and what to do in emergency situations. *Cain's Pipeline & Industrial Services, LLC.* shall ensure that all personnel who will be working at the job site will be properly trained in H₂S awareness and contingency procedures.

H₂S Characteristics

Hydrogen sulfide is a powerful and deadly gas which is colorless and smells like rotten eggs at low concentrations and has a sweet smell at high concentrations. But workers should not rely on the smell as a warning as the gas quickly paralyzes the olfactory nerves which allow you to smell. The result could be instant death. Long exposure to low concentrations will also deaden the sense of smell.

H₂S is explosive - it will ignite and explode when subjected to a spark or ordinary flame - in any concentration from 4% to 44% of the air. It is also soluble in water and oil, so it may flow for a considerable distance from its origin before escaping above ground or in an entirely unexpected place. Because the vapor (gas) is heavier than air, it may travel for a long way until ignited and then flash back towards the source. One of the products of burning H₂S is Sulfur Dioxide, also a toxic gas.

If the gas is burned, toxic products such as sulfur dioxide will be formed. Hydrogen sulfide is incompatible with oxidizing agents, such as nitric acid and chlorine trifluoride, and may react violently or ignite spontaneously.

Sources of H₂S

H₂S is found widely in industry and few workers are warned of its dangers, or their exposure. It is formed by the decomposition of organic materials, so it is found in natural gas and oil, recycled drilling mud, water from sour crude wells, in mines, wells, fertilizers, sewers, and cesspools. It is given off as a by-product in the manufacture of rayon, synthetic rubber, dyes, and the tanning of leather.

Hydrogen sulfide is found in large amounts in natural gas and petroleum. Any worker involved in extracting gas and petroleum from the ground, or in storing, transporting, or processing gas is at risk from exposure to H₂S. Hydrogen sulfide exists in solution in crude oil, and workers are exposed when the gas begins to "pass off" as it reaches the surface or comes into contact with air. This can occur at any point, including all stages of the refining operation, and it is accelerated by heat or hot weather.

Fundamentally, employers and employees must be alert to the fact that working with a "closed system" does not always ensure safety. Operations involving the opening of valves or pumps on otherwise closed systems or working on such equipment that is not isolated or locked out are particular sources of danger. When a normally closed system is opened, the potential exists for releasing hazardous chemicals into the workers' breathing zones in unknown concentrations.

Health Effects on the Body

Hydrogen Sulfide is extremely toxic. When you breathe in H₂S, it goes directly through your lungs and into your bloodstream. To protect itself, your body "oxidizes" (breaks down) the H₂S as rapidly as possible into a harmless compound.

If you breathe in so much H₂S that your body cannot oxidize all of it, the H₂S builds up in the blood and you become poisoned. It may cause death instantaneously in high airborne concentrations. The nervous centers in your brain that control breathing are paralyzed. Your lungs stop working and you are asphyxiated - just as though someone had come up and put their hands around your neck and strangled you.

A single breath of hydrogen sulfide at about 1000 ppm may paralyze the respiratory system and result in coma and death. A worker can be overcome by H₂S and lose consciousness in a few seconds; luckily if he is rescued in time and is given artificial respiration within a few minutes, the worker may recover. Either artificial mouth-to-mouth or an oxygen supply system of resuscitation will work if it is done in time, because, with an adequate source of oxygen and no further H₂S intake, the body will quickly break down the H₂S still in the blood.

Low levels may be extremely irritating to the lungs, nose, throat, and eyes. Hydrogen Sulfide can be detected by smell at levels as low as 0.13 parts H₂S per million parts air (ppm). Odor cannot be used as a warning because the gas can deaden the sense of smell within 2 to 15 minutes in exposures of approximately 100 ppm. Convulsions may also occur. Prolonged exposure at about 250 ppm H₂S may cause the lung tissue to swell and fill up with water (pulmonary edema). This effect may occur after the exposed worker recovers from the irritant effects of the gas. Exposures of 20 to 50 ppm hydrogen sulfide for one hour may cause inflammation of the cornea and the delicate lining of the eye and eyelid (a condition called keratoconjunctivitis). Exposures for long periods at 50 ppm may cause severe irritation of the nose, throat and lungs. Workers exposed to lower concentrations of H₂S may develop headaches, eye disorders, and chronic bronchitis.

Chronic effects

Hydrogen Sulfide can also cause a wide range of sub-acute and chronic effects. At very low concentrations of 10-100 ppm.) headache, dizziness, nausea, and vomiting may develop, together with irritation of the eyes and respiratory tract (the lungs and trachea and bronchi, or air pipes from the nose and mouth to the lungs). The eyes become red, sore, inflamed, and sensitive to light. Respiratory system effects include cough, pain in the nose and throat, and pain on breathing.

If exposure at low levels continues, the worker may develop a state of chronic poisoning. In addition to eye and respiratory tract irritation, there will be a slowed pulse rate, fatigue, insomnia, digestive disturbances, and cold sweats. More dangerous, if exposure at the level of 100 ppm (which results in eye and respiratory tract irritation and drowsiness after 15 minutes) lasts for several hours, it may result in death within the next 48 hours. Symptoms of chronic exposures at low levels are conjunctivitis (eye infections), headache, attacks of dizziness, diarrhea, and loss of weight.

Chronic H₂S intoxication is marked by headaches, eye disorders, chronic bronchitis, and a grey-green line on the gums. Reports of nervous system disorders including paralysis, meningitis, and neurological problems have been reported, but not confirmed.

A study of workers and community residents of a California refinery engaged in extracting sulfur from crude oil, which is rich in H₂S, complained of headaches, nausea, vomiting, depression, personality changes, nosebleeds, and breathing difficulties. When compared to a non-exposed group of people, the exposed people showed abnormalities of color discrimination, eye-hand coordination, balance, and mood disturbances.

Hydrogen Sulfide can penetrate the skin and cause toxicosis in people exposed to large concentrations over long periods. The speed of onset of acute H₂S poisoning and the potency of H₂S are almost the same as for cyanide gas. In rats, exposure to H₂S has caused teratogenic (biological monstrosities and malformations) effects.

Symptoms of H₂S exposure.

H₂S is classified as a chemical asphyxiant, similar to carbon monoxide and cyanide gases. It inhibits cellular respiration and uptake of oxygen, causing biochemical suffocation. Exposure levels to H₂S and symptoms of that exposure are divided into different toxicity levels, shown in the chart below.

10 ppm	Beginning eye irritation
50-100 ppm	Slight conjunctivitis and respiratory tract irritation after 1 hour exposure
100 ppm	Coughing, eye irritation, loss of sense of smell after 2-15 minutes. Altered respiration, pain in the eyes and drowsiness after 15-30 minutes followed by throat irritation after 1 hour. Several hours exposure results in gradual increase in severity of these symptoms and death may occur within the next 48 hours.
200-300 ppm	Marked conjunctivitis and respiratory tract irritation after 1 hour of exposure
500-700 ppm	Loss of consciousness and possibly death in 30 minutes to 1 hour.
700-1000 ppm	Rapid unconsciousness, cessation of respiration, and death.
1000-2000 ppm	Unconsciousness at once, with early cessation of respiration and death in a few minutes. Death may occur even if individual is removed to fresh air at once.

Use and operation of H₂S monitoring systems & detection methods used on site

Employees working at jobsites where there is a potential for exposure to hazardous atmospheres, will be supplied with personal monitoring equipment that must be carried outside of clothing on the worker at all times when in the work area. The monitors supplied will be capable of sensing a minimum of 10 ppm of H₂S in the atmosphere; and will activate audible and visual alarms when the concentration of H₂S in the atmosphere reaches 20 ppm. 20 ppm is the acceptable ceiling concentration for H₂S exposure, and 50 ppm is the acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift with a one-time 10-minute exposure only if no other measured exposure exists.

Alternatively, stationary monitors may be installed. Personal or stationary monitors must be capable of sounding an audible alarm or warning. *Brent Messina* will administer the monitor maintenance program for *Cain's Pipeline & Industrial Services, LLC*. Monitors will be calibrated and maintained per manufacturer's instructions.

Proper use and maintenance of PPE.

See *Cain's Pipeline & Industrial Services, LLC*. Policy on respiratory protection. Employees working in areas where the possibility of exposure to toxic gases exists will be provided NIOSH approved full face SCBA respiratory equipment, and trained in their use and maintenance according to the company Respiratory Protection Program which is administered by *Brent Messina*. Demonstrated proficiency in using PPE is required by the program.

Locations and use of safety equipment.

Personal hazardous atmosphere detection monitors and respiratory protective equipment will be immediately available to each employee at all times in the work area. Safety equipment will be kept immediately available to all employees on the job-site.

All employees of *Cain's Pipeline & Industrial Services, LLC.* must be notified of the location of safety equipment on each jobsite prior to commencement of work. Only personnel trained in the proper use of any required safety equipment will be allowed on the job-site.

Recognition and response to H₂S warnings at the workplace

Cain's Pipeline & Industrial Services, LLC. employees at will be required to respond immediately to audio or visual warnings issued either by personal monitoring equipment or established workplace general warning signals. Workplace site-specific contingency plans of the plant owner will be reviewed with personnel and provisions of the plan followed. When a warning signal is sounded, employees must immediately put on SCBA respiratory protection and initiate evacuation procedures. Evacuation plans must be established for each work-site prior to commencement of work. *Brent Messina*, or the foreman in charge of the job-site, will be responsible for supervision of evacuation procedures, checking for proper use of respiratory protection, ensuring all employees are cleared of the hazard area, notification of the facility management, and assembly and head-count of evacuated personnel at designated safe areas.

Proper rescue techniques and first aid procedures to be used in a H₂S exposure.

First aid kit and oxygen will be kept in the supervisor's work vehicle and available to all employees. A litter for transport of incapacitated workers will be provided by *Cain's Pipeline & Industrial Services, LLC.*, and kept on-site, if one is not available from the facility.

In the event an employee is exposed to H₂S, the employee will immediately be evacuated to a safe briefing area, emergency medical services will be notified, and oxygen will be administered, along with CPR if required. Oxygen will be administered regardless of the condition of the victim to ensure a reduction of the absorption concentration of H₂S. If an employee is rendered unconscious due to H₂S exposure, assigned personnel wearing proper SCBA must respond to perform rescue operations of the victim.

Locations of safe briefing areas.

Safe briefing areas will be designated outside the work zone for each work location where the possibility of hazardous atmospheres exist. At least two briefing areas will be designated for each work-site. Workers will be notified of these areas prior to the commencement of work. *Brent Messina* will be responsible for evaluation and designation of safe briefing areas for *Cain's Pipeline & Industrial Services, LLC.*

Wind direction awareness and routes of egress.

Wind direction will be monitored by *Brent Messina* at the beginning of each shift to determine safe egress routes for employees in the event of an evacuation. Wind direction will be regularly checked and noted throughout the work shift for wind shift which will necessarily facilitate a change of egress routes for evacuation. Evacuation routes will be determined for each work area before commencement of work, and routes will be clearly marked and posted in conspicuous areas in the workplace. In the event of an emergency evacuation, *Brent Messina* will be responsible for determination and notification of the proper egress route to be used for employee safety.

Confined space and enclosed facility entry procedures.

Whenever employees enter a confined space, such as a tank, strict work practices will be followed, including the company permit entry system.

Brent Messina will ensure that the *Cain's Pipeline & Industrial Services, LLC*. Confined Space Entry program is adhered to, that the air is continually monitored for the presence of H₂S, and that a worker be stationed as a monitor outside of a confined space. Supplied-air respirators, lifelines, and rescue equipment must be immediately available. See *Cain's Pipeline & Industrial Services, LLC*. Policy on Permit Required Confined Spaces. These procedures will be enforced in all confined work situations.

Hydrogen Sulfide (H₂S)		CAS 7783-06-4	
		RTECS MX1225000	
Synonyms & Trade Names Hydrosulfuric acid, Sewer gas, Sulfuretted hydrogen		DOT ID & Guide 1053 117	
Exposure Limits	NIOSH REL: C 10 ppm (15 mg/m ³) [10-minute]		
	OSHA PEL†: C 20 ppm 50 ppm [10-minute maximum peak]		
IDLH 100 ppm		Conversion 1 ppm = 1.40 mg/m³	
Physical Description Colorless gas with a strong odor of rotten eggs. [Note: Sense of smell becomes rapidly fatigued & can NOT be relied upon to warn of the continuous presence of H ₂ S. Shipped as a liquefied compressed gas.]			
MW: 34.1	BP: -77°F	FRZ: -122°F	Sol: 0.4%
VP: 17.6 atm	IP: 10.46 eV	RGasD: 1.19	
Fl.P: NA (Gas)	UEL: 44.0%	LEL: 4.0%	
Flammable Gas			
Incompatibilities & Reactivities Strong oxidizers, strong nitric acid, metals			
Measurement Methods NIOSH 6013; OSHA ID141			
Personal Protection & Sanitation Skin: Frostbite Eyes: Frostbite Wash skin: No recommendation Remove: When wet (flammable) Change: No recommendation Provide: Frostbite		First Aid (See procedures) Eye: Frostbite Skin: Frostbite Breathing: Respiratory support	
Respirator Recommendations NIOSH Up to 100 ppm: (APF = 25) Any powered, air-purifying respirator with cartridge(s) providing protection against the compound of concern/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus. Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus			
Exposure Routes - inhalation, skin and/or eye contact			
Symptoms - Irritation eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation; dizziness, headache, lassitude (weakness, exhaustion), irritability, insomnia; gastrointestinal disturbance; liquid: frostbite			
Target Organs - Eyes, respiratory system, central nervous system			

Uses: Hydrogen Sulfide - H₂S - is used in metallurgy for the preparation of metallic sulfides. It is also used in the preparation of phosphors, oil additives, and as an analytical reagent in chemical analysis. It is in metals separation, removal of metallic impurities and for reaction with numerous functional organic compounds.

Chapter 22

Cain's Pipeline & Industrial Services, LLC.

Incident Investigation and Reporting Policy

Policy Statement

Cain's Pipeline & Industrial Services, LLC. is committed to investigating all accidents/incidents. ***Brent Messina*** is responsible for ensuring that the Incident Investigation and Reporting policy is followed.

Cain's Pipeline & Industrial Services, LLC. will investigate all lost-time injuries. Fatalities and catastrophes must be reported to OSHA within 8 hours. Serious accidents must be reported to OSHA within 24 hours. OSHA requires reporting of work related incidents resulting in the death of an employee or the hospitalization of three or more employees. Owner clients require all incidents to be reported including, but not limited to, injuries, spills, property damage, fires, explosions, and vehicle damage.

Accidents and near miss incidents that result in personal injury, property damage, chemical spill, or other emergency situations will be immediately reported to the assigned supervisor at the time of the event and Emergency Medical Service, Fire Department, or Hazmat Services will be immediately summoned. Such events will be investigated and documented on the appropriate Company form. All forms will be fully completed and submitted to *Brent Messina* for review and for discussion at the next scheduled Safety Committee meeting. These investigations demonstrate the company's commitment to providing a safe and healthful work environment. Disciplinary Policy will be enforced.

To ensure that accidents will be reported, employees must be encouraged to participate in the "fact-finding" process. The point emphasized must be that "hazardous conditions" and "unsafe practices" are an indication of a much bigger problem with a breakdown in the safety and health policy. The purpose of the accident investigation then becomes one that will uncover these system problems and provide solutions that will result in long term corrective action.

It is important to gather facts and interview witnesses as soon as possible after an accident to ensure the most accurate information is being recorded. The efficiency of the corrective measures is determined by the accuracy of the information gathered. The best place to conduct an interview is wherever the employee being interviewed feels most comfortable. The most important interviewing technique you can use to ensure accuracy is to "listen".

Note: Consider the event a "serious accident" if an employee is admitted to a hospital for treatment or observation as a result of injuries suffered from a workplace accident.

Accident/Incident Causes

Accidents occur when hazards escape detection during preventive measures, such as a job or process safety assessment, when hazards are not obvious, or as the result of combinations of circumstances that were difficult to foresee. A thorough accident investigation may identify previously overlooked physical, environmental, or process hazards, the need for new or more extensive safety training, or unsafe work practices.

The primary focus of any accident investigation should be the determination of the facts surrounding the incident and the lessons that can be learned to prevent future similar occurrences. The focus of the investigation should NEVER be to place blame. The process should be positive and thought of as an opportunity for improvement.

When Accident/Incident Investigations are Required

As a general rule, investigations should be conducted for:

- All injuries (even the very minor ones).
- All accidents with potential for injury.
- Fires, explosions, Spills
- Property and/or product damage situations.
- All "Near Misses" where there was potential for serious injury.

Near miss and incident reporting and investigation allow you to identify and control hazards before they cause a more serious incident. Accident/incident investigations are a tool for uncovering hazards that either were missed earlier or hazards where controls were defeated. However, it is important to remember that the investigation is only useful when its objective is to identify root causes. In other words, every contributing factor to the incident must be uncovered and recommendations made to prevent recurrence.

Accident/Incident Investigation Plan

When a serious accident occurs in the workplace, everyone will be too busy dealing with the emergency at hand to worry about putting together an investigation plan, so the best time to develop effective accident investigation procedures is before the accident occurs.

The plan should include procedures that determine:

- Who should be notified of accident?
- Who is authorized to notify outside agencies? (fire, police, etc.)
- Who is assigned to conduct investigations?
- Training required for accident investigators:
- Who receives and acts on investigation reports?
- Timetables for conducting hazard correction.

Reporting Requirements

Local reporting sequence of events

For Injuries

- If a fatal injury, illness, or hospitalization of three (3) or more employees occurs, the plant manager will immediately notify the following persons and agency:
- Corporate Environmental Health and Safety (EHS) Director
- Division Manager (or any superior in this level)
- Group Manager or Team Leader (or any superior in this level)
- The area OSHA office (must be notified within 8 hours)

Involving the Environment

- If an environmental incident occurs that is required to be reported to local, state and/or federal agencies, the following persons should be notified:
- Corporate EHS Director
- Division Manager (or any superior in this level)
- Group Manager or Team Leader (or any superior in this level)
- Appropriate local, state and/or federal agency
- Time elements of when incident should be reported
- *Cain's Pipeline & Industrial Services, LLC.* is required to verbally report incidents to OSHA within 8 hours of discovery.
- Incidents must be reported to owner client as soon as possible (or within 24 hours).

Reportable Incidents

- injury, illness, death, hospitalization of employees
- spills, property damage, fires, explosions, vehicle damage

Secure the Accident/Incident Scene

For a serious accident, the first action the accident team needs to take is to secure the accident scene so material evidence is not moved or removed. Material evidence has a tendency to walk off after an accident. If the accident is quite serious, OSHA may inspect and require that all material evidence be marked and remain at the scene of the accident.

On site first response

Employees who could be first responders should be trained and qualified in first aid techniques to control the degree of loss during the immediate post-incident phase.

Prevent further loss.

After an immediate rescue, *Cain's Pipeline & Industrial Services, LLC.* will take actions to prevent further loss: for example:

Maintenance personnel should be summoned to assess integrity of building and equipment, engineering personnel to evaluate the need for bracing of structures, and special equipment/response requirements such as safe rendering of hazardous materials or explosives employed.

Gather Information

The next step is to gather useful information about what directly and indirectly contributed to the accident.

The proper equipment will be available to assist in conducting an investigation: Writing equipment such as paper, pens, pens, measuring equipment, cameras, small tools, audio recorder, PPE, marking devices such as flags, equipments manuals, etc.

The following tools should be used to gather as much information as possible:

- Locate witnesses, ensuring unbiased testimony, & obtain appropriate interviewing location
- To ensure detailed interviews, interviewers must be trained
- Interview eye witnesses as soon as possible after the accident. Interview witnesses separately, never as a group. Statements must be collected.
- Interview other interested persons such as supervisors, co-workers, etc.
- Follow-up interviews with all witnesses.
- Review related records such as:
 - Training records
 - Disciplinary records
 - Medical records (as allowed)
 - Maintenance records
 - OSHA 300 Log (past similar injuries)
 - Safety Committee records
- Document the scene with photographs, videotape, or sketches AND appropriate measurements.

Evidence

Initial Identification of evidence immediately following the incident will include a listing of People, equipment, and materials involved and a recording of factors such as weather, illumination temperature, noise, ventilation, Etc.

Cain's Pipeline & Industrial Services, LLC. must keep a collection of evidence, and ensure that it is preserved and secure. Evidence such as people, positions of equipment, parts, and papers must be preserved , secured, and collected through, notes, photographs, witness statements, flagging, and impounding of documents and equipment.

Develop a Sequence of Events

Use the information gathered to develop a detailed step by step description of the accident. Make sure the accident is documented in enough detail to enable an individual unfamiliar with the situation to envision the sequence of events. Do not just describe the accident itself; include a description of events that led up to the accident.

Analyze the Accident/Incident

The next step is to determine the cause(s) of the accident. This is the most difficult step because first the events must be analyzed to discover surface cause(s) for the accident, and then, by asking "why" a number of times, the related root causes are uncovered. Remember, surface causes are usually pretty obvious and not too difficult to determine. However, it may take a great deal more time to accurately determine the weaknesses in the management system, or root causes, that contributed to the conditions and practices associated with the accident.

More on surface causes:

The surface causes of accidents are those hazardous conditions and individual unsafe employee/manager behaviors that have directly caused or contributed in some way to the accident.

Hazardous conditions may exist in any of the following categories:

- Materials
- Machinery
- Equipment
- Tools
- Chemicals
- Environment
- Workstations
- Facilities
- People
- Workload

It is important to know that most hazardous conditions in the workplace are the result of unsafe behaviors that produced them. Individual unsafe behaviors may occur at any level of the organization.

Some example of unsafe employee/manager behaviors include:

- Failing to comply with rules
- Using unsafe methods
- Taking shortcuts
- Horseplay
- Failing to report injuries
- Failing to report hazards
- Allowing unsafe behaviors
- Failing to train
- Failing to supervise
- Failing to correct
- Scheduling too much work
- Ignoring worker stress

More on root causes:

The root causes for accidents are the underlying system weaknesses that have somehow contributed to the existence of hazardous conditions and unsafe behaviors that represent surface causes of accidents. Root causes always pre-exist surface causes. Inadequately designed system components have the potential to feed and nurture hazardous conditions and unsafe behaviors. If root causes are left unchecked, surface causes will flourish!

Root causes may be separated into two categories:

System design weaknesses — Missing or inadequately designed policies, programs, plans, processes, and procedures will affect conditions and practices generally throughout the workplace. Defects in system design represent hazardous system conditions.

System implementation weaknesses — Failures to initiate, carry out, or accomplish safety policies, programs, plans, processes, and procedures. Defects in implementation represent ineffective management behavior.

System Design Weaknesses

- Missing or inadequate safety policies/rules
- Training program not in place
- Poorly written plans
- Inadequate process
- No procedures in place
- Develop Preventive Actions

System Implementation Weaknesses

- Safety policies/rules are not being enforced
- Safety training is not being conducted
- Adequate supervision is not conducted
- Incident/Accident analysis is inconsistent
- Lockout/Tagout procedures are not reviewed annually

Corrective Actions

This is the most important piece of any investigation. All of the work done to this point culminates with recommendations to prevent similar accidents from happening in the future. Recommendations should relate directly to the surface and root causes of the accident.

These recommendations should include recommended actions such as:

- Assigned responsibilities relative to the corrective actions.
- Actions should be tracked to closure.
- Engineering controls (for example, local exhaust ventilation or use of a lift assisting device).
- Work practice controls (for example, pre-plan work, and remove jewelry and loose fitting clothing before operating machinery).
- Administrative controls (e.g., standard operating procedures or worker rotation).
- Personal protective equipment (for example, safety glasses or respirators).

It is crucial that, after making recommendations to eliminate or reduce the surface causes, that the same procedure is used to recommend actions to correct the root causes. If root causes are not corrected, it is only a matter of time before a similar accident occurs.

Roles and Responsibilities

Brent Messina is responsible for:

- implementing this procedure in their area of responsibility and accountability
- ensuring that appropriate staff receive suitable training to carry out their role in hazard and incident reporting, investigation and recording;
- completing the online learning program for Incident Investigation
- promptly reporting and investigating incidents in their area of responsibility and accountability
- completing and forwarding incident report forms as soon as practicable and within designated time lines using approved forms for incident reporting
- implementing identified risk control measures to prevent recurrence of incidents
- consulting with staff in relation to the measures to be taken to prevent recurrence of incidents
- reviewing hazard/incident reports for their area to ensure that all recommendations are implemented
- ensuring, as far as is reasonably practicable, that adequate financial provision and other resources are made available to institute the recommended actions

Staff is responsible for:

- not placing themselves or others at risk of injury
- reporting incidents to their supervisor or manager, and health and safety representative (if applicable), as soon as possible after the event
- participating in the development of appropriate risk control measures to prevent recurrence of similar incidents
- using risk control measures as required and any other action taken, which is designed to protect health and safety.

Health and Safety Representatives (HSR) are encouraged to participate in investigations of incidents and assist with the development of measures to prevent recurrence of

- Personnel must be trained in their roles and responsibilities for incident response and incident investigation techniques.
- Training requirements relative to incident investigation and reporting(Awareness, First Responder, investigation, and training frequency) should be identified in this program.

Written Incident report

- Written incident reports should be prepared and include an incident report form and a detailed narrative statement concerning the event. The format of the narrative may include an introduction, methodology, summary of the incident, investigation board members names, narrative of the event, findings, and recommendations. Photographs, witness statements, drawings, etc. should be included

Documentation and Communications of lessons learned

Lessons learned should be reviewed and communicated. Changes to processes must be placed into effect to prevent reoccurrences or similar events.

Summary

A successful accident investigation determines not only what happened, but also finds how and why the accident occurred. Investigations are crucial as an effort to prevent a similar or perhaps more disastrous sequence of events. Research has shown that a typical accident is the result of many related and unrelated factors that somehow all come together at the same time. It is estimated that there are usually more than ten factors that contribute to a serious accident. Although, this combination of factors normally makes an investigation very time consuming and resource intensive, the good news is that the accident can normally be prevented by removing only a few of the contributing factors.

Notes:

This image shows a full page of white paper with horizontal dashed lines, typical of primary school handwriting practice paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

EMPLOYEE INCIDENT REPORT

Work site: _____

Manager/Supervisor: _____

Employee name _____ Date _____

Job title _____

Incident:

Action taken:

CODE OF CONDUCT

- Proactive management includes Supervisory leadership and control to change unproductive activities. Conformance with safety policies, rules, and regulations is a necessary component of our Safety Program.
- Employee safety responsibilities are communicated during initial orientation. Safety rules and regulations are reviewed with employees by their supervisors and are part of the documented Employee Safety Training Process.
- Supervisors understand and enforce safety rules as a part of their job. This process may involve coaching, counseling, verbal, or written reprimands, and discipline in the form of suspension and/or termination. When appropriate, documented verbal warnings and reprimands are issued and carried out by supervisors.
- Failure to adhere to any of the Safety Rules and Safe Work Practices will result in disciplinary action. All discipline will be documented in the employee's folder. Discipline may be more severe depending on the offense.

Signature: _____ Date: _____

Employee

Signature: _____ Date: _____

Supervisor

ACCIDENT / INCIDENT REPORT

Cain's Pipeline & Industrial Services, LLC.

PAGE 1

Date of Accident	Time	Day of Week ☐ S ☐ M ☐ T ☐ W ☐ T ☐ F ☐ S		Shift ☐ 1 ☐ 2 ☐ 3	Department
INJURED PERSON					
Name:		Address:			
Age:	Phone:				
Job Title:		Supervisor Name:			
Length of Employment at Company:		Length of Employment at Job:			
Employee Classification: ☐ Full Time ☐ Part Time ☐ Contract ☐ Temporary					
Nature of Injury	☐ Bruising	☐ Dislocation	☐ Other (specify)	Injured Body Part :	
☐ Strain/Sprain	☐ Scratch/Abrasion	☐ Internal			
☐ Fracture	☐ Amputation	☐ Foreign Body	Remarks:		
☐ Laceration/Cut	☐ Burn/Scald	☐ Chemical Reaction			
Treatment	Name and Address of Treating Physician or Facility:				
☐ First Aid					
☐ Emergency Room					
☐ Dr.'s Office					
☐ Hospitalization					
DAMAGED PROPERTY					
Property, Equipment, or Material Damaged		Describe Damage			
Object or Substance Inflicting Damage:					
INCIDENT DESCRIPTION					
Describe what happened (attach photographs or diagrams if necessary)					
ROOT CAUSE ANALYSIS (Check All that Apply)					
Unsafe Acts	Unsafe Conditions	Management Deficiencies			
☐ Improper work technique	☐ Poor workstation design/layout	☐ Lack of written policies & procedures			
☐ Safety rule violation	☐ Congested work area	☐ Safety rules not enforced			
☐ Improper PPE or PPE not used	☐ Hazardous substances	☐ Hazards not identified			
☐ Operating without authority	☐ Fire or explosion hazard	☐ PPE unavailable			
☐ Failure to warn or secure	☐ Inadequate ventilation	☐ Insufficient worker training			
☐ Operating at improper speeds	☐ Improper material storage	☐ Insufficient supervisor training			
☐ By-passing safety devices	☐ Improper tool or equipment	☐ Improper maintenance			
☐ Guards not used	☐ Insufficient knowledge of job	☐ Inadequate supervision			
☐ Improper loading or placement	☐ Slippery conditions	☐ Inadequate job planning			
☐ Improper lifting	☐ Poor housekeeping	☐ Inadequate hiring practices			
☐ Servicing machinery in motion	☐ Excessive noise	☐ Inadequate workplace inspection			
☐ Horseplay	☐ Inadequate hazards guarding	☐ Inadequate equipment			
☐ Drug or alcohol use	☐ Defective tools/equipment	☐ Unsafe design or construction			
☐ Unnecessary haste	☐ Insufficient lighting	☐ Unrealistic scheduling			
☐ Unsafe act of others	☐ Inadequate fall protection	☐ Poor process design			
☐ Other:	☐ Other:	☐ Other:			

ACCIDENT / INCIDENT REPORT

ACCIDENT/INCIDENT ANALYSIS

Using the root cause analysis list on the previous page, explain the cause(s) of the incident in as much detail as possible.

Make sketches or illustrations to help describe incident:

How bad could the accident have been?

☐ Very Serious ☐ Serious ☐ Minor

What is the chance of the accident happening again?

☐ Frequent ☐ Occasional ☐ Rare

PREVENTIVE ACTIONS

Describe actions that will be taken to prevent recurrence:

Deadline

By Whom

Complete

INVESTIGATION TEAM

Name

Signature

Position

Chapter 23

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Ladders and Stairways

Cain's Pipeline & Industrial Services, LLC. has adopted this safety program for Ladders and Stairways from the following OSHA regulations:

§1926.1050 – Ladders and Stairways

Cain's Pipeline & Industrial Services, LLC. has implemented this policy to ensure that no employee is exposed to hazards caused by improper or unsafe use of ladders and/or stairways. *Cain's Pipeline & Industrial Services, LLC.* will provide a training program for each employee using ladders and stairways. The program will enable each employee to recognize hazards related to ladders and stairways and will train each employee in the procedures to be followed to minimize these hazards. ***Brent Messina*** is the supervisor responsible for ensuring the following training and safe work practices are enforced:

- *Brent Messina* will ensure that each employee has been trained by a competent person in the following areas, as applicable:
 - The nature of fall hazards in the work area.
 - The correct procedures for erecting, maintaining, and disassembling the fall protection systems to be used.
 - The proper construction, use, placement, and care in handling of all stairways and ladders.
 - The maximum intended load-carrying capacities of ladders.
 - The standards contained in §1926.1050 – Ladders and Stairways.
- Retraining will be provided for each employee as necessary so that the employee maintains the understanding and knowledge acquired through previous training required for OSHA compliance.

Brent Messina will ensure the following requirements are adhered to concerning the use of all ladders:

- When portable ladders are used for access to an upper landing surface, the ladder side rails will extend at least 3 feet above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder will be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grabrail, will be provided to assist employees in mounting and dismounting the ladder. In no case will the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.
- Ladders will be maintained free of oil, grease, and other slipping hazards.
- Ladder rungs, cleats, and steps will be parallel, level, and uniformly spaced when the ladder is in position for use.
- Ladders will not be loaded beyond the maximum intended load for which they were built or beyond their manufacturer's rated capacity.

- Ladders will be used only for the purpose for which they were designed.
 - Non-self-supporting ladders will be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support).
 - Wood job-made ladders with spliced side rails will be used at an angle such that the horizontal distance is one-eighth the working length of the ladder.
 - Fixed ladders will be used at a pitch no greater than 90 degrees from the horizontal, as measured to the back side of the ladder.
- Ladders will be used only on stable and level surfaces unless secured to prevent accidental displacement.
- Ladders will not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet will not be used as a substitute for care in placing, lashing, or holding a ladder that is used upon slippery surfaces, including flat metal or concrete surfaces that are constructed so they cannot be prevented from becoming slippery.
- Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways, or driveways, will be secured to prevent accidental displacement, or a barricade will be used to keep the activities or traffic away from the ladder.
- The area around the top and bottom of ladders will be kept clear.
- The top of a non-self-supporting ladder will be placed with the two rails supported equally unless it is equipped with a single support attachment.
- Ladders will not be moved, shifted, or extended while occupied.
- Ladders will have nonconductive side-rails if they are used where the employee or the ladder could contact exposed energized electrical equipment.
- The top or top step of a stepladder will not be used as a step.
- Cross-bracing on the rear section of stepladders will not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.
- Ladders will be inspected by a competent person for visible defects on a periodic basis and after any occurrence that could affect their safe use.
- Portable ladders with structural defects, such as broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty or defective components, will either be immediately marked in a manner that readily identifies them as defective, or be tagged with **"DO NOT USE"** or similar language, and will be withdrawn from service until repaired.
- Fixed ladders with structural defects, such as broken or missing rungs, cleats, or steps, broken or split rails, or corroded components, will be withdrawn from service until repaired. The defective ladder will be withdrawn from service in the following manner:
 - Immediately tagged with "Do Not Use" or similar language.
 - Marked in a method that readily identifies it as defective.
 - Blocked from further use, such as with a plywood attachment that spans several rungs.
- Before damaged or defective ladder may be returned to service, repairs will be made that restore the ladder to its original design specifications.

- Single-rail ladders will not be used.
- When ascending or descending a ladder, the user will face the ladder.
- Each employee will use at least one hand to grasp the ladder when progressing up and/or down the ladder.
- An employee will not carry any object or load that could cause the employee to lose balance and fall.

Brent Messina will ensure the following requirements are applied to all stairways:

- Stairways that will not be a permanent part of the structure on which construction work is being performed will have landings of not less than 30 inches in the direction of travel and extend at least 22 inches in width at every 12 feet or less of vertical rise.
- Stairs will be installed between 30 deg. and 50 deg. from horizontal.
- Riser height and tread depth will be uniform within each flight of stairs, including any foundation structure used as one or more treads of the stairs. Variations in riser height or tread depth will not be over ¼-inch in any stairway system.
- Where doors or gates open directly on a stairway, a platform will be provided, and the swing of the door will not reduce the effective width of the platform to less than 20 inches.
- Metal pan landings and metal pan treads, when used, will be secured in place before filling with concrete or other material.
- All parts of stairways will be free of hazardous projections, such as protruding nails.
- Slippery conditions on stairways will be eliminated before the stairways are used to reach other levels.
- Except during stairway construction, foot traffic is prohibited on stairways with pan stairs where the treads and/or landings are to be filled in with concrete or other material at a later date, unless the stairs are temporarily fitted with wood or other solid material at least to the top edge of each pan. Such temporary treads and landings will be replaced when worn below the level of the top edge of the pan.
- Except during stairway construction, foot traffic is prohibited on skeleton metal stairs where permanent treads and/or landings are to be installed at a later date, unless the stairs are fitted with secured temporary treads and landings long enough to cover the entire tread and/or landing area.
- Treads for temporary service will be made of wood or other solid material, and will be installed the full width and depth of the stair.
- Stairways having four or more risers or rising more than 30 inches, whichever is less, will be equipped with:
 - At least one handrail.
 - One stairrail system along each unprotected side or edge.
- Winding and spiral stairways will be equipped with a handrail offset sufficiently to prevent walking on those portions of the stairways where the tread width is less than 6 inches.
- The height of stairrails will be as follows will be not less than 36 inches from the upper surface of the stairrail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread.

- Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members, will be provided between the top rail of the stairrail system and the stairway steps.
 - Midrails will be located at a height midway between the top edge of the stairrail system and the stairway steps.
 - Screens or mesh will extend from the top rail to the stairway step, and along the entire opening between top rail supports.
 - When intermediate vertical members, such as balusters, are used between posts, they will be not more than 19 inches apart.
 - Other structural members will be installed such that there are no openings in the stairrail system that are more than 19 inches wide.
- Handrails and the top rails of stairrail systems will be capable of withstanding, without failure, a force of at least 200 pounds applied within 2 inches of the top edge, in any downward or outward direction, at any point along the top edge.
- The height of handrails will be not more than 37 inches or less than 30 inches from the upper surface of the handrail to the surface of the tread.
- When the top edge of a stairrail system also serves as a handrail, the height of the top edge will be not more than 37 inches or less than 36 inches.
- Stairrail systems and handrails will be so surfaced as to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.
- Handrails will provide an adequate handhold for employees grasping them to avoid falling.
- The ends of stairrail systems and handrails will be constructed so as not to constitute a projection hazard.
- Handrails that will not be a permanent part of the structure being built will have a minimum clearance of 3 inches between the handrail and walls, stairrail systems, and other objects.
- Unprotected sides and edges of stairway landings will be provided with guardrail systems.

§1926.1050 – Ladders and Stairways

Scope, application, and definitions applicable to this subpart

(a) Scope and application. This subpart applies to all stairways and ladders used in construction, alteration repair (including painting and decorating), and demolition workplaces covered under 29 CFR part 1926, and also sets forth, in specified circumstances, when ladders and stairways are required to be provided. Additional requirements for ladders used on or with scaffolds are contained in Subpart L - Scaffolds.

(b) Definitions. See definitions at the end of this section.

§1926.1051 – General requirements

(a) A stairway or ladder shall be provided at all personnel points of access where there is a break in elevation of 19 inches (48 cm) or more, and no ramp, runway, sloped embankment, or personnel hoist is provided.

(1) Employees shall not use any spiral stairways that will not be a permanent part of the structure on which construction work is being performed.

(2) A double-cleated ladder or two or more separate ladders shall be provided when ladders are the only mean of access or exit from a working area for 25 or more employees, or when a ladder is to serve simultaneous two-way traffic.

(3) When a building or structure has only one point of access between levels, that point of access shall be kept clear to permit free passage of employees. When work must be performed or equipment must be used such that free passage at that point of access is restricted, a second point of access shall be provided and used.

(4) When a building or structure has two or more points of access between levels, at least one point of access shall be kept clear to permit free passage of employees.

(b) Employers shall provide and install all stairway and ladder fall protection systems required by this subpart and shall comply with all other pertinent requirements of this subpart before employees begin the work that necessitates the installation and use of stairways, ladders, and their respective fall protection systems.

§1926.1052 – Stairways

(a) General. The following requirements apply to all stairways as indicated:

(1) Stairways that will not be a permanent part of the structure on which construction work is being performed shall have landings of not less than 30 inches (76 cm) in the direction of travel and extend at least 22 inches (56 cm) in width at every 12 feet (3.7 m) or less of vertical rise.

(2) Stairs shall be installed between 30 deg. and 50 deg. from horizontal.

(3) Riser height and tread depth shall be uniform within each flight of stairs, including any foundation structure used as one or more treads of the stairs. Variations in riser height or tread depth shall not be over 1/4-inch (0.6 cm) in any stairway system.

(4) Where doors or gates open directly on a stairway, a platform shall be provided, and the swing of the door shall not reduce the effective width of the platform to less than 20 inches (51 cm).

(5) Metal pan landings and metal pan treads, when used, shall be secured in place before filling with concrete or other material.

(6) All parts of stairways shall be free of hazardous projections, such as protruding nails.

(7) Slippery conditions on stairways shall be eliminated before the stairways are used to reach other levels.

(b) Temporary service. The following requirements apply to all stairways as indicated:

(1) Except during stairway construction, foot traffic is prohibited on stairways with pan stairs where the treads and/or landings are to be filled in with concrete or other material at a later date, unless the stairs are temporarily fitted with wood or other solid material at least to the top edge of each pan. Such temporary treads and landings shall be replaced when worn below the level of the top edge of the pan.

(2) Except during stairway construction, foot traffic is prohibited on skeleton metal stairs where permanent treads and/or landings are to be installed at a later date, unless the stairs are fitted with secured temporary treads and landings long enough to cover the entire tread and/or landing area.

(3) Treads for temporary service shall be made of wood or other solid material, and shall be installed the full width and depth of the stair.

- (c) Stairrails and handrails. The following requirements apply to all stairways as indicated:
- (1) Stairways having four or more risers or rising more than 30 inches (76 cm), whichever is less, shall be equipped with:
 - (i) At least one handrail; and
 - (ii) One stairrail system along each unprotected side or edge.

Note: When the top edge of a stairrail system also serves as a handrail, paragraph (c)(7) of this section applies.
 - (2) Winding and spiral stairways shall be equipped with a handrail offset sufficiently to prevent walking on those portions of the stairways where the tread width is less than 6 inches (15 cm).
 - (3) The height of stairrails shall be as follows:
 - (i) Stairrails installed after March 15, 1991, shall be not less than 36 inches (91.5 cm) from the upper surface of the stairrail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread.
 - (ii) Stairrails installed before March 15, 1991, shall be not less than 30 inches (76 cm) nor more than 34 inches (86 cm) from the upper surface of the stairrail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread.
 - (4) Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members, shall be provided between the top rail of the stairrail system and the stairway steps.
 - (i) Midrails, when used, shall be located at a height midway between the top edge of the stairrail system and the stairway steps.
 - (ii) Screens or mesh, when used, shall extend from the top rail to the stairway step, and along the entire opening between top rail supports.
 - (iii) When intermediate vertical members, such as balusters, are used between posts, they shall be not more than 19 inches (48 cm) apart.
 - (iv) Other structural members, when used, shall be installed such that there are no openings in the stairrail system that are more than 19 inches (48 cm) wide.
 - (5) Handrails and the top rails of stairrail systems shall be capable of withstanding, without failure, a force of at least 200 pounds (890 n) applied within 2 inches (5 cm) of the top edge, in any downward or outward direction, at any point along the top edge.
 - (6) The height of handrails shall be not more than 37 inches (94 cm) nor less than 30 inches (76 cm) from the upper surface of the handrail to the surface of the tread, in line with the face of the riser at the forward edge of the tread.
 - (7) When the top edge of a stairrail system also serves as a handrail, the height of the top edge shall be not more than 37 inches (94 cm) nor less than 36 inches (91.5 cm) from the upper surface of the stairrail system to the surface of the tread, in line with the face of the riser at the forward edge of the tread.
 - (8) Stairrail systems and handrails shall be so surfaced as to prevent injury to employees from punctures or lacerations, and to prevent snagging of clothing.
 - (9) Handrails shall provide an adequate handhold for employees grasping them to avoid falling.
 - (10) The ends of stairrail systems and handrails shall be constructed so as not to constitute a projection hazard.
 - (11) Handrails that will not be a permanent part of the structure being built shall have a minimum clearance of 3 inches (8 cm) between the handrail and walls, stairrail systems, and other objects.
 - (12) Unprotected sides and edges of stairway landings shall be provided with guardrail systems. Guardrail system criteria are contained in Subpart M of this part.

§1926.1053 – Ladders

- (a) General. The following requirements apply to all ladders as indicated, including job-made ladders.
- (1) Ladders shall be capable of supporting the following loads without failure:
 - (i) Each self-supporting portable ladder: At least four times the maximum intended load, except that each extra-heavy-duty type 1A metal or plastic ladder shall sustain at least 3.3 times the maximum intended load. The ability of a ladder to sustain the loads indicated in this paragraph shall be determined by applying or transmitting the requisite load to the ladder in a downward vertical direction. Ladders built and tested in conformance with the applicable provisions of Appendix A of this subpart will be deemed to meet this requirement.
 - (ii) Each portable ladder that is not self-supporting: At least four times the maximum intended load, except that each extra-heavy-duty type 1A metal or plastic ladders shall sustain at least 3.3 times the maximum intended load. The ability of a ladder to sustain the loads indicated in this paragraph shall be determined by applying or transmitting the requisite load to the ladder in a downward vertical direction when the ladder is placed at an angle of 75 1/2 degrees from the horizontal. Ladders built and tested in conformance with the applicable provisions of Appendix A will be deemed to meet this requirement.
 - (iii) Each fixed ladder: At least two loads of 250 pounds (114 kg) each, concentrated between any two consecutive attachments (the number and position of additional concentrated loads of 250 pounds (114 kg) each, determined from anticipated usage of the ladder, shall also be included), plus anticipated loads caused by ice buildup, winds, rigging, and impact loads resulting from the use of ladder safety devices. Each step or rung shall be capable of supporting a single concentrated load of a least 250 pounds (114 kg) applied in the middle of the step or rung. Ladders built in conformance with the applicable provisions of Appendix A will be deemed to meet this requirement.
 - (2) Ladder rungs, cleats, and steps shall be parallel, level, and uniformly spaced when the ladder is in position for use.
 - (3)
 - (i) Rungs, cleats, and steps of portable ladders (except as provided below) and fixed ladders (including individual-rung/step ladders) shall be spaced not less than 10 inches (25 cm) apart, nor more than 14 inches (36 cm) apart, as measured between center lines of the rungs, cleats and steps.
 - (ii) Rungs, cleats, and steps of step stools shall be not less than 8 inches (20 cm) apart, nor more than 12 inches (31 cm) apart, as measured between center lines of the rungs, cleats, and steps.
 - (iii) Rungs, cleats, and steps of the base section of extension trestle ladders shall be not less than 8 inches (20 cm) nor more than 18 inches (46 cm) apart, as measured between center lines of the rungs, cleats, and steps. The rung spacing on the extension section of the extension trestle ladder shall be not less than 6 inches (15 cm) nor more than 12 inches (31 cm), as measured between center lines of the rungs, cleats, and steps.
 - (4)
 - (i) The minimum clear distance between the sides of individual-rung/step ladders and the minimum clear distance between the side rails of other fixed ladders shall be 16 inches (41 cm).
 - (ii) The minimum clear distance between side rails for all portable ladders shall be 11 1/2 inches (29 cm).
 - (5) The rungs of individual-rung/step ladders shall be shaped such that employees' feet cannot slide off the end of the rungs.
 - (6)
 - (i) The rungs and steps of fixed metal ladders manufactured after March 15, 1991, shall be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize slipping.
 - (ii) The rungs and steps of portable metal ladders shall be corrugated, knurled, dimpled, coated with skid-resistant material, or otherwise treated to minimize slipping.
 - (7) Ladders shall not be tied or fastened together to provide longer sections unless they are specifically designed for such use.
 - (8) A metal spreader or locking device shall be provided on each stepladder to hold the front and back sections in an open position when the ladder is being used.
 - (9) When splicing is required to obtain a given length of side rail, the resulting side rail must be at least equivalent in strength to a one-piece side rail made of the same material.
 - (10) Except when portable ladders are used to gain access to fixed ladders (such as those on utility towers, billboards, and other structures where the bottom of the fixed ladder is elevated to limit access), when two or more separate ladders are used to reach an elevated work area, the ladders shall be offset with a platform or landing between the ladders. (The requirements to have guardrail systems with toeboards for falling object and overhead protection on platforms and landings are set forth in Subpart M of this part.)
 - (11) Ladder components shall be surfaced so as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing.

- (12) Wood ladders shall not be coated with any opaque covering, except for identification or warning labels which may be placed on one face only of a side rail.
- (13) The minimum perpendicular clearance between fixed ladder rungs, cleats, and steps, and any obstruction behind the ladder shall be 7 inches (18 cm), except in the case of an elevator pit ladder for which a minimum perpendicular clearance of 4 1/2 inches (11 cm) is required.
- (14) The minimum perpendicular clearance between the center line of fixed ladder rungs, cleats, and steps, and any obstruction on the climbing side of the ladder shall be 30 inches (76 cm), except as provided in paragraph (a)(15) of this section.
- (15) When unavoidable obstructions are encountered, the minimum perpendicular clearance between the centerline of fixed ladder rungs, cleats, and steps, and the obstruction on the climbing side of the ladder may be reduced to 24 inches (61 cm), provided that a deflection device is installed to guide employees around the obstruction.
- (16) Through fixed ladders at their point of access/egress shall have a step-across distance of not less than 7 inches (18 cm) nor more than 12 inches (30 cm) as measured from the centerline of the steps or rungs to the nearest edge of the landing area. If the normal step-across distance exceeds 12 inches (30 cm), a landing platform shall be provided to reduce the distance to the specified limit.
- (17) Fixed ladders without cages or wells shall have a clear width to the nearest permanent object of at least 15 inches (30 cm) on each side of the centerline of the ladder.
- (18) Fixed ladders shall be provided with cages, wells, ladder safety devices, or self-retracting lifelines where the length of climb is less than 24 feet (7.3 m) but the top of the ladder is at a distance greater than 24 feet (7.3 m) above lower levels.
- (19) Where the total length of a climb equals or exceeds 24 feet (7.3 m), fixed ladders shall be equipped with one of the following:
- (i) Ladder safety devices; or
 - (ii) Self-retracting lifelines, and rest platforms at intervals not to exceed 150 feet (45.7 m); or
 - (iii) A cage or well, and multiple ladder sections, each ladder section not to exceed 50 feet (15.2 m) in length. Ladder sections shall be offset from adjacent sections, and landing platforms shall be provided at maximum intervals of 50 feet (15.2 m).
- (20) Cages for fixed ladders shall conform to all of the following:
- (i) Horizontal bands shall be fastened to the side rails of rail ladders, or directly to the structure, building, or equipment for individual-rung ladders;
 - (ii) Vertical bars shall be on the inside of the horizontal bands and shall be fastened to them;
 - (iii) Cages shall extend not less than 27 inches (66 cm), or more than 30 inches (76 cm) from the centerline of the step or rung (excluding the flare at the bottom of the cage), and shall not be less than 27 inches (68 cm) in width;
 - (iv) The inside of the cage shall be clear of projections;
 - (v) Horizontal bands shall be spaced not more than 4 feet (1.2 m) on center vertically;
 - (vi) Vertical bars shall be spaced at intervals not more than 9 1/2 inches (24 cm) on center horizontally;
 - (vii) The bottom of the cage shall be at a level not less than 7 feet (2.1 m) nor more than 8 feet (2.4 m) above the point of access to the bottom of the ladder. The bottom of the cage shall be flared not less than 4 inches (10 cm) all around within the distance between the bottom horizontal band and the next higher band;
 - (viii) The top of the cage shall be a minimum of 42 inches (1.1 m) above the top of the platform, or the point of access at the top of the ladder, with provision for access to the platform or other point of access.
- (21) Wells for fixed ladders shall conform to all of the following:
- (i) They shall completely encircle the ladder;
 - (ii) They shall be free of projections;
 - (iii) Their inside face on the climbing side of the ladder shall extend not less than 27 inches (68 cm) nor more than 30 inches (76 cm) from the centerline of the step or rung;
 - (iv) The inside clear width shall be at least 30 inches (76 cm);
 - (v) The bottom of the wall on the access side shall start at a level not less than 7 feet (2.1 m) nor more than 8 feet (2.4 m) above the point of access to the bottom of the ladder.
- (22) Ladder safety devices, and related support systems, for fixed ladders shall conform to all of the following:
- (i) They shall be capable of withstanding without failure a drop test consisting of an 18-inch (41 cm) drop of a 500-pound (226 kg) weight;

- (ii) They shall permit the employee using the device to ascend or descend without continually having to hold, push, or pull any part of the device, leaving both hands free for climbing;
- (iii) They shall be activated within 2 feet (.61 m) after a fall occurs, and limit the descending velocity of an employee to 7 feet/sec. (2.1 m/sec.) or less;
- (iv) The connection between the carrier or lifeline and the point of attachment to the body belt or harness shall not exceed 9 inches (23 cm) in length.

(23) The mounting of ladder safety devices for fixed ladders shall conform to the following:

- (i) Mountings for rigid carriers shall be attached at each end of the carrier, with intermediate mountings, as necessary, spaced along the entire length of the carrier, to provide the strength necessary to stop employees' falls;
- (ii) Mountings for flexible carriers shall be attached at each end of the carrier. When the system is exposed to wind, cable guides for flexible carriers shall be installed at a minimum spacing of 25 feet (7.6 m) and maximum spacing of 40 feet (12.2 m) along the entire length of the carrier, to prevent wind damage to the system.
- (iii) The design and installation of mountings and cable guides shall not reduce the design strength of the ladder.

(24) The side rails of through or side-step fixed ladders shall extend 42 inches (1.1 m) above the top of the access level or landing platform served by the ladder. For a parapet is continuous, the access level shall be the top of the parapet.

(25) For through-fixed-ladder extensions, the steps or rungs shall be omitted from the extension and the extension of the side rails shall be flared to provide not less than 24 inches (61 cm) nor more than 30 inches (76 cm) clearance between side rails. Where ladder safety devices are provided, the maximum clearance between side rails of the extensions shall not exceed 36 inches (91 cm).

(26) For side-step fixed ladders, the side rails and the steps or rungs shall be continuous in the extension.

(27) Individual-rung/step ladders, except those used where their access openings are covered with manhole covers or hatches, shall extend at least 42 inches (1.1 m) above an access level or landing platform either by the continuation of the rung spacings as horizontal grab bars or by providing vertical grab bars that shall have the same lateral spacing as the vertical legs of the rungs.

(b) Use. The following requirements apply to the use of all ladders, including job-made ladders, except as otherwise indicated:

(1) When portable ladders are used for access to an upper landing surface, the ladder side rails shall extend at least 3 feet (.9 m) above the upper landing surface to which the ladder is used to gain access; or, when such an extension is not possible because of the ladder's length, then the ladder shall be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grabrail, shall be provided to assist employees in mounting and dismounting the ladder. In no case shall the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.

(2) Ladders shall be maintained free of oil, grease, and other slipping hazards.

(3) Ladders shall not be loaded beyond the maximum intended load for which they were built, nor beyond their manufacturer's rated capacity.

(4) Ladders shall be used only for the purpose for which they were designed.

(5) (i) Non-self-supporting ladders shall be used at an angle such that the horizontal distance from the top support to the foot of the ladder is approximately one-quarter of the working length of the ladder (the distance along the ladder between the foot and the top support).

(ii) Wood job-made ladders with spliced side rails shall be used at an angle such that the horizontal distance is one-eighth the working length of the ladder.

(iii) Fixed ladders shall be used at a pitch no greater than 90 degrees from the horizontal, as measured to the back side of the ladder.

(6) Ladders shall be used only on stable and level surfaces unless secured to prevent accidental displacement.

- (7) Ladders shall not be used on slippery surfaces unless secured or provided with slip-resistant feet to prevent accidental displacement. Slip-resistant feet shall not be used as a substitute for care in placing, lashing, or holding a ladder that is used upon slippery surfaces including, but not limited to, flat metal or concrete surfaces that are constructed so they cannot be prevented from becoming slippery.
- (8) Ladders placed in any location where they can be displaced by workplace activities or traffic, such as in passageways, doorways, or driveways, shall be secured to prevent accidental displacement, or a barricade shall be used to keep the activities or traffic away from the ladder.
- (9) The area around the top and bottom of ladders shall be kept clear.
- (10) The top of a non-self-supporting ladder shall be placed with the two rails supported equally unless it is equipped with a single support attachment.
- (11) Ladders shall not be moved, shifted, or extended while occupied.
- (12) Ladders shall have nonconductive siderails if they are used where the employee or the ladder could contact exposed energized electrical equipment, except as provided in 1926.951(c)(1) of this part.
- (13) The top or top step of a stepladder shall not be used as a step.
- (14) Cross-bracing on the rear section of stepladders shall not be used for climbing unless the ladders are designed and provided with steps for climbing on both front and rear sections.
- (15) Ladders shall be inspected by a competent person for visible defects on a periodic basis and after any occurrence that could affect their safe use.
- (16) Portable ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, corroded components, or other faulty or defective components, shall either be immediately marked in a manner that readily identifies them as defective, or be tagged with "Do Not Use" or similar language, and shall be withdrawn from service until repaired.
- (17) Fixed ladders with structural defects, such as, but not limited to, broken or missing rungs, cleats, or steps, broken or split rails, or corroded components, shall be withdrawn from service until repaired. The requirement to withdraw a defective ladder from service is satisfied if the ladder is either:
- (i) Immediately tagged with "Do Not Use" or similar language;
 - (ii) Marked in a manner that readily identifies it as defective;
 - (iii) Or blocked (such as with a plywood attachment that spans several rungs).
- (18) Ladder repairs shall restore the ladder to a condition meeting its original design criteria, before the ladder is returned to use.
- (19) Single-rail ladders shall not be used.
- (20) When ascending or descending a ladder, the user shall face the ladder.
- (21) Each employee shall use at least one hand to grasp the ladder when progressing up and/or down the ladder.
- (22) An employee shall not carry any object or load that could cause the employee to lose balance and fall.

§1926.1060 – Training requirements

The following training provisions clarify the requirements of §1926.21(b)(2), regarding the hazards addressed in Subpart X.

- (a) The employer shall provide a training program for each employee using ladders and stairways, as necessary. The program shall enable each employee to recognize hazards related to ladders and stairways, and shall train each employee in the procedures to be followed to minimize these hazards.
- (1) The employer shall ensure that each employee has been trained by a competent person in the following areas, as applicable:
- (i) The nature of fall hazards in the work area;
 - (ii) The correct procedures for erecting, maintaining, and disassembling the fall protection systems to be used;
 - (iii) The proper construction, use, placement, and care in handling of all stairways and ladders;
 - (iv) The maximum intended load-carrying capacities of ladders; and
 - (v) The standards contained in this subpart.
- (b) Retaining shall be provided for each employee as necessary so that the employee maintains the understanding and knowledge acquired through compliance with this section.

Definitions

Cleat means a ladder crosspiece of rectangular cross section placed on edge upon which a person may step while ascending or descending a ladder.

Double-cleat ladder means a ladder similar in construction to a single-cleat ladder, but with a center rail to allow simultaneous two-way traffic for employees ascending or descending.

Equivalent means alternative designs, materials, or methods that the employer can demonstrate will provide an equal or greater degree of safety for employees than the method or item specified in the standard.

Extension trestle ladder means a self-supporting portable ladder, adjustable in length consisting of a trestle ladder base and a vertically adjustable extension section, with a suitable means for locking the ladders together.

Failure means load refusal, breakage or separation of component parts. Load refusal is the point where the structural members lose their ability to carry the loads.

Fixed-ladder means a ladder that cannot be readily moved or carried because it is an integral part of a building or structure. A side-step fixed ladder is a fixed ladder that requires a person getting off at the top to step to the side of the ladder side rails to reach the landing. A through fixed ladder is a fixed ladder that requires a person getting off at the top to step between the side rails of the ladder to reach the landing.

Handrail means a rail used to provide employees with a handhold for support.

Individual-rung/step ladders means ladders without a side rail or center rail support. Such ladders are made by mounting individual steps or rungs directly to the side or wall of the structure.

Job-made ladder means a ladder that is fabricated by employees, typically at the construction site, and is not commercially manufactured. This definition does not apply to any individual-rung/step ladders.

Ladder stand. A mobile fixed size self-supporting ladder consisting of a wide flat tread ladder in the form of stairs. The assembly may include handrails.

Lower levels means those areas to which an employee can fall from a stairway or ladder. Such areas include ground levels, floors, roofs, ramps, runways, excavations, pits, tanks, material, water, equipment, and similar surfaces. It does not include the surface from which the employee falls.

Maximum intended load means the total load of all employees, equipment, tools, materials, transmitted loads, and other loads anticipated to be applied to a ladder component at any one time.

Nosing means that portion of a tread projecting beyond the face of the riser immediately below.

Point of access means all areas used by employees for work related passage from one area or level to another. Such open areas include doorways, passageways, stairway openings, studded walls, and various other permanent or temporary openings used for such travel.

Portable ladder means a ladder that can be readily moved or carried.

Riser height means the vertical distance from the top of a tread to the top of the next higher tread or platform/landing or the distance from the top of a platform/landing to the top of the next higher tread or platform/landing.

Single-cleat ladder means a ladder consisting of a pair of side rails, connected together by cleats, rungs, or steps.

Single-rail ladder means a portable ladder with rungs, cleats, or steps mounted on a single rail instead of the normal two rails used on most other ladders.

Spiral stairway means a series of steps attached to a vertical pole and progressing upward in a winding fashion within a cylindrical space.

Stairrail system means a vertical barrier erected along the unprotected sides and edges of a stairway to prevent employees from falling to lower levels. The top surface of a stairrail system may also be a "handrail."

Step stool (ladder type) means a self-supporting, foldable, portable ladder, nonadjustable in length, 32 inches or less in overall size, with flat steps and without a pail shelf, designed to be climbed on the ladder top cap as well as all steps. The side rails may continue above the top cap.

Tread depth means the horizontal distance from front to back of a tread (excluding nosing, if any).

Unprotected sides and edges means any side or edge (except at entrances to points of access) of a stairway where there is no stairrail system or wall 36 inches (.9 m) or more in height, and any side or edge (except at entrances to points of access) of a stairway landing, or ladder platform where there is no wall or guardrail system 39 inches (1 m) or more in height.

Notes:

Handwriting practice lines consisting of 20 sets of three horizontal lines (top, middle dashed, bottom).

Chapter 24

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Toxic and Hazardous Materials

Lead

Cain's Pipeline & Industrial Services, LLC. has adopted this policy for the prevention of employee exposure to hazardous levels of Lead substances in accordance with the following OSHA regulations:

§1910.1025 – Lead

Cain's Pipeline & Industrial Services, LLC. has implemented this policy to ensure that no employee is exposed to lead at levels in excess of Permissible Exposure Limits (PEL), which for lead will be 50 micrograms per cubic meter ($50\mu\text{g}/\text{m}^3$) at 8 hour Time Weighted Average (TWA). If exposures are above the "Action Level", engineering controls, work practices, or PPE will be required to reduce exposure levels. Action Level means employee exposure, without regard to the use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air ($30\mu\text{g}/\text{m}^3$) averaged over an 8-hour period.

Brent Messina is the assigned supervisor responsible for ensuring the following administrative controls, engineering controls, and work practices are enforced:

- *Brent Messina* will provide information and training for each employee who has potential exposure to Lead that includes the following required elements:
 - Provides a training program for, and assures the participation of, all employees who are subject to exposure to lead at or above the action level or for whom the possibility of skin or eye irritation exists.
 - Provide initial training prior to the time of initial job assignment.
 - The training program will be repeated annually for each employee.
 - Employee will be informed of Appendices A and B of the Lead Regulation.
 - All affected employees are required to attend training programs.
 - Employees will be informed of the specific nature of the operations which could result in exposure to lead above the action level.
 - Employees will be informed of the purpose, proper selection, fitting, use, and limitations of respirators.
 - Employees will be informed of the engineering controls being used.
 - The employees will be informed of the purpose and a description of the Medical Surveillance Program and the Medical Removal Program.
 - There could be adverse effects on reproductive systems.
- *Brent Messina* will make readily available to all affected employees, a copy of the OSHA Lead standard and its appendices.
- Exposure monitoring will be conducted to determine if any employee may be exposed to lead at or above the action level. Employee exposure is that exposure which would occur if the employee were not using a respirator.

- Personal monitoring will be conducted to collect Industrial Hygiene measurements necessary to determine employee exposure.
- *Brent Messina* will collect full shift (for at least 7 continuous hours) personal samples including at least one sample for each shift, for each job classification, in each work area. Full shift personal samples will represent the monitored employee's regular, daily exposure to lead.
- *Brent Messina* will determine if any employee may be exposed to lead at or above the action level and will monitor employee exposures and base initial determinations on the monitoring results including:
 - Any information, observations, or calculations which would indicate employee exposure to lead.
 - Any previous measurements of airborne lead.
 - Any employee complaints of symptoms which may be attributable to exposure to lead.
- If the initial determination or subsequent monitoring reveals employee exposure to be at or above the action level but below the Permissible Exposure Limit, the monitoring will be repeated at least every 6 months.
- If the initial monitoring reveals that employee exposure is above the permissible exposure limit, the monitoring will be repeated quarterly.
- Additional monitoring will be done whenever there has been a production, process, control, or personnel change that may result in new or additional exposure to lead.
- Each affected employee will be notified in writing within 5 working days after the receipt of monitoring results.
- Whenever the results indicate that employee exposure exceeds the PEL, *Brent Messina* will include in the written notice a statement that the PEL was exceeded and a description of the corrective action taken or to be taken to reduce exposure to or below the PEL.
- *Cain's Pipeline & Industrial Services, LLC.* will use a method of monitoring and analysis which has an accuracy (to a confidence level of 95%) of not less than plus or minus 20 percent for airborne concentrations of lead equal to or greater than 30 $\mu\text{g}/\text{m}^3$.
- Where any employee is exposed to lead above the PEL for more than 30 days per year, *Cain's Pipeline & Industrial Services, LLC.* will implement engineering and work practice controls (including administrative controls) to reduce employee exposure to lead. If such controls are not feasible, *Cain's Pipeline & Industrial Services, LLC.* will demonstrate and document the reasons.
- Wherever the engineering and work practice controls which can be instituted are not sufficient to reduce employee exposure to or below the PEL, *Cain's Pipeline & Industrial Services, LLC.* will continue to use them to reduce exposures to the lowest feasible level and will supplement them by the use of respiratory protection.
- *Cain's Pipeline & Industrial Services, LLC.* will provide a written Site-specific Compliance Program to reduce exposures to or below the PEL, and interim levels if applicable, solely by means of engineering and work practice controls. Written plans will include at least the following:

- A description of each operation in which lead is emitted; e.g. machinery used, material processed, controls in place, crew size, employee job responsibilities, operating procedures and maintenance practices.
- A description of the specific means that will be employed to achieve compliance, including engineering plans and studies used to determine methods selected for controlling exposure to lead.
- A report of the technology considered in meeting the PEL.
- Air monitoring data which documents the source of lead emissions.
- A work practice program which includes items required.
- The Site-specific Compliance Program will be available at the worksite for examination and copying by any affected employee or OSHA. Program will be revised and updated at least every 6 months to reflect the current status.
- When ventilation is used to control exposure, measurements which demonstrate the effectiveness, such as capture velocity, duct velocity, or static pressure shall be made at least every 3 months. Measurements will be made within 5 days of any change in production, process, or control which might result in a change in employee exposure to lead.
- If air from exhaust ventilation is recirculated into the workplace, *Brent Messina* will assure that:
 - The system has a high efficiency filters with reliable back-up filters.
 - Controls to monitor the concentration of lead in the return air and to bypass the recirculation system automatically if it fails are installed, operating, and maintained.
- When administrative controls are used as a means of reducing employees TWA exposure to lead, *Cain's Pipeline & Industrial Services, LLC.* will establish and implement a job rotation schedule which includes:
 - Name or identification number of each affected employee;
 - Duration and exposure levels at each job or workstation where each affected employee is located.
 - Any other information that may be useful in assessing the reliability of administrative controls to reduce exposure to lead.
- The Respiratory Protection Program and respiratory protective equipment is provided for all employees with potential for exposure to lead. All respiratory equipment will be NIOSH certified, and is provided without cost to the employee. Respirators will be used during:
 - Periods necessary to install or implement engineering or work-practice controls.
 - Work operations for which engineering and work-practice controls are not sufficient to reduce employee exposures to or below the PEL.
 - Periods when an employee requests a respirator.

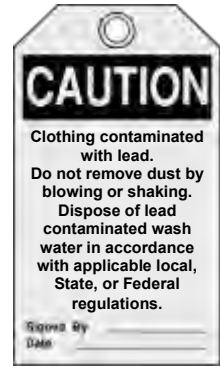
- *Cain's Pipeline & Industrial Services, LLC.* provides a Respiratory Protection Program in accordance with §1910.134. If an employee has breathing difficulty during fit testing or respirator use, the employee will be provided with a medical examination to determine whether the employee can use a respirator while performing the required duty.

Table II - Respiratory Protection for Lead Aerosols	
Airborne concentration of lead or condition of use	Required respirator <u>3</u>
Not in excess of 0.5 mg/m ³ (10 x PEL)	Half-mask, air-purifying respirator equipped with high efficiency filters. <u>2,3</u>
Not in excess of 2.5 mg/m ³ (50 x PEL)	Full facepiece, air-purifying respirator with high efficiency filters. <u>3</u>
Not in excess of 50 mg/m ³ (1000 x PEL)	(1) Any powered, air-purifying respirator with high efficiency filters; <u>3</u> or
	(2) Half-mask supplied-air respirator operated in positive-pressure mode. <u>2</u>
Not in excess of 100 mg/m ³ (2000 x PEL)	Supplied-air respirators with full facepiece, hood, helmet, or suit, operated in positive pressure mode.
Greater than 100 mg/m ³ , unknown concentration or firefighting	Full facepiece, self-contained breathing apparatus operated in positive-pressure mode.

- 1 Respirators specified for high concentrations can be used at lower concentrations of lead.
2 Full facepiece is required if the lead aerosols cause eye or skin irritation at the use of concentrations.
3 A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron size particles.

- The appropriate respirator or combination of respirators will be selected from Table II. An employee may choose a NIOSH-certified powered, air purifying respirators (PAPR) at no extra cost to the employee. The respirator will be used during the time-period necessary to install or implement engineering or work practice controls.
- Protective work clothing and equipment will be provided at no cost to employees exposed to lead above the PEL. Employees will be required to use appropriate protective work clothing and equipment such as, but not limited to:
 - Coveralls or similar full-body work clothing.
 - Gloves, hats, and shoes or disposable shoe coverlets.
 - Face shields, vented goggles, or other appropriate PPE.
- *Cain's Pipeline & Industrial Services, LLC.* will provide the protective clothing in a clean and dry condition at least weekly, and daily to employees whose exposure levels are over 200 µg/m³ of lead as an 8-hour TWA, as well as:
 - Provide for the cleaning, laundering, or disposal of protective clothing and equipment as required.
 - Repair or replace required protective clothing and equipment as needed to maintain their effectiveness.
 - Ensure that all protective clothing is removed at the completion of a work shift only in change rooms provided for that purpose as prescribed.
 - Ensure that contaminated protective clothing which is to be cleaned, laundered, or disposed of, is placed in a closed container in the change-room which prevents dispersion of lead outside the container.
 - Inform in writing any person who cleans or launders protective clothing or equipment of the potentially harmful effects of exposure to lead.

- Ensure that the containers of contaminated protective clothing and equipment are labeled in a manner such as:
- Prohibit the removal of lead from protective clothing or equipment by blowing, shaking, or any other means that disperses lead into the air.
- Housekeeping methods will be such that all surfaces in the workplace will be maintained as free as practicable of accumulations of lead, in a manner that minimizes the reentry of lead into the workplace.
- *Cain's Pipeline & Industrial Services, LLC.* will provide decontamination, changing, and hygiene facilities for employees.
- *Brent Messina* will ensure that food or beverage is not consumed, tobacco not used, or cosmetics not applied except in change rooms, lunchrooms, and showers. Where employee airborne exposure to lead is above the PEL, *Cain's Pipeline & Industrial Services, LLC.* will provide:
 - Clean change rooms that are equipped with separate storage facilities for protective work clothing and equipment and for street clothes that prevent cross-contamination.
 - Shower facilities at the end of the work shift for employees who are required to shower and ensure employees do not leave the workplace wearing any clothing or equipment worn during the work shift.
 - Lunchroom facilities that have a temperature controlled, positive pressure, filtered air supply, and are readily accessible to employees. Employees are prohibited from entering lunchroom facilities with protective work clothing or equipment unless surface lead dust has been removed by vacuuming, down draft booth, or other cleaning method.
 - An adequate number of lavatory facilities. Employees are required to wash their hands and face before eating, drinking, or smoking.
- *Cain's Pipeline & Industrial Services, LLC.* will provide a medical surveillance program, without cost to employees and at a reasonable time and place, for all employees who are or may be exposed above the action level for more than 30 days per year. All medical examinations and procedures are performed by or under the supervision of a licensed physician.
- Biological monitoring is available according to the following schedule:
 - Blood sampling and analysis for lead and zinc protoporphyrin levels to each employee at least every 6 months.
 - At least every two months for each employee whose last blood sampling and analysis indicated a blood lead level at or above 40 µg/100 g of whole blood. This frequency will continue until two consecutive blood samples and analyses indicate a blood lead level below 40 µg/100 g of whole blood.
 - At least monthly during the removal period of each employee removed from exposure to lead due to an elevated blood lead level.



- Follow-up blood sampling tests will be provided whenever the results of a blood lead level test indicate that an employee's blood lead level exceeds the levels for medical removal. This follow-up will be provided within two weeks after receiving the results of the first blood-sampling test.
- Accuracy of blood lead level sampling and analysis shall have an accuracy (to a confidence level of 95 percent) within plus or minus 15 percent or 6 µg/100 ml, whichever is greater, and shall be conducted by a laboratory licensed by the Center for Disease Control, United States Department of Health, Education and Welfare (CDC) or which has received a satisfactory grade in blood lead proficiency testing from CDC in the prior twelve months.
- Each employee whose blood lead level exceeds 40 µg/100 g will be notified in writing within five working days after the receipt of biological monitoring results.
- Medical examinations and consultations are available to affected employees on the following schedule:
 - At least annually for each employee for whom a blood sampling test conducted at any time during the preceding 12 months indicated a blood lead level at or above 40 µg/100 g.
 - Prior to assignment for each employee being assigned for the first time to an area in which airborne concentrations of lead are at or above the action level.
 - As soon as possible, upon notification by an employee either that the employee has developed signs or symptoms commonly associated with lead intoxication, that the employee desires medical advice concerning the effects of current or past exposure to lead on the employee's ability to procreate a healthy child, or that the employee has demonstrated difficulty in breathing during a respirator fitting test or during use.
 - As medically appropriate for each employee, either removed from exposure to lead due to a risk of sustaining material impairment to health, or otherwise limited pursuant to a final medical determination.
- *Cain's Pipeline & Industrial Services, LLC.* will provide Medical Removal Protection benefits to any employee subject to Temporary Medical Removal.
- The following warning sign will be posted in and around each regulated work area where the PEL is exceeded:
 - Signs will be illuminated and cleaned as necessary so that the legend is readily visible.
- *Cain's Pipeline & Industrial Services, LLC.* will maintain an accurate record of all monitoring. This record shall include:
 - The date(s), number, duration, location, and results of each of the samples taken, including a description of the sampling procedure used to determine exposure.
 - A description of the sampling and analytical methods used and evidence of their accuracy.
 - Name, social security number, and job classification of the employee monitored and of all other employees whose exposure the measurement is intended to represent.



- The type of respiratory protection worn, if any.
 - These monitoring records will be maintained for at least 40 years or for the duration of employment plus 20 years, whichever is longer.
- *Cain's Pipeline & Industrial Services, LLC.* will maintain an accurate record for each employee subject to medical surveillance. This record shall include:
 - The name, social security number, and description of the duties of the employee.
 - A copy of the physician's written opinions.
 - Results of any airborne exposure monitoring done for that employee and the representative exposure levels supplied to the physician.
 - Any employee medical complaints related to exposure to lead.
- *Cain's Pipeline & Industrial Services, LLC.* will keep, or assure that the examining physician keeps, a copy of the medical examination results, including medical and work history; a description of the laboratory procedures; a copy of the results of biological monitoring. These medical records will be maintained for at least 40 years, or for the duration of employment plus 20 years, whichever is longer.
- *Cain's Pipeline & Industrial Services, LLC.* will maintain an accurate record for each employee removed from current exposure to lead. Each record shall include:
 - The name and social security number of the employee.
 - The date on each occasion that the employee was removed from current exposure to lead as well as the corresponding date on which the employee was returned to his or her former job status.
 - A brief explanation of how each removal was or is being accomplished.
 - A statement with respect to each removal indicating whether or not the reason for the removal was an elevated blood lead level.
 - Medical removal records will be maintained for at least the duration of an employee's employment.
- Environmental monitoring, medical removal, and medical records will be provided upon request to employees, designated representatives, and OSHA.
- All containers or materials containing lead will be appropriately labeled to indicate the contents and the hazards of the contents.
- MSDS for Lead and all hazardous materials are available to all employees at the company office.

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(b) See Definitions at the end of this section.

(c) **Permissible exposure limit (PEL).**

(1) The employer shall assure that no employee is exposed to lead at concentrations greater than fifty micrograms per cubic meter of air (50 µg/m³) averaged over an 8-hour period.

(d) **Exposure monitoring.**

(1) **General.**

(i) For the purposes of paragraph (d), employee exposure is that exposure which would occur if the employee were not using a respirator.

(ii) With the exception of monitoring under paragraph (d)(3), the employer shall collect full shift (for at least 7 continuous hours) personal samples including at least one sample for each shift for each job classification in each work area.

(iii) Full shift personal samples shall be representative of the monitored employee's regular, daily exposure to lead.

(2) **Initial determination.** Each employer who has a workplace or work operation covered by this standard shall determine if any employee may be exposed to lead at or above the action level.

(6) **Frequency.**

(i) If the initial monitoring reveals employee exposure to be below the action level the measurements need not be repeated except as otherwise provided in paragraph (d)(7) of this section.

(ii) If the initial determination or subsequent monitoring reveals employee exposure to be at or above the action level but below the permissible exposure limit the employer shall repeat monitoring in accordance with this paragraph at least every 6 months.

The employer shall continue monitoring at the required frequency until at least two consecutive measurements, taken at least 7 days apart, are below the action level at which time the employer may discontinue monitoring for that employee except as otherwise provided in paragraph (d)(7) of this section.

(iii) If the initial monitoring reveals that employee exposure is above the permissible exposure limit the employer shall repeat monitoring quarterly. The employer shall continue monitoring at the required frequency until at least two consecutive measurements, taken at least 7 days apart, are below the PEL but at or above the action level at which time the employer shall repeat monitoring for that employee at the frequency specified in paragraph (d)(6)(ii), except as otherwise provided in paragraph (d)(7) of this section.

(7) **Additional monitoring.** 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 exposures to lead, additional monitoring in accordance with this paragraph shall be conducted.

(8) **Employee notification.**

(i) Within 5 working days after the receipt of monitoring results, the employer shall notify each employee in writing of the results which represent that employee's exposure.

(ii) Whenever the results indicate that the representative employee exposure, without regard to respirators, exceeds the permissible exposure limit, the employer shall include in the written notice a statement that the permissible exposure limit was exceeded and a description of the corrective action taken or to be taken to reduce exposure to or below the permissible exposure limit.

(9) **Accuracy of measurement.** The employer shall use a method of monitoring and analysis which has an accuracy (to a confidence level of 95%) of not less than plus or minus 20 percent for airborne concentrations of lead equal to or greater than 30 µg/m³.

(e) **Methods of compliance.**

(1) **Engineering and work practice controls.**

(i) Where any employee is exposed to lead above the permissible exposure limit for more than 30 days per year, the employer shall implement engineering and work practice controls (including administrative controls) to reduce and maintain employee exposure to lead in accordance with the implementation schedule in Table I below, except to the extent that the employer can demonstrate that such controls are not feasible.

Wherever the engineering and work practice controls which can be instituted are not sufficient to reduce employee exposure to or below the permissible exposure limit, the employer shall nonetheless use them to reduce exposures to the lowest feasible level and shall supplement them by the use of respiratory protection which complies with the requirements of paragraph (f) of this section.

(ii) Where any employee is exposed to lead above the permissible exposure limit, but for 30 days or less per year, the employer shall implement engineering controls to reduce exposures to 200 µg/m³, but thereafter may implement any combination of engineering, work practice (including administrative controls), and respiratory controls to reduce and maintain employee exposure to lead to or below 50 µg/m³.

TABLE I – IMPLEMENTATION SCHEDULE	
Industry	Compliance Dates (50 µg/m ³) ¹
Lead chemicals, secondary copper smelting	July 19, 1996
Nonferrous foundries	July 19, 1996 ²
Brass and bronze ingot manufacture	6 years ³

¹ Calculated by counting from the date the Stay on implementation of paragraph (e)(1) was lifted by the U.S. Court of Appeals for the District of Columbia, the number of years specified in the 1978 lead standard and subsequent amendments for compliance with the PEL of 50 µg/m³ for exposure to airborne concentrations.

² Large nonferrous foundries (20 or more employees) are required to achieve the PEL of 50 µg/m³ by means of engineering and work practice controls. Small nonferrous foundries (fewer than 20 employees) are required to achieve an 8-hour TWA of 75 µg/m³ by such controls.

³ Expressed as the number of years from the date on which the Court lifts the stay on the implementation of paragraph (e)(1) for this industry for employers to achieve a lead in air concentration of 75 µg/m³. Compliance with paragraph (e) in this industry is determined by a compliance directive that incorporates elements from the settlement agreement between OSHA and representatives of the industry.

(2) **Respiratory protection.** Where engineering and work practice controls do not reduce employee exposure to or below the 50 µg/m³ permissible exposure limit, the employer shall supplement these controls with respirators in accordance with paragraph (f).

(3) **Compliance program.**

(i) Each employer shall establish and implement a written compliance program to reduce exposures to or below the permissible exposure limit, and interim levels if applicable, solely by means of engineering and work practice controls in accordance with the implementation schedule in paragraph (e)(1).

(ii) Written plans for these compliance programs shall include at least the following:

- (A) A description of each operation in which lead is emitted; e.g. machinery used, material processed, controls in place, crew size, employee job responsibilities, operating procedures and maintenance practices;
- (B) A description of the specific means that will be employed to achieve compliance, including engineering plans and studies used to determine methods selected for controlling exposure to lead;
- (C) A report of the technology considered in meeting the permissible exposure limit;
- (D) Air monitoring data which documents the source of lead emissions;
- (E) A detailed schedule for implementation of the program, including documentation such as copies of purchase orders for equipment, construction contracts, etc.;
- (F) A work practice program which includes items required under paragraphs (g), (h) and (i) of this regulation;
- (G) An administrative control schedule required by paragraph (e)(6), if applicable;
- (H) Other relevant information.

(iii) Written programs shall be submitted upon request to the Assistant Secretary and the Director, and shall be available at the worksite for examination and copying by the Assistant Secretary, Director, any affected employee or authorized employee representatives.

(iv) Written programs shall be revised and updated at least every 6 months to reflect the current status of the program.

(4) Mechanical ventilation.

(i) When ventilation is used to control exposure, measurements which demonstrate the effectiveness of the system in controlling exposure, such as capture velocity, duct velocity, or static pressure shall be made at least every 3 months. Measurements of the system's effectiveness in controlling exposure shall be made within 5 days of any change in production, process, or control which might result in a change in employee exposure to lead.

(ii) **Recirculation of air.** If air from exhaust ventilation is recirculated into the workplace, the employer shall assure that:

(A) The system has a high efficiency filter with reliable back-up filter; and

(B) Controls to monitor the concentration of lead in the return air and to bypass the recirculation system automatically if it fails are installed, operating, and maintained.

(5) **Administrative controls.** If administrative controls are used as a means of reducing employees TWA exposure to lead, the employer shall establish and implement a job rotation schedule which includes:

(i) Name or identification number of each affected employee;

(ii) Duration and exposure levels at each job or work station where each affected employee is located;

(iii) Any other information which may be useful in assessing the reliability of administrative controls to reduce exposure to lead.

(f) Respiratory protection.

(1) **General.** For employees who use respirators required by this section, the employer must provide respirators that comply with the requirements of this paragraph. Respirators must be used during:

(i) Periods necessary to install or implement engineering or work-practice controls.

(ii) Work operations for which engineering and work-practice controls are not sufficient to reduce employee exposures to or below the permissible exposure limit;

(iii) Periods when an employee requests a respirator.

(2) Respirator program.

(i) The employer must implement a respiratory protection program in accordance with 29 CFR 1910.134(b) through (d) (except (d)(1)(iii)), and (f) through (m).

(ii) If an employee has breathing difficulty during fit testing or respirator use, the employer must provide the employee with a medical examination in accordance with paragraph (j)(3)(i)(C) of this section to determine whether or not the employee can use a respirator while performing the required duty.

TABLE II – RESPIRATORY PROTECTION FOR LEAD AEROSOLS	
Airborne concentration of lead or condition of use	Required respirator ¹
Not in excess of 0.5 mg/m ³ (10 X PEL)	Half-mask, air-purifying respirator equipped with high efficiency filters. ^{2,3}
Not in excess of 2.5 mg/m ³ (50 X PEL)	Full facepiece, air-purifying respirator with high efficiency filters. ³
Not in excess of 50 mg/m ³ (1000 X PEL)	(1) Any powered, air-purifying respirator with high efficiency filters; ³ or (2) Half-mask supplied-air respirator operated in positive-pressure mode. ²
Not in excess of 100 mg/m ³ (2000 X PEL)	Supplied-air respirators with full facepiece, hood, helmet, or suit, operated in positive-pressure mode.
Greater than 100 mg/m ³ , unknown concentration or fire fighting	Full facepiece, self-contained breathing apparatus operated in positive-pressure mode.

¹ Respirators specified for high concentrations can be used at lower concentrations of lead.
² Full facepiece is required if the lead aerosols cause eye or skin irritation at the use concentrations.
³ A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron size particles.

(3) Respirator selection.

(i) The employer must select the appropriate respirator or combination of respirators from Table II of this section.

(ii) The employer must provide a powered air-purifying respirator instead of the respirator specified in Table II of this section when an employee chooses to use this type of respirator and such a respirator provides adequate protection to the employee.

(g) Protective work clothing and equipment.

(1) Provision and use. If an employee is exposed to lead above the PEL, without regard to the use of respirators or where the possibility of skin or eye irritation exists, the employer shall provide at no cost to the employee and assure that the employee uses appropriate protective work clothing and equipment such as, but not limited to:

- (i) Coveralls or similar full-body work clothing;**
- (ii) Gloves, hats, and shoes or disposable shoe coverlets; and**
- (iii) Face shields, vented goggles, or other appropriate protective equipment which complies with §1910.133 of this Part.**

(2) Cleaning and replacement.

(i) The employer shall provide the protective clothing required in paragraph (g)(1) of this section in a clean and dry condition at least weekly, and daily to employees whose exposure levels without regard to a respirator are over 200 µg/m³ of lead as an 8-hour TWA.

(ii) The employer shall provide for the cleaning, laundering, or disposal of protective clothing and equipment required by paragraph (g)(1) of this section.

(iii) The employer shall repair or replace required protective clothing and equipment as needed to maintain their effectiveness.

(iv) The employer shall assure that all protective clothing is removed at the completion of a work shift only in change rooms provided for that purpose as prescribed in paragraph (i)(2) of this section.

(v) The employer shall assure that contaminated protective clothing which is to be cleaned, laundered, or disposed of, is placed in a closed container in the change room which prevents dispersion of lead outside the container.

(vi) The employer shall inform in writing any person who cleans or launders protective clothing or equipment of the potentially harmful effects of exposure to lead.

(vii) The employer shall assure that the containers of contaminated protective clothing and equipment required by paragraph (g)(2)(v) are labeled as follows:

CAUTION: CLOTHING CONTAMINATED WITH LEAD.

DO NOT REMOVEDUST BY BLOWING OR SHAKING.

DISPOSE OF LEAD CONTAMINATED WASH WATER IN ACCORDANCE WITH

APPLICABLE LOCAL, STATE, OR FEDERAL REGULATIONS.

(viii) The employer shall prohibit the removal of lead from protective clothing or equipment by blowing, shaking, or any other means which disperses lead into the air.

(h) Housekeeping.

(1) Surfaces. All surfaces shall be maintained as free as practicable of accumulations of lead.

(2) Cleaning floors.

(i) Floors and other surfaces where lead accumulates may not be cleaned by the use of compressed air.

(ii) Shoveling, dry or wet sweeping, and brushing may be used only where vacuuming or other equally effective methods have been tried and found not to be effective.

(3) Vacuuming. Where vacuuming methods are selected, the vacuums shall be used and emptied in a manner which minimizes the reentry of lead into the workplace.

(i) Hygiene facilities and practices.

(1) The employer shall assure that in areas where employees are exposed to lead above the PEL, without regard to the use of respirators, food or beverage is not present or consumed, tobacco products are not present or used, and cosmetics are not applied, except in change rooms, lunchrooms, and showers required under paragraphs (i)(2) through (i)(4) of this section.

(2) Change rooms.

(i) The employer shall provide clean change rooms for employees who work in areas where their airborne exposure to lead is above the PEL, without regard to the use of respirators.

(ii) The employer shall assure that change rooms are equipped with separate storage facilities for protective work clothing and equipment and for street clothes which prevent cross-contamination.

(3) Showers.

(i) The employer shall assure that employees who work in areas where their airborne exposure to lead is above the PEL, without regard to the use of respirators, shower at the end of the work shift.

(ii) The employer shall provide shower facilities in accordance with §1910.141(d)(3) of this part.

(iii) The employer shall assure that employees who are required to shower pursuant to paragraph (i)(3)(i) do not leave the workplace wearing any clothing or equipment worn during the work shift.

(4) Lunchrooms.

- (i) The employer shall provide lunchroom facilities for employees who work in areas where their airborne exposure to lead is above the PEL, without regard to the use of respirators.
- (ii) The employer shall assure that lunchroom facilities have a temperature controlled, positive pressure, filtered air supply, and are readily accessible to employees.
- (iii) The employer shall assure that employees who work in areas where their airborne exposure to lead is above the PEL without regard to the use of a respirator wash their hands and face prior to eating, drinking, smoking or applying cosmetics.
- (iv) The employer shall assure that employees do not enter lunchroom facilities with protective work clothing or equipment unless surface lead dust has been removed by vacuuming, downdraft booth, or other cleaning method.

(5) Lavatories. The employer shall provide an adequate number of lavatory facilities which comply with §1910.141(d)(1) and (2) of this part.

(j) Medical surveillance.

(1) General.

- (i) The employer shall institute a medical surveillance program for all employees who are or may be exposed above the action level for more than 30 days per year.
- (ii) The employer shall assure that all medical examinations and procedures are performed by or under the supervision of a licensed physician.
- (iii) The employer shall provide the required medical surveillance including multiple physician review under paragraph (j)(3)(iii) without cost to employees and at a reasonable time and place.

(2) Biological monitoring.

(i) **Blood lead and ZPP level sampling and analysis.** The employer shall make available biological monitoring in the form of blood sampling and analysis for lead and zinc protoporphyrin levels to each employee covered under paragraph (j)(1)(i) of this section on the following schedule:

- (A) At least every 6 months to each employee covered under paragraph (j)(1)(i) of this section;
- (B) At least every two months for each employee whose last blood sampling and analysis indicated a blood lead level at or above 40 µg/100 g of whole blood. This frequency shall continue until two consecutive blood samples and analyses indicate a blood lead level below 40 µg/100 g of whole blood; and
- (C) At least monthly during the removal period of each employee removed from exposure to lead due to an elevated blood lead level.

(iv) **Employee notification.** Within five working days after the receipt of biological monitoring results, the employer shall notify in writing each employee whose blood lead level exceeds 40 µg/100 g:

- (A) of that employee's blood lead level and
- (B) that the standard requires temporary medical removal with Medical Removal Protection benefits when an employee's blood lead level exceeds the numerical criterion for medical removal under paragraph (k)(1)(i) of this section.

(k) Medical Removal Protection.

(1) Temporary medical removal and return of an employee.

(i) Temporary removal due to elevated blood lead levels.

- (A) Third year of the standard, and thereafter. The employer shall remove an employee from work having an exposure to lead at or above the action level on each occasion that a periodic and a follow-up blood sampling test conducted pursuant to this section indicate that the employee's blood lead level is at or above 60 µg/100 g of whole blood; and,
- (B) Fifth year of the standard, and thereafter. The employer shall remove an employee from work having an exposure to lead at or above the action level on each occasion that the average of the last three blood sampling tests conducted pursuant to this section (or the average of all blood sampling tests conducted over the previous six (6) months, whichever is longer) indicates that the employee's blood lead level is at or above 50 µg/100 g of whole blood; provided, however, that an employee need not be removed if the last blood sampling test indicates a blood lead level at or below 40 µg/100 g of whole blood.

(l) Employee information and training.

(1) Training program.

- (i) Each employer who has a workplace in which there is a potential exposure to airborne lead at any level shall inform employees of the content of Appendices A and B of this regulation.

(ii) The employer shall institute a training program for and assure the participation of all employees who are subject to exposure to lead at or above the action level or for whom the possibility of skin or eye irritation exists.

(iii) The employer shall provide initial training by 180 days from the effective date for those employees covered by paragraph (l)(1)(ii) on the standard's effective date and prior to the time of initial job assignment for those employees subsequently covered by this paragraph.

(iv) The training program shall be repeated at least annually for each employee.

(v) The employer shall assure that each employee is informed of the following:

(A) The content of this standard and its appendices;

(B) The specific nature of the operations which could result in exposure to lead above the action level;

(C) The purpose, proper selection, fitting, use, and limitations of respirators;

(D) The purpose and a description of the medical surveillance program, and the medical removal protection 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);

(E) The engineering controls and work practices associated with the employee's job assignment;

(F) The contents of any compliance plan in effect; and

(G) Instructions to employees 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;

(m) Signs.

(1) General.

(i) The employer may use signs required by other statutes, regulations or ordinances in addition to, or in combination with, signs required by this paragraph.

(ii) The employer shall assure that no statement appears on or near any sign required by this paragraph which contradicts or detracts from the meaning of the required sign.

(2) Signs.

(i) **The employer shall post the following warning signs in each work area where the PEL is exceeded:**

**WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING**

(ii) The employer shall assure that signs required by this paragraph are illuminated and cleaned as necessary so that the legend is readily visible.

Definitions

“Action level” means employee exposure, without regard to the use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air (30 µg/m³) averaged over an 8-hour period.

“Assistant Secretary” means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

“Director” means the Director, National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health, Education, and Welfare, or designee.

“Lead” means metallic lead, all inorganic lead compounds, and organic lead soaps. Excluded from this definition are all other organic lead compounds.

The following appendices are relevant information for the safety program and are to be used in conjunction with the previous information and regulations.

APPENDIX A TO §1910.1025
SUBSTANCE DATA SHEET FOR OCCUPATIONAL EXPOSURE TO LEAD

I. SUBSTANCE IDENTIFICATION

A. Substance: Pure lead (Pb) is a heavy metal at room temperature and pressure and is a basic chemical element. It can combine with various other substances to form numerous lead compounds.

B. Compounds Covered by the Standard: The word “lead” when used in this standard means elemental lead, all inorganic lead compounds and a class of organic lead compounds called lead soaps. This standard does not apply to other organic lead compounds.

C. Uses: Exposure to lead occurs in at least 120 different occupations, including primary and secondary lead smelting, lead storage battery manufacturing, lead pigment manufacturing and use, solder manufacturing and use, shipbuilding and ship repairing, auto manufacturing, and printing.

D. Permissible Exposure: The Permissible Exposure Limit (PEL) set by the standard is 50 micrograms of lead per cubic meter of air (50 µg/m³), averaged over an 8-hour workday.

E. Action Level: The standard establishes an action level of 30 micrograms per cubic meter of air (30 µg/m³), time weighted average, based on an 8-hour workday. The action level initiates several requirements of the standard, such as exposure monitoring, medical surveillance, and training and education.

II. HEALTH HAZARD DATA

A. Ways in which lead enters your body. When absorbed into your body in certain doses lead is a toxic substance. The object of the lead standard is to prevent absorption of harmful quantities of lead. The standard is intended to protect you not only from the immediate toxic effects of lead, but also from the serious toxic effects that may not become apparent until years of exposure have passed.

Lead can be absorbed into your body by inhalation (breathing) and ingestion (eating). Lead (except for certain organic lead compounds not covered by the standard, such as tetraethyl lead) is not absorbed through your skin. When lead is scattered in the air as a dust, fume or mist it can be inhaled and absorbed through your lungs and upper respiratory tract. Inhalation of airborne lead is generally the most important source of occupational lead absorption.

You can also absorb lead through your digestive system if lead gets into your mouth and is swallowed. If you handle food, cigarettes, chewing tobacco, or make-up which have lead on them or handle them with hands contaminated with lead, this will contribute to ingestion.

A significant portion of the lead that you inhale or ingest gets into your blood stream. Once in your blood stream, lead is circulated throughout your body and stored in various organs and body tissues. Some of this lead is quickly filtered out of your body and excreted, but some remains in the blood and other tissues. As exposure to lead continues, the amount stored in your body will increase if you are absorbing more lead than your body is excreting. Even though you may not be aware of any immediate symptoms of disease, this lead stored in your tissues can be slowly causing irreversible damage, first to individual cells, then to your organs and whole body systems.

B. Effects of overexposure to lead.

(1) Short term (acute) overexposure. Lead is a potent, systemic poison that serves no known useful function once absorbed by your body. Taken in large enough doses, lead can kill you in a matter of days. A condition affecting the brain called acute encephalopathy may arise which develops quickly to seizures, coma, and death from cardiorespiratory arrest. A short term dose of lead can lead to acute encephalopathy. Short term occupational exposures of this magnitude are highly unusual, but not impossible.

Similar forms of encephalopathy may, however, arise from extended, chronic exposure to lower doses of lead. There is no sharp dividing line between rapidly developing acute effects of lead, and chronic effects which take longer to acquire. Lead adversely affects numerous body systems, and causes forms of health impairment and disease which arise after periods of exposure as short as days or as long as several years.

(2) Long-term (chronic) overexposure. Chronic overexposure to lead may result in severe damage to your blood-forming, nervous, urinary and reproductive systems. Some common symptoms of chronic overexposure include loss of appetite, metallic taste in the mouth, anxiety, constipation, nausea, pallor, excessive tiredness, weakness, insomnia, headache, nervous irritability, muscle and joint pain or soreness, fine tremors, numbness, dizziness, hyperactivity and colic. In lead colic there may be severe abdominal pain.

Damage to the central nervous system in general and the brain (encephalopathy) in particular is one of the most severe forms of lead poisoning. The most severe, often fatal, form of encephalopathy may be preceded by vomiting, a feeling of dullness progressing to drowsiness and stupor, poor memory, restlessness, irritability, tremor, and convulsions. It may arise suddenly with the onset of seizures, followed by coma, and death. There is a tendency for muscular weakness to develop at the same time.

This weakness may progress to paralysis often observed as a characteristic “**wrist drop**” or “**foot drop**” and is a manifestation of a disease to the nervous system called peripheral neuropathy.

Chronic overexposure to lead also results in kidney disease with few, if any, symptoms appearing until extensive and most likely permanent kidney damage has occurred. Routine laboratory tests reveal the presence of this kidney disease only after about two-thirds of kidney function is lost. When overt symptoms of urinary dysfunction arise, it is often too late to correct or prevent worsening conditions, and progression to kidney dialysis or death is possible.

Chronic overexposure to lead impairs the reproductive systems of both men and women. Overexposure to lead may result in decreased sex drive, impotence and sterility in men. Lead can alter the structure of sperm cells raising the risk of birth defects. There is evidence of miscarriage and stillbirth in women whose husbands were exposed to lead or who were exposed to lead themselves. Lead exposure also may result in decreased fertility, and abnormal menstrual cycles in women. The course of pregnancy may be adversely affected by exposure to lead since lead crosses the placental barrier and poses risks to developing fetuses. Children born of parents either one of whom were exposed to excess lead levels are more likely to have birth defects, mental retardation, behavioral disorders or die during the first year of childhood.

Overexposure to lead also disrupts the blood-forming system resulting in decreased hemoglobin (the substance in the blood that carries oxygen to the cells) and ultimately anemia. Anemia is characterized by weakness, pallor and fatigability as a result of decreased oxygen carrying capacity in the blood.

(3) Health protection goals of the standard. Prevention of adverse health effects for most workers from exposure to lead throughout a working lifetime requires that worker blood lead (PbB) levels be maintained at or below forty micrograms per one hundred grams of whole blood (40 µg/100g). The blood lead levels of workers (both male and female workers) who intend to have children should be maintained below 30 µg/100g to minimize adverse reproductive health effects to the parents and to the developing fetus.

The measurement of your blood lead level is the most useful indicator of the amount of lead being absorbed by your body. Blood lead levels (PbB) are most often reported in units of milligrams (mg) or micrograms (µg) of lead (1 mg=1000 µg) per 100 grams (100g), 100 milliliters (100 ml) or deciliter (dl) of blood. These three units are essentially the same. Sometime PbB's are expressed in the form of mg% or µg%.

This is a shorthand notation for 100g, 100 ml, or dl. PbB measurements show the amount of lead circulating in your blood stream, but do not give any information about the amount of lead stored in your various tissues. PbB measurements merely show current absorption of lead, not the effect that lead is having on your body or the effects that past lead exposure may have already caused. Past research into lead related diseases, however, has focused heavily on associations between PbBs and various diseases. As a result, your PbB is an important indicator of the likelihood that you will gradually acquire a lead-related health impairment or disease.

Once your blood lead level climbs above 40 µg/100g, your risk of disease increases. There is a wide variability of individual response to lead, thus it is difficult to say that a particular PbB in a given person will cause a particular effect. Studies have associated fatal encephalopathy with PbBs as low as 150 µg/100g. Other studies have shown other forms of diseases in some workers with PbBs well below 80 µg/100g. Your PbB is a crucial indicator of the risks to your health, but one other factor is also extremely important. This factor is the length of time you have had elevated PbBs. The longer you have an elevated PbB, the greater the risk that large quantities of lead are being gradually stored in your organs and tissues (body burden). The greater your overall body burden, the greater the chances of substantial permanent damage.

The best way to prevent all forms of lead-related impairments and diseases – both short term and long term – is to maintain your PbB below 40 µg/100g. The provisions of the standard are designed with this end in mind. Your employer has prime responsibility to assure that the provisions of the standard are complied with both by the company and by individual workers. You as a worker, however, also have a responsibility to assist your employer in complying with the standard. You can play a key role in protecting your own health by learning about the lead hazards and their control, learning what the standard requires, following the standard where it governs your own actions, and seeing that your employer complies with provisions governing his actions.

(4) Reporting signs and symptoms of health problems. You should immediately notify your employer if you develop signs or symptoms associated with lead poisoning or if you desire medical advice concerning the effects of current or past exposure to lead on your ability to have a healthy child. You should also notify your employer if you have difficulty breathing during a respirator fit test or while wearing a respirator. In each of these cases your employer must make available to you appropriate medical examinations or consultations. These must be provided at no cost to you and at a reasonable time and place. The standard contains a procedure whereby you can obtain a second opinion by a physician of your choice if the employer selected the initial physician.

APPENDIX B TO §1910.1025 – EMPLOYEE STANDARD SUMMARY

This appendix summarizes key provisions of the standard that you as a worker should become familiar with.

I. PERMISSIBLE EXPOSURE LIMIT (PEL) – Paragraph (c)

The standard sets a permissible exposure limit (PEL) of fifty micrograms of lead per cubic meter of air (50 µg/m³), averaged over an 8-hour workday. This is the highest level of lead in air to which you may be permissibly exposed over an 8-hour workday. Since it is an 8-hour average it permits short exposures above the PEL so long as for each 8-hour work day your average exposure does not exceed the PEL.

This standard recognizes that your daily exposure to lead can extend beyond a typical 8-hour workday as the result of overtime or other alterations in your work schedule. To deal with this, the standard contains a formula which reduces your permissible exposure when you are exposed more than 8 hours. For example, if you are exposed to lead for 10 hours a day, the maximum permitted average exposure would be 40 µg/m³.

II. EXPOSURE MONITORING – Paragraph (d)

If lead is present in the workplace where you work in any quantity, your employer is required to make an initial determination of whether the action level is exceeded for any employee. This initial determination must include instrument monitoring of the air for the presence of lead and must cover the exposure of a representative number of employees who are reasonably believed to have the highest exposure levels. If your employer has conducted appropriate air sampling for lead in the past year he may use these results. If there have been any employee complaints of symptoms which may be attributable to exposure to lead or if there is any other information or observations which would indicate employee exposure to lead, this must also be considered as part of the initial determination. This initial determination must have been completed by March 31, 1979. If this initial determination shows that a reasonable possibility exists that any employee may be exposed, without regard to respirators, over the action level (30 µg/m³) your employer must set up an air monitoring program to determine the exposure level of every employee exposed to lead at your workplace.

In carrying out this air monitoring program, your employer is not required to monitor the exposure of every employee, but he must monitor a representative number of employees and job types. Enough sampling must be done to enable each employee's exposure level to be reasonably represented by at least one full shift (at least 7 hours) air sample. In addition, these air samples must be taken under conditions which represent each employee's regular, daily exposure to lead. All initial exposure monitoring must have been completed by May 30, 1979.

If you are exposed to lead and air sampling is performed, your employer is required to quickly notify you in writing of air monitoring results which represent your exposure. If the results indicate your exposure exceeds the PEL (without regard to your use of respirators), then your employer must also notify you of this in writing, and provide you with a description of the corrective action that will be taken to reduce your exposure.

Your exposure must be rechecked by monitoring every six months if your exposure is over the action level but below the PEL. Air monitoring must be repeated every 3 months if you are exposed over the PEL. Your employer may discontinue monitoring for you if 2 consecutive measurements, taken at least two weeks apart, are below the action level. However, whenever there is a production, process, control, or personnel change at your workplace which may result in new or additional exposure to lead, or whenever there is any other reason to suspect a change which may result in new or additional exposure to lead, your employer must perform additional monitoring.

III. METHODS OF COMPLIANCE – Paragraph (e)

Your employer is required to assure that no employee is exposed to lead in excess of the PEL. The standard establishes a priority of methods to be used to meet the PEL.

IV. RESPIRATORY PROTECTION – Paragraph (f)

Your employer is required to provide and assure your use of respirators when your exposure to lead is not controlled below the PEL by other means. The employer must pay the cost of the respirator. Whenever you request one, your employer is also required to provide you a respirator even if your air exposure level does not exceed the PEL. You might desire a respirator when, for example, you have received medical advice that your lead absorption should be decreased. Or, you may intend to have children in the near future, and want to reduce the level of lead in your body to minimize adverse reproductive effects. While respirators are the least satisfactory means of controlling your exposure, they are capable of providing significant protection if properly chosen, fitted, worn, cleaned, maintained, and replaced when they stop providing adequate protection.

Your employer is required to select respirators from the seven types listed in Table II of the Respiratory Protection section of the standard (§1910.1025(f)). Any respirator chosen must be approved by the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 42 CFR part 84. This respirator selection table will enable your employer to choose a type of respirator that will give you a proper amount of protection based on your airborne lead exposure.

Your employer may select a type of respirator that provides greater protection than that required by the standard; that is, one recommended for a higher concentration of lead than is present in your workplace.

For example, a powered air-purifying respirator (PAPR) is much more protective than a typical negative pressure respirator, and may also be more comfortable to wear. A PAPR has a filter, cartridge, or canister to clean the air, and a power source that continuously blows filtered air into your breathing zone. Your employer might make a PAPR available to you to ease the burden of having to wear a respirator for long periods of time. The standard provides that you can obtain a PAPR upon request.

Your employer must also start a Respiratory Protection Program. This program must include written procedures for the proper selection, use, cleaning, storage, and maintenance of respirators. Your employer must ensure that your respirator facepiece fits properly. Proper fit of a respirator facepiece is critical to your protection from airborne lead. Obtaining a proper fit on each employee may require your employer to make available several different types of respirator masks. To ensure that your respirator fits properly and that facepiece leakage is minimal, your employer must give you either a qualitative or quantitative fit test as specified in Appendix A of the Respiratory Protection standard located at 29 CFR 1910.134. You must also receive from your employer proper training in the use of respirators. Your employer is required to teach you how to wear a respirator, to know why it is needed, and to understand its limitations.

The standard provides that if your respirator uses filter elements, you must be given an opportunity to change the filter elements whenever an increase in breathing resistance is detected. You also must be permitted to periodically leave your work area to wash your face and respirator facepiece whenever necessary to prevent skin irritation. If you ever have difficulty in breathing during a fit test or while using a respirator, your employer must make a medical examination available to you to determine whether you can safely wear a respirator. The result of this examination may be to give you a positive pressure respirator (which reduces breathing resistance) or to provide alternative means of protection.

V. PROTECTIVE WORK CLOTHING AND EQUIPMENT – Paragraph (g)

If you are exposed to lead above the PEL, or if you are exposed to lead compounds such as lead arsenate or lead azide which can cause skin and eye irritation, your employer must provide you with protective work clothing and equipment appropriate for the hazard. If work clothing is provided, it must be provided in a clean and dry condition at least weekly, and daily if your airborne exposure to lead is greater than 200 µg/m³. Appropriate protective work clothing and equipment can include coveralls or similar full-body work clothing, gloves, hats, shoes or disposable shoe coverlets, and face shields or vented goggles. Your employer is required to provide all such equipment at no cost to you. He is responsible for providing repairs and replacement as necessary, and also is responsible for the cleaning, laundering or disposal of protective clothing and equipment. Contaminated work clothing or equipment must be removed in change rooms and not worn home or you will extend your exposure and expose your family since lead from your clothing can accumulate in your house, car, etc. Contaminated clothing which is to be cleaned, laundered or disposed of must be placed in closed containers in the change room. At no time may lead be removed from protective clothing or equipment by any means which disperses lead into the workroom air.

VI. HOUSEKEEPING – Paragraph (h)

Your employer must establish a housekeeping program sufficient to maintain all surfaces as free as practicable of accumulations of lead dust. Vacuuming is the preferred method of meeting this requirement, and the use of compressed air to clean floors and other surfaces is absolutely prohibited. Dry or wet sweeping, shoveling, or brushing may not be used except where vacuuming or other equally effective methods have been tried and do not work. Vacuums must be used and emptied in a manner which minimizes the reentry of lead into the workplace.

VII. HYGIENE FACILITIES AND PRACTICES – Paragraph (i)

The standard requires that change rooms, showers, and filtered air lunchrooms be constructed and made available to workers exposed to lead above the PEL. When the PEL is exceeded, the employer must assure that food and beverage is not present or consumed, tobacco products are not present or used, and cosmetics are not applied, except in these facilities. Change rooms, showers, and lunchrooms must be used by workers exposed in excess of the PEL. After showering, no clothing or equipment worn during the shift may be worn home, and this includes shoes and underwear. Your own clothing worn during the shift should be carried home and cleaned carefully so that it does not contaminate your home. Lunchrooms may not be entered with protective clothing or equipment unless surface dust has been removed by vacuuming, downdraft booth, or other cleaning method. Finally, workers exposed above the PEL must wash both their hands and faces prior to eating, drinking, smoking or applying cosmetics.

All of the facilities and hygiene practices just discussed are essential to minimize additional sources of lead absorption from inhalation or ingestion of lead that may accumulate on you, your clothes, or your possessions. Strict compliance with these provisions can virtually eliminate several sources of lead exposure which significantly contribute to excessive lead absorption.

VIII. MEDICAL SURVEILLANCE – Paragraph (j)

The medical surveillance program is part of the standard's comprehensive approach to the prevention of lead-related disease. Its purpose is to supplement the main thrust of the standard which is aimed at minimizing airborne concentrations of lead and sources of ingestion. Only medical surveillance can determine if the other provisions of the standard have affectively protected you as an individual. Compliance with the standard's provision will protect most workers from the adverse effects of lead exposure, but may not be satisfactory to protect individual workers (1) who have high body burdens of lead acquired over past years, (2) who have additional uncontrolled sources of non-occupational lead exposure, (3) who exhibit unusual variations in lead absorption rates, or (4) who have specific non-work related medical conditions which could be aggravated by lead exposure (e.g., renal disease, anemia). In addition, control systems may fail, or hygiene and respirator programs may be inadequate. Periodic medical surveillance of individual workers will help detect those failures. Medical surveillance will also be important to protect your reproductive ability – regardless of whether you are a man or woman. All medical surveillance required by the standard must be performed by or under the supervision of a licensed physician. The employer must provide required medical surveillance without cost to employees and at a reasonable time and place. The standard's medical surveillance program has two parts – periodic biological monitoring and medical examinations. Your employer's obligation to offer you medical surveillance is triggered by the results of the air monitoring program.

Medical surveillance must be made available to all employees who are exposed in excess of the action level for more than 30 days a year. The initial phase of the medical surveillance program, which includes blood lead level tests and medical examinations, must be completed for all covered employees no later than August 28, 1979. Priority within this first round of medical surveillance must be given to employees whom the employer believes to be at greatest risk from continued exposure (for example, those with the longest prior exposure to lead, or those with the highest current exposure). Thereafter, the employer must periodically make medical surveillance – both biological monitoring and medical examinations – available to all covered employees.

Biological monitoring under the standard consists of blood lead level (PbB) and zinc protoporphyrin tests at least every 6 months after the initial PbB test. A zinc protoporphyrin (ZPP) test is a very useful blood test which measures an effect of lead on your body. If a worker's PbB exceeds 40 µg/100g the monitoring frequency must be increased from every 6 months to at least every 2 months and not reduced until two consecutive PbBs indicate a blood lead level below 40 µg/100g. Each time your PbB is determined to be over 40 µg/ 100g, your employer must notify you of this in writing within five working days of his receipt of the test results. The employer must also inform you that the standard requires temporary medical removal with economic protection when your PbB exceeds certain criteria. (See Discussion of Medical Removal Protection – Paragraph (k).) During the first year of the standard, this removal criterion is 80 µg/100g. Anytime your PbB exceeds 80 µg/100g your employer must make available to you a prompt follow-up PbB test to ascertain your PbB. If the two tests both exceed 80 µg/100g and you are temporarily removed, then your employer must make successive PbB tests available to you on a monthly basis during the period of your removal.

Medical examinations beyond the initial one must be made available on an annual basis if your blood lead level exceeds 40 µg/100g at any time during the preceding year. The initial examination will provide information to establish a baseline to which subsequent data can be compared. An initial medical examination must also be made available (prior to assignment) for each employee being assigned for the first time to an area where the airborne concentration of lead equals or exceeds the action level. In addition, a medical examination or consultation must be made available as soon as possible if you notify your employer that you are experiencing signs or symptoms commonly associated with lead poisoning or that you have difficulty breathing while wearing a respirator or during a respirator fit test. You must also be provided a medical examination or consultation if you notify your employer that you desire medical advice concerning the effects of current or past exposure to lead on your ability to procreate a healthy child.

Finally, appropriate follow-up medical examinations or consultations may also be provided for employees who have been temporarily removed from exposure under the medical removal protection provisions of the standard. (See Part IX, below.)

The standard specifies the minimum content of pre-assignment and annual medical examinations. The content of other types of medical examinations and consultations is left up to the sound discretion of the examining physician. Pre-assignment and annual medical examinations must include (1) a detailed work history and medical history, (2) a thorough physical examination, and (3) a series of laboratory tests designed to check your blood chemistry and your kidney function. In addition, at any time upon your request, a laboratory evaluation of male fertility will be made (microscopic examination of a sperm sample), or a pregnancy test will be given.

The standard does not require that you participate in any of the medical procedures, tests, etc. which your employer is required to make available to you. Medical surveillance can, however, play a very important role in

protecting your health. You are strongly encouraged, therefore, to participate in a meaningful fashion. The standard contains a multiple physician review mechanism which would give you a chance to have a physician of your choice directly participate in the medical surveillance program. If you were dissatisfied with an examination by a physician chosen by your employer, you could select a second physician to conduct an independent analysis. The two doctors would attempt to resolve any differences of opinion, and select a third physician to resolve any firm dispute. Generally your employer will choose the physician who conducts medical surveillance under the lead standard – unless you and your employer can agree on the choice of a physician or physicians. Some companies and unions have agreed in advance, for example, to use certain independent medical laboratories or panels of physicians. Any of these arrangements are acceptable so long as required medical surveillance is made available to workers.

The standard requires your employer to provide certain information to a physician to aid in his or her examination of you. This information includes (1) the standard and its appendices, (2) a description of your duties as they relate to lead exposure, (3) your exposure level, (4) a description of personal protective equipment you wear, (5) prior blood lead level results, and (6) prior written medical opinions concerning you that the employer has. After a medical examination or consultation the physician must prepare a written report which must contain (1) the physician's opinion as to whether you have any medical condition which places you at increased risk of material impairment to health from exposure to lead, (2) any recommended special protective measures to be provided to you, (3) any blood lead level determinations, and (4) any recommended limitation on your use of respirators. This last element must include a determination of whether you can wear a powered air purifying respirator (PAPR) if you are found unable to wear a negative pressure respirator.

The medical surveillance program of the lead standard may at some point in time serve to notify certain workers that they have acquired a disease or other adverse medical condition as a result of occupational lead exposure. If this is true, these workers might have legal rights to compensation from public agencies, their employers, firms that supply hazardous products to their employers, or other persons. Some states have laws, including worker compensation laws, that disallow a worker who learns of a job-related health impairment to sue, unless the worker sues within a short period of time after learning of the impairment. (This period of time may be a matter of months or years.) An attorney can be consulted about these possibilities. It should be stressed that OSHA is in no way trying to either encourage or discourage claims or lawsuits. However, since results of the standard's medical surveillance program can significantly affect the legal remedies of a worker who has acquired a job-related disease or impairment, it is proper for OSHA to make you aware of this.

The medical surveillance section of the standard also contains provisions dealing with chelation. Chelation is the use of certain drugs (administered in pill form or injected into the body) to reduce the amount of lead absorbed in body tissues. Experience accumulated by the medical and scientific communities has largely confirmed the effectiveness of this type of therapy for the treatment of very severe lead poisoning. On the other hand, it has also been established that there can be a long list of extremely harmful side effects associated with the use of chelating agents. The medical community has balanced the advantages and disadvantages resulting from the use of chelating agents in various circumstances and has established when the use of these agents is acceptable. The standard includes these accepted limitations due to a history of abuse of chelation therapy by some lead companies. The most widely used chelating agents are calcium disodium EDTA, (Ca Na₂ EDTA), Calcium Disodium Versenate (Versenate), and d-penicillamine (pencillamine or Cupramine).

The standard prohibits **“prophylactic chelation”** of any employee by any person the employer retains, supervises or controls. **“Prophylactic chelation”** is the routine use of chelating or similarly acting drugs to prevent elevated blood levels in workers who are occupationally exposed to lead, or the use of these drugs to **routinely** lower blood lead levels to predesignated concentrations believed to be 'safe'. It should be emphasized that where an employer takes a worker who has no symptoms of lead poisoning and has chelation carried out by a physician (either inside or outside of a hospital) solely to reduce the worker's blood lead level, that will generally be considered prophylactic chelation. The use of a hospital and a physician does not mean that prophylactic chelation is not being performed. Routine chelation to prevent increased or reduce current blood lead levels is unacceptable whatever the setting.

The standard allows the use of **“therapeutic”** or **“diagnostic”** chelation if administered under the supervision of a licensed physician in a clinical setting with thorough and appropriate medical monitoring. Therapeutic chelation responds to severe lead poisoning where there are marked symptoms. Diagnostic chelation involved giving a patient a dose of the drug then collecting all urine excreted for some period of time as an aid to the diagnosis of lead poisoning.

In cases where the examining physician determines that chelation is appropriate, you must be notified in writing of this fact before such treatment. This will inform you of a potentially harmful treatment, and allow you to obtain a second opinion.

IX. MEDICAL REMOVAL PROTECTION – Paragraph (k)

Excessive lead absorption subjects you to increased risk of disease. Medical removal protection (MRP) is a means of protecting you when, for whatever reasons, other methods, such as engineering controls, work practices, and respirators, have failed to provide the protection you need. MRP involves the temporary removal

of a worker from his or her regular job to a place of significantly lower exposure without any loss of earnings, seniority, or other employment rights or benefits. The purpose of this program is to cease further lead absorption and allow your body to naturally excrete lead which has previously been absorbed. Temporary medical removal can result from an elevated blood lead level, or a medical opinion. Up to 18 months of protection is provided as a result of either form of removal. The vast majority of removed workers, however, will return to their former jobs long before this eighteen month period expires. The standard contains special provisions to deal with the extraordinary but possible case where a longterm worker's blood lead level does not adequately decline during eighteen months of removal. During the first year of the standard, if your blood lead level is 80 µg/100g or above you must be removed from any exposure where your air lead level without a respirator would be 100 µg/m³ or above. If you are removed from your normal job you may not be returned until your blood lead level declines to at least 60 µg/100g. These criteria for removal and return will change according to the following schedule:

	Removal blood lead (µg/100 g)	Air lead (µg/m ³)	Return blood lead (µg/100 g)
After Mar. 1, 1980	70 and above	50 and above	At or below 50.
After Mar. 1, 1981	60 and above	30 and above	At or below 40.
After Mar. 1, 1983	50 and above averaged over six months.	30 and above	Do.

You may also be removed from exposure even if your blood lead levels are below these criteria if a final medical determination indicates that you temporarily need reduced lead exposure for medical reasons. If the physician who is implementing your employers medical program makes a final written opinion recommending your removal or other special protective measures, your employer must implement the physician's recommendation. If you are removed in this manner, you may only be returned when the doctor indicates that it is safe for you to do so.

The standard does not give specific instructions dealing with what an employer must do with a removed worker. Your job assignment upon removal is a matter for you, your employer and your union (if any) to work out consistent with existing procedures for job assignments. Each removal must be accomplished in a manner consistent with existing collective bargaining relationships. Your employer is given broad discretion to implement temporary removals so long as no attempt is made to override existing agreements. Similarly, a removed worker is provided no right to veto an employer's choice which satisfies the standard.

In most cases, employers will likely transfer removed employees to other jobs with sufficiently low lead exposure. Alternatively, a worker's hours may be reduced so that the time weighted average exposure is reduced, or he or she may be temporarily laid off if no other alternative is feasible. In all of these situation, MRP benefits must be provided during the period of removal – i.e., you continue to receive the same earnings, seniority, and other rights and benefits you would have had if you had not been removed. Earnings includes more than just your base wage; it includes overtime, shift differentials, incentives, and other compensation you would have earned if you had not been removed. During the period of removal you must also be provided with appropriate follow-up medical surveillance. If you were removed because your blood lead level was too high, you must be provided with a monthly blood test.

If a medical opinion caused your removal, you must be provided medical tests or examinations that the doctor believes to be appropriate. If you do not participate in this follow up medical surveillance, you may lose your eligibility for MRP benefits.

When you are medically eligible to return to your former job, your employer must return you to your **“former job status.”** This means that you are entitled to the position, wages, benefits, etc., you would have had if you had not been removed. If you would still be in your old job if no removal had occurred that is where you go back. If not, you are returned consistent with whatever job assignment discretion your employer would have had if no removal had occurred. MRP only seeks to maintain your rights, not expand them or diminish them.

If you are removed under MRP and you are also eligible for worker compensation or other compensation for lost wages, your employer's MRP benefits obligation is reduced by the amount that you **actually** receive from these other sources. This is also true if you obtain other employment during the time you are laid off with MRP benefits.

The standard also covers situations where an employer **voluntarily** removes a worker from exposure to lead due to the effects of lead on the employee's medical condition, even though the standard does not require removal. In these situations MRP benefits must still be provided as though the standard required removal. Finally, it is important to note that in all cases where removal is required, respirators cannot be used as a substitute. Respirators may be used before removal becomes necessary, but not as an alternative to a transfer to a low exposure job, or to a lay-off with MRP benefits.

X. EMPLOYEE INFORMATION AND TRAINING – Paragraph (l)

Your employer is required to provide an information and training program for all employees exposed to lead above the action level or who may suffer skin or eye irritation from lead. This program must inform these employees of the specific hazards associated with their work environment, protective measures which can be taken, the danger of lead to their bodies (including their reproductive systems), and their rights under the standard. In addition your employer must make readily available to all employees, including those exposed below the action level, a copy of the standard and its appendices and must distribute to all employees any materials provided to the employer by the Occupational Safety and Health Administration (OSHA). Your employer is required to complete this training program for all employees by August 28, 1979. After this date, all new employees must be trained prior to initial assignment to areas where there is a possibility of exposure over the action level. This training program must also be provided at least annually thereafter.

XI. SIGNS – Paragraph (m)

The standard requires that the following warning sign be posted in work areas where the exposure to lead exceeds the PEL:

**WARNING
LEAD WORK AREA
NO SMOKING OR EATING**

XII. RECORDKEEPING – Paragraph (n)

Your employer is required to keep all records of exposure monitoring for airborne lead. These records must include the name and job classification of employees measured, details of the sampling and analytic techniques, the results of this sampling, and the type of respiratory protection being worn by the person sampled. Your employer is also required to keep all records of biological monitoring and medical examination results. These must include the names of the employees, the physician's written opinion, and a copy of the results of the examination. All of the above kinds of records must be kept for 40 years, or for at least 20 years after your termination of employment, whichever is longer.

Recordkeeping is also required if you are temporarily removed from your job under the medical removal protection program. This record must include your name and social security number, the date of your removal and return, how the removal was or is being accomplished, and whether or not the reason for the removal was an elevated blood lead level. Your employer is required to keep each medical removal record only for as long as the duration of an employee's employment.

The standard requires that if you request to see or copy environmental monitoring, blood lead level monitoring, or medical removal records, they must be made available to you or to a representative that you authorize. Your union also has access to these records. Medical records other than PbB's must also be provided upon request to you, to your physician or to any other person whom you may specifically designate. Your union does not have access to your personal medical records unless you authorize their access.

XIII. OBSERVATIONS OF MONITORING – Paragraph (o)

When air monitoring for lead is performed at your workplace as required by this standard, your employer must allow you or someone you designate to act as an observer of the monitoring. Observers are entitled to an explanation of the measurement procedure, and to record the results obtained. Since results will not normally be available at the time of the monitoring, observers are entitled to record or receive the results of the monitoring when returned by the laboratory.

Your employer is required to provide the observer with any personal protective devices required to be worn by employees working in the area that is being monitored. The employer must require the observer to wear all such equipment and to comply with all other applicable safety and health procedures.

XIV. EFFECTIVE DATE – Paragraph (p)

The standard's effective date is March 1, 1979, and employer obligations under the standard begin to come into effect as of that date.

XV. FOR ADDITIONAL INFORMATION

A. Copies of the Standard and explanatory material may be obtained by writing or calling the OSHA Docket Office, Department of Labor, Room N2634, 200 Constitution Avenue NW, Washington, D.C. 20210. Telephone: (202) 219-7894.

1. The standard and summary of the statement of reasons (preamble), Federal Register, Volume 43, pp. 52952-53014, November 14, 1978.
2. The full statement of reasons (preamble) Federal Register, vol. 43, pp. 54354-54509, November 21, 1978.
3. Partial Administrative Stay and Corrections to the standard, (44 FR 5446-5448) January 26, 1979.
4. Notice of the Partial Judicial Stay (44 FR 14554-14555) March 13, 1979.
5. Corrections to the preamble, Federal Register, vol. 44, pp. 20680-20681, April 6, 1979.
6. Additional correction to the preamble concerning the construction industry, Federal Register, vol. 44, p. 50338, August 28, 1979.
7. Appendices to the standard (Appendices A, B, C), Federal Register, Vol. 44, pp. 60980-60995, October 23, 1979.
8. Corrections to appendices, Federal Register, Vol. 44, 68828, November 30, 1979.
9. Revision to the standard and an additional appendix (Appendix D, Federal Register, Vol. 47, pp. 51117-51119, November 12, 1982.
10. Notice of reopening of lead rulemaking for nine remand industry sectors, Federal Register, vol. 53, pp. 11511-11513, April 7, 1988.
11. Statement of reasons, Federal Register, vol. 54, pp. 29142-29275, July 11, 1989.
12. Statement of reasons, Federal Register, vol. 55, pp. 3146-3167, January 30, 1990.
13. Correction to Appendix B, Federal Register, vol. 55, pp. 4998-4999, February 13, 1991.
14. Correction to appendices, Federal Register, vol. 56, p. 24686, May 31, 1991.

B. Additional information about the standard, its enforcement, and your employer's compliance can be obtained from the nearest OSHA Area Office listed in your telephone directory under United States Government/Department of Labor.

Chapter 25

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Control of Hazardous Energy

Lockout/Tagout

Cain's Pipeline & Industrial Services, LLC. has adopted this policy for the prevention of employee exposure to hazards resulting either directly or indirectly from Control of Hazardous Energy and Lockout/Tagout procedures in the workplace from the following OSHA regulations:

§1910.147 – *The Control of Hazardous Energy (Lockout/Tagout)*

Cain's Pipeline & Industrial Services, LLC. has implemented this Hazardous Energy Control Program and Lockout/Tagout procedures to ensure that employees are properly trained, aware of hazards associated with Lockout/Tagout, and correctly informed of procedures, policies, and practices to prevent or, if possible, eliminate these hazards.

The *Cain's Pipeline & Industrial Services, LLC.* Hazardous Energy Control Program will address the following elements:

- Program Training.
- Who controls the Program.
- How the Program is enforced.
- Specific procedures that outline the scope, purpose, authorization, rules, and techniques to be utilized.
- Inspections where unexpected energizing start up or release of stored energy could occur and cause injury.
- Equipment surveys and listings will be provided that will include electrical, steam, hydraulic, tension, gravity, etc. as potential sources of energy.

Brent Messina is the supervisor responsible for ensuring the following training, engineering controls, work practices, and safety procedures are enforced:

- *Cain's Pipeline & Industrial Services, LLC.* will provide training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. The training will include the following:
 - Each authorized employee will receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.
 - Each affected employee will be instructed in the purpose and use of the energy control procedure.
 - All other employees whose work operations are or may be in an area where energy control procedures may be utilized, will be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.
- When tagout systems are used, employees will also be trained in the following limitations of tags:

- Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock.
- When a tag is attached to an energy isolating means, it is not to be removed without permission of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.
- Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.
- Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.
- Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.
- Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.
- *Cain's Pipeline & Industrial Services, LLC.* will provide employee retraining under the following circumstances:
 - Retraining will be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment, or processes that present a new hazard, or when there is a change in the energy control procedures.
 - Additional retraining will also be conducted whenever a periodic inspection reveals, or whenever *Brent Messina* has reason to believe that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.
 - The retraining will reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.
- *Cain's Pipeline & Industrial Services, LLC.* will certify that employee training and/or retraining has been accomplished and is being kept up to date. The documentation will contain each employee's name, dates of training, and who conducted the training.
- If an energy source can be locked out, this method will be utilized. A "Lockout Device" utilizes a lock, either key or combination, to hold an energy isolating device in a safe position.
- If an energy source cannot be locked out, a tagout system will be utilized. A "Tagout Device" is a warning tag (weather and chemical resistant) standardized in size, color, with wording warning of hazardous energy such as: (Do Not Start) (Do Not Open) (Do Not Close) (Do Not Energize) (Do Not Operate).
- Lockout/Tagout devices will be clearly marked to indicate the identity of the employee applying the device.
- Lockout or tagout will be performed only by the authorized employees who are performing the servicing or maintenance.

- Affected employees will be notified by *Brent Messina* or authorized employee of the application and removal of lockout devices or tagout devices. Notification will be given before the controls are applied, and after they are removed from the machine or equipment.
- Established *Cain's Pipeline & Industrial Services, LLC.* procedures for energy control and the application of lockout or tagout devices covers the following elements and actions and will be done in the following sequence:

Preparation for Shutdown

- Before an authorized or affected employee turns off a machine or equipment, the authorized employee will have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

Machine or Equipment Shutdown

- The machine or equipment will be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown will be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.

Machine or Equipment Isolation

- All energy isolating devices that are needed to control the energy to the machine or equipment will be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).

Lockout or Tagout Device Application

- Lockout or tagout devices will be affixed to each energy isolating device by authorized employees.
- Lockout devices, where used, will be affixed in a manner to that will hold the energy isolating devices in a "safe" or "off" position.
- Tagout devices, where used, will be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited.
 - Where tagout devices are used with energy isolating devices designed with the capability of being locked, the tag attachment will be fastened at the same point at which the lock would have been attached.
 - Where a tag cannot be affixed directly to the energy isolating device, the tag will be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.

Stored Energy

- Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy will be relieved, disconnected, restrained, and otherwise rendered safe.

- If there is a possibility of reaccumulation of stored energy to a hazardous level, verification of isolation will be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

Verification of Isolation

- Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee will verify that isolation and deenergization of the machine or equipment have been accomplished.
- Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures will be followed and actions taken by the authorized employee(s) to ensure the following:

The machine or equipment

- The work area will be inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact.

Employees

- The work area will be checked to ensure that all employees have been safely positioned or removed.
- After lockout or tagout devices have been removed and before a machine or equipment is started, affected employees will be notified that the lockout or tagout device(s) have been removed.

Removal of Lockout or Tagout Devices

- Each lockout or tagout device will be removed from each energy isolating device by the employee who applied the device.
- ***Exception:*** When the authorized employee who applied the lockout or tagout device is not available to remove it, that device may be removed under the direction of *Brent Messina*. Such procedures include the following elements:
 - Verification by *Brent Messina* that the authorized employee who applied the device is not at the facility.
 - All reasonable efforts were made to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed.
 - Ensuring that the authorized employee has this knowledge before he/she resumes work at that facility.
- In situations where lockout or tagout devices must be temporarily removed and the machine or equipment energized to test or position, the following procedures will be followed:
 - Clear the machine or equipment of tools and materials.
 - Remove employees from the machine or equipment area.
 - Remove the lockout or tagout devices as specified.
 - Energize and proceed with testing or positioning.
 - Deenergize all systems and reapply energy control measures to continue the servicing and/or maintenance.

This procedure will be verified and documented by personnel performing it.

- Whenever outside servicing personnel are to be engaged in operations requiring lockout or tagout procedures, *Brent Messina* and the outside employer will inform each other of their respective lockout or tagout procedures.
Brent Messina will ensure that employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

- When servicing and/or maintenance is performed by a crew, craft, department, or other group, they will utilize a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device. Group lockout or tagout devices will be used with the following specific requirements:
 - Primary responsibility is vested in *Brent Messina* for a set number of employees working under the protection of a group lockout or tagout device (such as an operations lock).
 - Provision for *Brent Messina* to ascertain the exposure status of individual group members with regard to the lockout or tagout of the machine or equipment.
 - When more than one crew, craft, department, etc. is involved, assignment of overall job-associated lockout or tagout control responsibility to *Brent Messina* to coordinate affected work forces and ensure continuity of protection.
 - Each authorized employee will affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and will remove those devices when he or she stops working on the machine or equipment being serviced or maintained.
- During shift or personnel changes, procedures will be utilized to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees, to minimize exposure to hazards from the unexpected energization or start-up of the machine or equipment, or the release of stored energy. Documentation will be maintained as to personnel, equipment, and particular Lockout/Tagout procedures involved in a specific ongoing operation.
- Failure to comply with proper Lockout/Tagout procedures is grounds for disciplinary action. Any unauthorized removal of warning tags or lockout devices will be grounds for immediate termination of employment. The performance of Lockout/Tagout procedures at *Cain's Pipeline & Industrial Services, LLC*. will be inspected/evaluated at least annually by *Brent Messina* for compliance with Company Policy. Inspections will be documented and date, equipment, and employee(s) reviewed will be recorded.
- Lockout procedures are to be utilized over tagout procedures, where possible.
- Locks and tags used for lockout or tagout procedures will be clearly marked with identification of the employee applying the device.
- The Lockout /Tagout procedures for *Cain's Pipeline & Industrial Services, LLC*. are administered by *Brent Messina*, and will be those described in the following procedures.

Lockout Procedure for Cain's Pipeline & Industrial Services, LLC.

Purpose

This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done on machines or equipment. It will be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.

Compliance with this Program

All employees are required to comply with the restrictions and limitations imposed upon them during the use of lockout. The authorized employees are required to perform the lockout in accordance with this procedure. All employees, upon observing a machine or piece of equipment which is locked out to perform servicing or maintenance will not attempt to start, energize, or use that machine or equipment. Type of compliance enforcement to be taken for violation of the above:

Sequence of Lockout

- 1.)** Notify all affected employees that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.

Affected employees and how to notify:

Name(s): _____

Job Title(s): _____

- 2.)** The authorized employee will refer to the company procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, will understand the hazards of the energy, and will know the methods to control the energy.

Type(s) and magnitude(s) of energy, its hazards and the methods to control the energy.

- 3.)** If the machine or equipment is operating, shut it down by the normal stopping procedure (depress stop button, open switch, close valve, etc.).

Machine(s) or Equipment operating controls:

Type(s): _____

Location(s): _____

Type(s): _____

Location(s): _____

Type(s): _____

Location(s): _____

Type(s): _____

Location(s): _____

- 4.) Deactivate the energy isolating device(s) so that the machine or equipment is isolated from the energy source(s).

Type(s) and location(s) of energy isolating devices.

- 5.) Lock out the energy isolating device(s) with assigned individual lock

(Locks will be labeled with individuals name and number).

Lock #: _____ **Assigned To:** _____

Lock #: _____ **Assigned To:** _____

Lock #: _____ **Assigned To:** _____

Lock #: _____ **Assigned To:** _____

- 6.) Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.

Type(s) of stored energy - methods to dissipate or restrain.

- 7.) Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.

Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment.

Method of verifying the isolation of the equipment.

- 8.) The machine or equipment is now locked out.

RESTORING EQUIPMENT TO SERVICE. When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps will be taken:

- 1.) Check the machine or equipment and the immediate area around the machine or equipment to ensure that non-essential items have been removed and that the machine or equipment components are operationally intact.
- 2.) Check the work area to ensure that all employees have been safely positioned or removed from the area.
- 3.) Verify that the controls are in neutral.
- 4.) Remove the lockout devices and reenergize the machine or equipment.

Note: The removal of some forms of blocking may require re-energization of the machine before safe removal.

- 5.) Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

The Lockout/Tagout program for *Cain's Pipeline & Industrial Services, LLC.* has been implemented from the following OSHA regulation with particular emphasis on the highlighted areas:

§1910.147 – The Control of Hazardous Energy (Lockout/Tagout)

(a) Scope, application and purpose.

(1) Scope.

(i) This standard covers the servicing and maintenance of machines and equipment in which the unexpected energization or start up of the machines or equipment, or release of stored energy could cause injury to employees. This standard establishes minimum performance requirements for the control of such hazardous energy.

(ii) This standard **does not cover** the following:

(A) Construction, agriculture, and maritime employment;

(B) Installations under the exclusive control of electric utilities for the purpose of power generation, transmission and distribution, including related equipment for communication or metering; and

(C) Exposure to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations, which is covered by Subdivision S of this Division; and

(D) Oil and gas well drilling and servicing.

(2) Application.

(i) This standard applies to the control of energy during servicing and/or maintenance of machines and equipment.

(ii) Normal production operations are not covered by this standard (See Subdivision O of this Division). Servicing and/or maintenance which takes place during normal production operations is covered by this standard only if:

(A) An employee is required to remove or bypass a guard or other safety device; or

(B) An employee is required to place any part of his or her body into an area on a machine or piece of equipment where work is actually performed upon the material being processed (point of operation) or where an associated danger zone exists during a machine operating cycle.

Note: Exception to paragraph (a)(2)(ii): Minor tool changes and adjustments, and other minor servicing activities, which take place during normal production operations, are not covered by this standard if they are routine, repetitive, and integral to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection.

(iii) This standard **does not apply** to the following.

(A) Work on cord and plug connected electric equipment for which exposure to the hazards of unexpected energization or start up of the equipment is controlled by the unplugging of the equipment from the energy source and by the plug being under the exclusive control of the employee performing the servicing or maintenance.

(B) Hot tap operations involving transmission and distribution systems for substances such as gas, steam, water or petroleum products when they are performed on pressurized pipelines, provided that the employer demonstrates that (1) continuity of service is essential; (2) shutdown of the system is impractical; and (3) documented procedures are followed, and special equipment is used which will provide proven effective protection for employees.

(3) Purpose.

(i) This section requires employers to establish a program and utilize procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices, and to otherwise disable machines or equipment to prevent unexpected energization, start-up or release of stored energy in order to prevent injury to employees.

(ii) When other standards in this part require the use of lockout or tagout, they shall be used and supplemented by the procedural and training requirements of this section.

(b) Definitions (See definitions at the end of this section).

(c) General.

(1) **Energy control program.** The employer shall establish a program consisting of energy control procedures, employee training and periodic inspections to ensure that before any employee performs any servicing or maintenance on a machine or equipment where the unexpected energizing, start up or release of stored energy could occur and cause injury, the machine or equipment shall be isolated from the energy source, and rendered inoperative.

(2) Lockout/tagout.

(i) If an energy isolating device is not capable of being locked out, the employer's energy control program under paragraph (c)(1) of this section shall utilize a tagout system.

(ii) If an energy isolating device is capable of being locked out, the employer's energy control program under paragraph (c)(1) of this section shall utilize lockout, unless the employer can

demonstrate that the utilization of a tagout system will provide full employee protection as set forth in paragraph (c)(3) of this section.

(iii) After January 2, 1990, whenever replacement or major repair, renovation or modification of a machine or equipment is performed, and whenever new machines or equipment are installed, energy isolating devices for such machines or equipment shall be designed to accept a lockout device.

(3) Full employee protection.

(i) When a tagout device is used on an energy isolating device which is capable of being locked out, the tagout device shall be attached at the same location that the lockout device would have been attached, and the employer shall demonstrate that the tagout program will provide a level of safety equivalent to that obtained by using a lockout program.

(ii) In demonstrating that a level of safety is achieved in the tagout program which is equivalent to the level of safety obtained by using a lockout program, the employer shall demonstrate full compliance with all tagout-related provisions of this standard together with such additional elements as are necessary to provide the equivalent safety available from the use of a lockout device. Additional means to be considered as part of the demonstration of full employee protection shall include the implementation of additional safety measures such as the removal of an isolating circuit element, blocking of a controlling switch, opening of an extra disconnecting device, or the removal of a valve handle to reduce the likelihood of inadvertent energization.

(4) Energy control procedure.

(i) Procedures shall be developed, documented and utilized for the control of potentially hazardous energy when employees are engaged in the activities covered by this section.

Note: Exception: The employer need not document the required procedure for a particular machine or equipment, when all of the following elements exist:

(1) The machine or equipment has no potential for stored or residual energy or reaccumulation of stored energy after shut down which could endanger employees;

(2) The machine or equipment has a single energy source which can be readily identified and isolated;

(3) The isolation and locking out of that energy source will completely deenergize and deactivate the machine or equipment;

(4) The machine or equipment is isolated from that energy source and locked out during servicing or maintenance;

(5) A single lockout device will achieve a locked-out condition;

(6) The lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance;

(7) The servicing or maintenance does not create hazards for other employees; and

(8) The employer, in utilizing this exception, has had no accidents involving the unexpected activation or reenergization of the machine or equipment during servicing or maintenance.

(ii) The procedures shall clearly and specifically outline the scope, purpose, authorization, rules, and techniques to be utilized for the control of hazardous energy, and the means to enforce compliance including, but not limited to, the following:

(A) A specific statement of the intended use of the procedure;

(B) Specific procedural steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy;

(C) Specific procedural steps for the placement, removal and transfer of lockout devices or tagout devices and the responsibility for them; and

(D) Specific requirements for testing a machine or equipment to determine and verify the effectiveness of lockout devices, tagout devices, and other energy control measures.

(5) Protective materials and hardware.

(i) Locks, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, or other hardware shall be provided by the employer for isolating, securing or blocking of machines or equipment from energy sources.

(ii) Lockout devices and tagout devices shall be singularly identified; shall be the only device(s) used for controlling energy; shall not be used for other purposes; and shall meet the following requirements:

(A) Durable.

(1) Lockout and tagout devices shall be capable of withstanding the environment to which they are exposed for the maximum period of time that exposure is expected.

(2) Tagout devices shall be constructed and printed so that exposure to weather conditions or wet and damp locations will not cause the tag to deteriorate or the message on the tag to become illegible.

(3) Tags shall not deteriorate when used in corrosive environments such as areas where acid and alkali chemicals are handled and stored.

(B) Standardized. Lockout and tagout devices shall be standardized within the facility in at least one of the following criteria: Color; shape; or size; and additionally, in the case of tagout devices, print and format shall be standardized.

(C) Substantial.

(1) Lockout devices. Lockout devices shall be substantial enough to prevent removal without the use of excessive force or unusual techniques, such as with the use of bolt cutters or other metal cutting tools.

(2) Tagout devices. Tagout devices, including and their means of attachment, shall be substantial enough to prevent inadvertent or accidental removal. Tagout device attachment means shall be of a non-reusable type, attachable by hand, self-locking, and non-releasable with a minimum unlocking strength of no less than 50 pounds and having the general design and basic characteristics of being at least equivalent to a one-piece, all-environment-tolerant nylon cable tie.

(D) Identifiable. Lockout devices and tagout devices shall indicate the identity of the employee applying the device(s).

(iii) Tagout devices shall warn against hazardous conditions if the machine or equipment is energized and shall include a legend such as the following: **Do Not Start, Do Not Open, Do Not Close, Do Not Energize, Do Not Operate.**

(6) Periodic inspection.

(i) The employer shall conduct a periodic inspection of the energy control procedure at least annually to ensure that the procedure and the requirements of this standard are being followed.

(A) The periodic inspection shall be performed by an authorized employee other than the one(s) utilizing the energy control procedure being inspected.

(B) The periodic inspection shall be conducted to correct any deviations or inadequacies identified.

(C) Where lockout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized employee, of that employee's responsibilities under the energy control procedure being inspected.

(D) Where tagout is used for energy control, the periodic inspection shall include a review, between the inspector and each authorized and affected employee, of that employee's responsibilities under the energy control procedure being inspected, and the elements set forth in paragraph (c)(7)(ii) of this section.

(ii) The employer shall certify that the periodic inspections have been performed. The certification shall identify the machine or equipment on which the energy control procedure was being utilized, the date of the inspection, the employees included in the inspection, and the person performing the inspection.

(7) Training and communication.

(i) The employer shall provide training to ensure that the purpose and function of the energy control program are understood by employees and that the knowledge and skills required for the safe application, usage, and removal of the energy controls are acquired by employees. The training shall include the following:

(A) Each authorized employee shall receive training in the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control.

(B) Each affected employee shall be instructed in the purpose and use of the energy control procedure.

(C) All other employees whose work operations are or may be in an area where energy control procedures may be utilized, shall be instructed about the procedure, and about the prohibition relating to attempts to restart or reenergize machines or equipment which are locked out or tagged out.

(ii) When tagout systems are used, employees shall also be trained in the following limitations of tags:

(A) Tags are essentially warning devices affixed to energy isolating devices, and do not provide the physical restraint on those devices that is provided by a lock.

(B) When a tag is attached to an energy isolating means, it is not to be removed without authorization of the authorized person responsible for it, and it is never to be bypassed, ignored, or otherwise defeated.

(C) Tags must be legible and understandable by all authorized employees, affected employees, and all other employees whose work operations are or may be in the area, in order to be effective.

(D) Tags and their means of attachment must be made of materials which will withstand the environmental conditions encountered in the workplace.

(E) Tags may evoke a false sense of security, and their meaning needs to be understood as part of the overall energy control program.

(F) Tags must be securely attached to energy isolating devices so that they cannot be inadvertently or accidentally detached during use.

(iii) Employee retraining.

(A) Retraining shall be provided for all authorized and affected employees whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.

(B) Additional retraining shall also be conducted whenever a periodic inspection under paragraph (c)(6) of this section reveals, or whenever the employer has reason to believe, that there are deviations from or inadequacies in the employee's knowledge or use of the energy control procedures.

(C) The retraining shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.

(iv) The employer shall certify that employee training has been accomplished and is being kept up-to-date. The certification shall contain each employee's name and dates of training.

(8) Energy isolation. Lockout or tagout shall be performed only by the authorized employees who are performing the servicing or maintenance.

(9) Notification of employees. Affected employees shall be notified by the employer or authorized employee of the application and removal of lockout devices or tagout devices. Notification shall be given before the controls are applied, and after they are removed from the machine or equipment.

(d) Application of control. The established procedures for the application of energy control (the lockout or tagout procedures) shall cover the following elements and actions and shall be done in the following sequence:

(1) Preparation for shutdown. Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy.

(2) Machine or equipment shutdown. The machine or equipment shall be turned off or shut down using the procedures established for the machine or equipment. An orderly shutdown must be utilized to avoid any additional or increased hazard(s) to employees as a result of the equipment stoppage.

(3) Machine or equipment isolation. All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located and operated in such a manner as to isolate the machine or equipment from the energy source(s).

(4) Lockout or tagout device application.

(i) Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees.

(ii) Lockout devices, where used, shall be affixed in a manner to that will hold the energy isolating devices in a "safe" or "off" position.

(iii) Tagout devices, where used, shall be affixed in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited.

(A) Where tagout devices are used with energy isolating devices designed with the capability of being locked, the tag attachment shall be fastened at the same point at which the lock would have been attached.

(B) Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.

(5) Stored energy.

(i) Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.

(ii) If there is a possibility of re-accumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

(6) Verification of isolation. Prior to starting work on machines or equipment that have been locked out or tagged out, the authorized employee shall verify that isolation and de-energization of the machine or equipment have been accomplished.

(e) Release from lockout or tagout. Before lockout or tagout devices are removed and energy is restored to the machine or equipment, procedures shall be followed and actions taken by the authorized employee(s) to ensure the following:

(1) The machine or equipment. The work area shall be inspected to ensure that non-essential items have been removed and to ensure that machine or equipment components are operationally intact.

(2) Employees.

(i) The work area shall be checked to ensure that all employees have been safely positioned or removed.

(ii) After lockout or tagout devices have been removed and before a machine or equipment is started, affected employees shall be notified that the lockout or tagout device(s) have been removed.

(3) Lockout or tagout devices removal. Each lockout or tagout device shall be removed from each energy isolating device by the employee who applied the device. **Exception to paragraph (e)(3):** When the authorized employee who applied the lockout or tagout device is not available to remove it, that device may be removed under the direction of the employer, provided that specific procedures and training for such removal have been developed, documented and incorporated into the employer's energy control program. The employer shall demonstrate that the specific procedure provides equivalent safety to the removal of the device by the authorized employee who applied it. The specific procedure shall include at least the following elements:

(i) Verification by the employer that the authorized employee who applied the device is not at the facility;

(ii) Making all reasonable efforts to contact the authorized employee to inform him/her that his/her lockout or tagout device has been removed; and

(iii) Ensuring that the authorized employee has this knowledge before he/she resumes work at that facility.

(f) Additional requirements.

(1) Testing or positioning of machines, equipment or components thereof. In situations in which lockout or tagout devices must be temporarily removed from the energy isolating device and the machine or equipment energized to test or position the machine, equipment or component thereof, the following sequence of actions shall be followed:

(i) Clear the machine or equipment of tools and materials in accordance with paragraph (e)(1) of this section;

(ii) Remove employees from the machine or equipment area in accordance with paragraph (e)(2) of this section;

(iii) Remove the lockout or tagout devices as specified in paragraph (e)(3) of this section;

(iv) Energize and proceed with testing or positioning;

(v) Deenergize all systems and reapply energy control measures in accordance with paragraph (d) of this section to continue the servicing and/or maintenance.

(2) Outside personnel (contractors, etc.).

(i) Whenever outside servicing personnel are to be engaged in activities covered by the scope and application of this standard, the on-site employer and the outside employer shall inform each other of their respective lockout or tagout procedures.

(ii) The on-site employer shall ensure that his/her employees understand and comply with the restrictions and prohibitions of the outside employer's energy control program.

(3) Group lockout or tagout.

(i) When servicing and/or maintenance is performed by a crew, craft, department or other group, they shall utilize a procedure which affords the employees a level of protection equivalent to that provided by the implementation of a personal lockout or tagout device.

(ii) Group lockout or tagout devices shall be used in accordance with the procedures required by paragraph (c)(4) of this section including, but not necessarily limited to, the following specific requirements:

- (A) Primary responsibility is vested in an authorized employee for a set number of employees working under the protection of a group lockout or tagout device (such as an operations lock);
 - (B) Provision for the authorized employee to ascertain the exposure status of individual group members with regard to the lockout or tagout of the machine or equipment and
 - (C) When more than one crew, craft, department, etc. is involved, assignment of overall job-associated lockout or tagout control responsibility to an authorized employee designated to coordinate affected work forces and ensure continuity of protection; and
 - (D) Each authorized employee shall affix a personal lockout or tagout device to the group lockout device, group lockbox, or comparable mechanism when he or she begins work, and shall remove those devices when he or she stops working on the machine or equipment being serviced or maintained.
- (4) Shift or personnel changes. Specific procedures shall be utilized during shift or personnel changes to ensure the continuity of lockout or tagout protection, including provision for the orderly transfer of lockout or tagout device protection between off-going and oncoming employees, to minimize exposure to hazards from the unexpected energization or start-up of the machine or equipment, or the release of stored energy.

Definition of Terms for Control of Hazardous Energy

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

Authorized employee. A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.

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

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

Energy isolating device. A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors, and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

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

Hot tap. A procedure used in the repair, maintenance and services activities which involves welding on a piece of equipment (pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.

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

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

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

Servicing and/or maintenance. Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or startup of the equipment or release of hazardous energy.

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

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

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

Note: The following Appendix to §1910.147 serves as a non-mandatory guideline to assist employers and employees in complying with the requirements of this section, as well as to provide other helpful information. Nothing in the Appendix adds to or detracts from any of the requirements of this section.

APPENDIX A – TYPICAL MINIMAL LOCKOUT PROCEDURE – GENERAL

The following simple lockout procedure is provided to assist employers in developing their procedures so they meet the requirements of this standard. When the energy isolating devices are not lockable, tagout may be used, provided the employer complies with the provisions of the standard which require additional training and more rigorous periodic inspections. When tagout is used and the energy isolating devices are lockable, the employer must provide full employee protection (see paragraph (c)(3)) and additional training and more rigorous periodic inspections are required. For more complex systems, more comprehensive procedures may need to be developed, documented and utilized.

Lockout Procedure – Purpose

This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done on machines or equipment. It shall be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.

Compliance with this Program

All employees are required to comply with the restrictions and limitations imposed upon them during the use of lockout. The authorized employees are required to perform the lockout in accordance with this procedure. All employees, upon observing a machine or piece of equipment which is locked out to perform servicing or maintenance shall not attempt to start, energize or use that machine or equipment. Type of compliance enforcement to be taken for violation of the above.

Sequence of Lockout

(1) Notify all affected employees that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.

Name(s)/Job Title(s) of affected employees and how to notify.

(2) The authorized employee shall refer to the company procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, shall understand the hazards of the energy, and shall know the methods to control the energy.

Type(s) and magnitude(s) of energy, its hazards and the methods to control the energy.

(3) If the machine or equipment is operating, shut it down by the normal stopping procedure (depress stop button, open switch, close valve, etc.).

Type(s) and location(s) of machine or equipment operating controls.

(4) Deactivate the energy isolating device(s) so that the machine or equipment is isolated from the energy source(s).

Type(s) and location(s) of energy isolating devices.

(5) Lock out the energy isolating device(s) with assigned individual lock(s).

(6) Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.

Type(s) of stored energy--methods to dissipate or restrain.

(7) Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.

Caution: Return operating control(s) to neutral or “off” position after verifying the isolation of the equipment.

Method of verifying the isolation of the equipment.

(8) The machine or equipment is now locked out.

RESTORING EQUIPMENT TO SERVICE. When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps shall be taken:

(1) Check the machine or equipment and the immediate area around the equipment to ensure that non-essential items have been removed and that the machine or equipment components are operationally intact.

(2) Check the work area to ensure that all employees have been safely positioned or removed from the area.

(3) Verify that the controls are in neutral.

(4) Remove the lockout devices and reenergize the machine or equipment.

Note: The removal of some forms of blocking may require reenergization of the machine before safe removal.

(5) Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for use.

Notes:

Handwriting practice lines consisting of 20 sets of three horizontal lines (top, middle, and bottom) for letter formation.

Chapter 26

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Occupational Noise Exposure

Cain's Pipeline & Industrial Services, LLC. Safety Policy for the prevention of employee exposure to hazardous levels of noise is adopted from the following OSHA regulations:

§1910.95 – Occupational Noise Exposure

Cain's Pipeline & Industrial Services, LLC. has implemented this Policy to ensure that no employee is exposed to noise levels in excess of the action levels as listed in the following regulations. *Brent Messina* is the designated supervisor for ensuring the following engineering controls and work practices will be enforced:

- Upon initial hiring, all employees who are exposed to action level noise will be trained in the hazards presented by excessive noise levels in the workplace, and the use and care of hearing protection devices. Training will be repeated annually for each employee and updated to reflect changes in personal protective equipment (PPE) and work processes or requirements. *Brent Messina* will make copies of the noise exposure procedures available to affected employees and will also post a copy in the workplace and allow OSHA access to records.
- Hearing protectors are available upon request from *Brent Messina* at no cost to all employees exposed to an 8-hr. time-weighted average of 85 decibels. Hearing protection will be replaced as necessary. Each employee will be properly trained in the use, care, and fitting of hearing protectors. *Brent Messina* will ensure that hearing protectors are worn. Employees will be given the opportunity to select their hearing protectors from a variety of suitable hearing protectors.
- *Cain's Pipeline & Industrial Services, LLC.* will provide a continuing effective hearing conservation program when employees are exposed to sound levels greater than 85 dBs on an 8 hour time-weighted average basis.
- When information indicates that employee exposure may equal/exceed the 8 hr time-weighted avg. of 85 decibels, *Brent Messina* will implement a monitoring program to identify employees to be included in the hearing conservation program.
- Employees will be required to wear hearing protection in work areas whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale (slow response) or, equivalently, a dose of fifty percent.
- *Brent Messina* will maintain an audiometric testing program by making audiometric testing available to all employees whose exposures equal or exceed an 8-hr. time-weighted avg. 85 decibels. The program is provided at no cost to employees.
- Audio monitoring will be implemented if it is believed noise levels in work areas are approaching or exceed action level limits. If monitoring results indicate exposures equaling or exceeding safe limits, an employee will be included in a hearing conservation program.

- Within 6 months of an employee's first exposure at or above the action level, *Cain's Pipeline & Industrial Services, LLC*. shall establish a valid baseline audiogram against which future audiograms can be compared. When a mobile van is used, the baseline shall be established within 1 yr.
- Testing to establish a baseline audiogram will be preceded by at least 14 hours without exposure to workplace noise. Hearing protection may be used to meet the requirement. Employees will also be notified to avoid high levels of noise.
- At least annually after obtaining the baseline audiogram, *Brent Messina* will obtain a new audiogram for each employee exposed at or above an 8-hour time-weighted average of 85 decibels. Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if a standard threshold shift has occurred. If a comparison of the annual audiogram to the baseline audiogram indicates a standard threshold shift, the employee shall be informed of this fact in writing, within 21 days of the determination.
- If a standard threshold shift occurs, use of hearing protection shall be re-evaluated and/or refitted and if necessary a medical evaluation may be required. The following procedures will be implemented:
 - Employees not using hearing protectors will be fitted with hearing protectors, trained in their use and care, and required to use them.
 - Employees already using hearing protectors will be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation if necessary.
 - Employees will be referred for a clinical audiological evaluation or an otological examination, as appropriate, if additional testing is necessary or if it is suspected that a medical pathology of the ear is caused or aggravated by the wearing of hearing protectors.
 - Employees will be informed of the need for an otological examination if a medical pathology of the ear that is unrelated to the use of hearing protectors is suspected.
 - Audiometric evaluation and testing conducted by a licensed physician using the guidelines contained in §1910.95 (g), and is available to all employees whose work requirements equals or exceeds an 8 hr. time-weighted average 85 decibels on a regular basis at no cost to the employee. Hearing protection is available at no cost to all employees upon request from the jobsite foreman or company office.
- *Brent Messina* will evaluate hearing protection for the specific noise environments in which the protector will be used.
- An accurate record of all audio testing and monitoring will be kept at the company office and maintained as required. Evaluations will be done for suitable hearing protection from the noise levels encountered in the workplace. These records, as well as information on these OSHA regulations and appendices will be available to employees upon request.
- Hearing protection is available at no cost to all employees upon request from the jobsite foreman or company office.

§1910.95 – Occupational Noise Exposure

a) Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table G-16 when measured on the A scale of a standard sound level meter at slow response. When noise levels are determined by octave band analysis, the equivalent A-weighted sound level may be determined as follows:

Equivalent sound level contours. Octave band sound pressure levels may be converted to the equivalent A-weighted sound level by plotting them on this graph and noting the A-weighted sound level corresponding to the point of highest penetration into the sound level contours. This equivalent A-weighted sound level, which may differ from the actual A-weighted sound level of the noise, is used to determine exposure limits from Table 1.G-16.

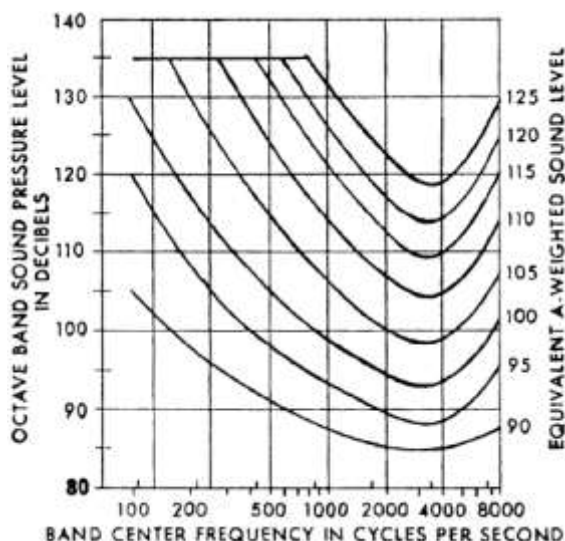


Figure G-9

TABLE G-16—PERMISSIBLE NOISE EXPOSURES¹

Duration per day, hours	Sound level dBA slow response
8	90
6	92
4	95
3	97
2	100
1½	102
1	105
½	110
¼ or less	115

¹ When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: $C_1/T_1 + C_2/T_2 + C_3/T_3$, exceeds unity, then, the mixed exposure should be considered to exceed the limit value. C_n indicates the total time of exposure at a specified noise level, and T_n indicates the total time of exposure permitted at that level.

Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

(b) (1) When employees are subjected to sound exceeding those listed in Table G-16, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table G-16, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.

(2) If the variations in noise level involve maxima at intervals of 1 second or less, it is to be considered continuous.

(c) Hearing conservation program.

(1) The employer shall administer a continuing, effective hearing conservation program, as described in paragraphs (c) through (o) of this section, whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale (slow response) or, equivalently, a dose of fifty percent. For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with Appendix A and Table G-16a, and without regard to any attenuation provided by the use of personal protective equipment.

(2) For purposes of paragraphs (c) through (n) of this section, an 8-hour time-weighted average of 85 decibels or a dose of fifty percent shall also be referred to as the action level.

(d) Monitoring.

(1) When information indicates that any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, the employer shall develop and implement a monitoring program.

(i) The sampling strategy shall be designed to identify employees for inclusion in the hearing conservation program and to enable the proper selection of hearing protectors.

(ii) Where circumstances such as high worker mobility, significant variations in sound level, or a significant component of impulse noise make area monitoring generally inappropriate, the employer shall use representative personal sampling to comply with the monitoring requirements of this paragraph unless the employer can show that area sampling produces equivalent results.

(2) (i) All continuous, intermittent and impulsive sound levels from 80 decibels to 130 decibels shall be integrated into the noise measurements.

(ii) Instruments used to measure employee noise exposure shall be calibrated to ensure measurement accuracy.

(3) Monitoring shall be repeated whenever a change in production, process, equipment or controls increases noise exposures to the extent that:

(i) Additional employees may be exposed at or above the action level; or

(ii) The attenuation provided by hearing protectors being used by employees may be rendered inadequate to meet the requirements of paragraph (j) of this section.

(e) **Employee notification.** The employer shall notify each employee exposed at or above an 8-hour time-weighted average of 85 decibels of the results of the monitoring.

(f) **Observation of monitoring.** The employer shall provide affected employees or their representatives with an opportunity to observe any noise measurements conducted pursuant to this section.

(g) **Audiometric testing program.**

(1) The employer shall establish and maintain an audiometric testing program as provided in this paragraph by making audiometric testing available to all employees whose exposures equal or exceed an 8-hour time-weighted average of 85 decibels.

(2) The program shall be provided at no cost to employees.

(4) All audiograms obtained pursuant to this section shall meet the requirements of Appendix C: Audiometric Measuring Instruments.

(5) **Baseline audiogram.**

(i) Within 6 months of an employee's first exposure at or above the action level, the employer shall establish a valid baseline audiogram against which subsequent audiograms can be compared.

(ii) **Mobile test van exception.** Where mobile test vans are used to meet the audiometric testing obligation, the employer shall obtain a valid baseline audiogram within one year of an employee's first exposure at or above the action level, employees shall wear hearing protectors for any period exceeding six months after first exposure until the baseline audiogram is obtained.

(iii) Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace noise. Hearing protectors may be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to workplace noise.

(iv) The employer shall notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination.

(6) **Annual audiogram.** At least annually after obtaining the baseline audiogram, the employer shall obtain a new audiogram for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.

(7) **Evaluation of audiogram.**

(i) Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if a standard threshold shift as defined in paragraph (g)(10) of this section has occurred. This comparison may be done by a technician.

(ii) If the annual audiogram shows that an employee has suffered a standard threshold shift, the employer may obtain a retest within 30 days and consider the results of the retest as the annual audiogram.

(iii) The audiologist, otolaryngologist, or physician shall review problem audiograms and shall determine whether there is a need for further evaluation. The employer shall provide to the person performing this evaluation the following information:

(A) A copy of the requirements for hearing conservation as set forth in paragraphs (c) through (n) of this section;

(B) The baseline audiogram and most recent audiogram of the employee to be evaluated;

(C) Measurements of background sound pressure levels in the audiometric test room as required in Appendix D: Audiometric Test Rooms.

(D) Records of audiometer calibrations required by paragraph (h)(5) of this section.

(8) **Follow-up procedures.**

(i) If a comparison of the annual audiogram to the baseline audiogram indicates a standard threshold shift as defined in paragraph (g)(10) of this section has occurred, the employee shall be informed of this fact in writing, within 21 days of the determination.

(ii) Unless a physician determines that the standard threshold shift is not work related or aggravated by occupational noise exposure, the employer shall ensure that the following steps are taken when a standard threshold shift occurs:

(A) Employees not using hearing protectors shall be fitted with hearing protectors, trained in their use and care, and required to use them.

(B) Employees already using hearing protectors shall be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation if necessary.

(C) The employee shall be referred for a clinical audiological evaluation or an otological examination, as appropriate, if additional testing is necessary or if the employer suspects that a medical pathology of the ear is caused or aggravated by the wearing of hearing protectors.

(D) The employee is informed of the need for an otological examination if a medical pathology of the ear that is unrelated to the use of hearing protectors is suspected.

(iii) If subsequent audiometric testing of an employee whose exposure to noise is less than an 8-hour TWA of 90 decibels indicates that a standard threshold shift is not persistent, the employer:

(A) Shall inform the employee of the new audiometric interpretation; and

(B) May discontinue the required use of hearing protectors for that employee.

(9) Revised baseline. An annual audiogram may be substituted for the baseline audiogram when, in the judgment of the audiologist, otolaryngologist or physician who is evaluating the audiogram:

(i) The standard threshold shift revealed by the audiogram is persistent; or

(ii) The hearing threshold shown in the annual audiogram indicates significant improvement over the baseline audiogram.

(10) Standard threshold shift.

(i) As used in this section, a standard threshold shift is a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear.

(ii) In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging (presbycusis) to the change in hearing level by correcting the annual audiogram according to the procedure described in appendix F: *Calculation and Application of Age Correction to Audiograms*.

(h) Audiometric test requirements.

(1) Audiometric tests shall be pure tone, air conduction, hearing threshold examinations, with test frequencies including as a minimum 500, 1000, 2000, 3000, 4000, and 6000 Hz. Tests at each frequency shall be taken separately for each ear.

(2) Audiometric tests shall be conducted with audiometers (including microprocessor audiometers) that meet the specifications of, and are maintained and used in accordance with, American National Standard Specification for Audiometers, S3.6-1969, which is incorporated by reference as specified in §1910.6.

(3) Pulsed-tone and self-recording audiometers, if used, shall meet the requirements specified in Appendix C: Audiometric Measuring Instruments.

(4) Audiometric examinations shall be administered in a room meeting the requirements listed in Appendix D: Audiometric Test Rooms.

(5) Audiometer calibration.

(i) The functional operation of the audiometer shall be checked before each day's use by testing a person with known, stable hearing thresholds, and by listening to the audiometer's output to make sure that the output is free from distorted or unwanted sounds. Deviations of 10 decibels or greater require an acoustic calibration.

(ii) Audiometer calibration shall be checked acoustically at least annually in accordance with Appendix E: Acoustic Calibration of Audiometers. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this check. Deviations of 15 decibels or greater require an exhaustive calibration.

(iii) An exhaustive calibration shall be performed at least every two years in accordance with sections 4.1.2; 4.1.3.; 4.1.4.3; 4.2; 4.4.1; 4.4.2; 4.4.3; and 4.5 of the American National Standard Specification for Audiometers, S3.6-1969. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this calibration.

(i) Hearing protectors.

(1) Employers shall make hearing protectors available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater at no cost to the employees. Hearing protectors shall be replaced as necessary.

(2) Employers shall ensure that hearing protectors are worn:

(i) By an employee who is required by paragraph (b)(1) of this section to wear personal protective equipment; and

(ii) By any employee who is exposed to an 8-hour time-weighted average of 85 decibels or greater, and who:

(A) Has not yet had a baseline audiogram established pursuant to paragraph (g)(5)(ii); or

(B) Has experienced a standard threshold shift.

(3) Employees shall be given the opportunity to select their hearing protectors from a variety of suitable hearing protectors provided by the employer.

(4) The employer shall provide training in the use and care of all hearing protectors provided to employees.

(5) The employer shall ensure proper initial fitting and supervise the correct use of all hearing protectors.

(j) Hearing protector attenuation.

(1) The employer shall evaluate hearing protector attenuation for the specific noise environments in which the protector will be used. The employer shall use one of the evaluation methods described in **Appendix B: Methods for Estimating the Adequacy of Hearing Protection Attenuation.**

(2) Hearing protectors must attenuate employee exposure at least to an 8-hour time-weighted average of 90 decibels as required by paragraph (b) of this section.

(3) For employees who have experienced a standard threshold shift, hearing protectors must attenuate employee exposure to an 8-hour time-weighted average of 85 decibels or below.

(4) The adequacy of hearing protector attenuation shall be re-evaluated whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. The employer shall provide more effective hearing protectors where necessary.

(k) Training program.

(1) The employer shall institute a training program for all employees who are exposed to noise at or above an 8-hour time-weighted average of 85 decibels, and shall ensure employee participation in such program.

(2) The training program shall be repeated annually for each employee included in the hearing conservation program. Information provided in the training program shall be updated to be consistent with changes in protective equipment and work processes.

(3) The employer shall ensure that each employee is informed of the following:

(i) The effects of noise on hearing;

(ii) The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care; and

(iii) The purpose of audiometric testing, and an explanation of the test procedures.

(l) Access to information and training materials.

(1) The employer shall make available to affected employees or their representatives copies of this standard and shall also post a copy in the workplace.

(2) The employer shall provide to affected employees any informational materials pertaining to the standard that are supplied to the employer by the Assistant Secretary.

(3) The employer shall provide, upon request, all materials related to the employer's training and education program pertaining to this standard to the Assistant Secretary and the Director.

(m) Recordkeeping.

(1) Exposure measurements. The employer shall maintain an accurate record of all employee exposure measurements required by paragraph (d) of this section.

(2) Audiometric tests.

(i) The employer shall retain all employee audiometric test records obtained pursuant to paragraph (g) of this section:

(ii) This record shall include:

(A) Name and job classification of the employee;

(B) Date of the audiogram;

(C) The examiner's name;

(D) Date of the last acoustic or exhaustive calibration of the audiometer; and

(E) Employee's most recent noise exposure assessment.

(F) The employer shall maintain accurate records of the measurements of the background sound pressure levels in audiometric test rooms.

(3) Record retention. The employer shall retain records required in this paragraph (m) for at least the following periods.

(i) Noise exposure measurement records shall be retained for two years.

(ii) Audiometric test records shall be retained for the duration of the affected employee's employment.

(4) Access to records. All records required by this section shall be provided upon request to employees, former employees, representatives designated by the individual employee, and the Assistant Secretary. The provisions of 29 CFR 1910.20(a)-(e) and (g)-(i) apply to access to records under this section.

(5) Transfer of records. If the employer ceases to do business, the employer shall transfer to the successor employer all records required to be maintained by this section, and the successor employer shall retain them for the remainder of the period prescribed in paragraph (m)(3) of this section.

APPENDIX A to §1910.95 — Noise Exposure Computation

This Appendix is Mandatory

I. Computation of Employee Noise Exposure.

(1) Noise dose is computed using Table G-16a as follows:

(i) When the sound level, L , is constant over the entire work shift, the noise dose, D , in percent, is given by: $D = 100 C/T$ where C is the total length of the work day, in hours, and T is the reference duration corresponding to the measured sound level, L , as given in Table G-16a or by the formula shown as a footnote to that table.

(ii) When the workshift noise exposure is composed of two or more periods of noise at different levels, the total noise dose over the work day is given by: $D = 100 (C_1/T_1 + C_2/T_2 + \dots + C_n/T_n)$,

where C_n indicates the total time of exposure at a specific noise level, and T_n indicates the reference duration for that level as given by Table G-16a.

(2) The eight-hour time-weighted average sound level (TWA), in decibels, may be computed from the dose, in percent, by means of the formula: $TWA = 16.61 \log_{10} (D/100) + 90$. For an eight-hour workshift with the noise level constant over the entire shift, the TWA is equal to the measured sound level.

(3) A table relating dose and TWA is given in Section II.

<i>A-weighted sound level, L (decibel)</i>	<i>Reference duration, T (hour)</i>	<i>A-weighted sound level, L (decibel)</i>	<i>Reference duration, T (hour)</i>
80	32	106	0.87
81	27.9	107	0.76
82	24.3	108	0.66
83	21.1	109	0.57
84	18.4	110	0.5
85	16	111	0.44
86	13.9	112	0.38
87	12.1	113	0.33
88	10.6	114	0.29
89	9.2	115	0.25
90	8	116	0.22
91	7.0	117	0.19
92	6.1	118	0.16
93	5.3	119	0.14
94	4.6	120	0.125
95	4	121	0.11
96	3.5	122	0.095
97	3.0	123	0.082
98	2.6	124	0.072
99	2.3	125	0.063
100	2	126	0.054
101	1.7	127	0.047
102	1.5	128	0.041
103	1.3	129	0.036
104	1.1	130	0.031
105	1		

In the above table the reference duration, T , is computed by

$$T = \frac{8}{2^{(L-90)/5}}$$

where L is the measured A-weighted sound level.

II. Conversion Between "Dose" and "8-Hour Time-Weighted Average" Sound Level.

Compliance with paragraphs (c)-(r) of this regulation is determined by the amount of exposure to noise in the workplace. The amount of such exposure is usually measured with an audio dosimeter which gives a readout in terms of "dose." In order to better understand the requirements of the amendment, dosimeter readings can be converted to an "8-hour time-weighted average sound level." (TWA).

In order to convert the reading of a dosimeter into TWA, see Table A-1, below. This table applies to dosimeters that are set by the manufacturer to calculate dose or percent exposure according to the relationships in Table G-16a. So, for example, a dose of 91 percent over an eight hour day results in a TWA of 89.3 dB, and, a dose of 50 percent corresponds to a TWA of 85 dB.

If the dose as read on the dosimeter is less than or greater than the values found in Table A-1, the TWA may be calculated by using the formula: $TWA = 16.61 \log_{10} (D/100) + 90$ where TWA = 8-hour time-weighted average sound level and D = accumulated dose in percent exposure.

Table A-1 - Conversion from "Percent Noise Exposure" or "Dose" to "8-hour Time-Weighted Average Sound Level" (TWA)

Dose or percent noise exposure	TWA	Dose or percent noise exposure	TWA	Dose or percent noise exposure	TWA	Dose or percent noise exposure	TWA
10	73.4	104	90.3	260	96.9	640	103.4
15	76.3	105	90.4	270	97.2	650	103.5
20	78.4	106	90.4	280	97.4	660	103.6
25	80.0	107	90.5	290	97.7	670	103.7
30	81.3	108	90.6	300	97.9	680	103.8
35	82.4	109	90.6	310	98.2	690	103.9
40	83.4	110	90.7	320	98.4	700	104.0
45	84.2	111	90.8	330	98.6	710	104.1
50	85.0	112	90.8	340	98.8	720	104.2
55	85.7	113	90.9	350	99.0	730	104.3
60	86.3	114	90.9	360	99.2	740	104.4
65	86.9	115	91.1	370	99.4	750	104.5
70	87.4	116	91.1	380	99.6	760	104.6
75	87.9	117	91.1	390	99.8	770	104.7
80	88.4	118	91.2	400	100.0	780	104.8
81	88.5	119	91.3	410	100.2	790	104.9
82	88.6	120	91.3	420	100.4	800	105.0
83	88.7	125	91.6	430	100.5	810	105.1
84	88.7	130	91.9	440	100.7	820	105.2
85	88.8	135	92.2	450	100.8	830	105.3
86	88.9	140	92.4	460	101.0	840	105.4
87	89.0	145	92.7	470	101.2	850	105.4
88	89.1	150	92.9	480	101.3	860	105.5
89	89.2	155	93.2	490	101.5	870	105.6
90	89.2	160	93.4	500	101.6	880	105.7
91	89.3	165	93.6	510	101.8	890	105.8
92	89.4	170	93.8	520	101.9	900	105.8
93	89.5	175	94.0	530	102.0	910	105.9
94	89.6	180	94.2	540	102.2	920	106.0
95	89.6	185	94.4	550	102.3	930	106.1
96	89.7	190	94.6	560	102.4	940	106.2
97	89.8	195	94.8	570	102.6	950	106.2
98	89.9	200	95.0	580	102.7	960	106.3
99	89.9	210	95.4	590	102.8	970	106.4
100	90.0	220	95.7	600	102.9	980	106.5
101	90.1	230	96.0	610	103.0	990	106.5
102	90.1	240	96.3	620	103.2	999	106.6
103	90.2	250	96.6	630	103.3		

APPENDIX B to §1910.95

Methods for Estimating the Adequacy of Hearing Protector Attenuation

This Appendix is Mandatory

For employees who have experienced a significant threshold shift, hearing protector attenuation must be sufficient to reduce employee exposure to a TWA of 85 dB. Employers must select one of the following methods by which to estimate the adequacy of hearing protector attenuation.

The most convenient method is the Noise Reduction Rating (NRR) developed by the Environmental Protection Agency (EPA). According to EPA regulation, the NRR must be shown on the hearing protector package. The NRR is then related to an individual worker's noise environment in order to assess the adequacy of the attenuation of a given hearing protector. This Appendix describes four methods of using the NRR to determine whether a particular hearing protector provides adequate protection within a given exposure environment. Selection among the four procedures is dependent upon the employer's noise measuring instruments.

Instead of using the NRR, employers may evaluate the adequacy of hearing protector attenuation by using one of the three methods developed by the National Institute for Occupational Safety and Health (NIOSH), which are described in the "List of Personal Hearing Protectors and Attenuation Data," HEW Publication No. 76-120, 1975, pages 21-37. These methods are known as NIOSH methods #1, #2 and #3. The NRR described below is a simplification of NIOSH method #2. The most complex method is NIOSH method #1, which is probably the most accurate method since it uses the largest amount of spectral information from the individual employee's noise environment. As in the case of the NRR method described below, if one of the NIOSH methods is used, the selected method must be applied to an individual's noise environment to assess the adequacy of the attenuation. Employers should be careful to take a sufficient number of measurements in order to achieve a representative sample for each time segment.

NOTE: The employer must remember that calculated attenuation values reflect realistic values only to the extent that the protectors are properly fitted and worn. When using the NRR to assess hearing protector adequacy, one of the following methods must be used:

- (i) When using a dosimeter that is capable of C-weighted measurements:
 - (A) Obtain the employee's C-weighted dose for the entire workshift, and convert to TWA (see App A, II).
 - (B) Subtract the NRR from the C-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.
- (ii) When using a dosimeter that is not capable of C-weighted measurements, the following method may be used:
 - (A) Convert the A-weighted dose to TWA (see Appendix A).
 - (B) Subtract 7 dB from the NRR.
 - (C) Subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.
- (iii) When using a sound level meter set to the A-weighting network:
 - (A) Obtain the employee's A-weighted TWA.
 - (B) Subtract 7 dB from the NRR, and subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.
- (iv) When using a sound level meter set on the C-weighting network:
 - (A) Obtain a representative sample of the C-weighted sound levels in the employee's environment.
 - (B) Subtract the NRR from the C-weighted average sound level to obtain the estimated A-weighted TWA under the ear protector.
- (v) When using area monitoring procedures and a sound level meter set to the A-weighting network:
 - (A) Obtain a representative sound level for the area in question.
 - (B) Subtract 7 dB from the NRR and subtract the remainder from the A-weighted sound level for that area.
- (vi) When using area monitoring procedures and a sound level meter set to the C-weighting network:
 - (A) Obtain a representative sound level for the area in question.
 - (B) Subtract the NRR from the C-weighted sound level for that area.

Chapter 27

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Personal Protective Equipment

General Requirements

Cain's Pipeline & Industrial Services, LLC. has adopted this program for Personal Protective Equipment (PPE) from the following OSHA regulations:

§1910.132 – Personal Protective Equipment

Cain's Pipeline & Industrial Services, LLC. has implemented this safety program to ensure the protection of personnel from hazards on the job which may be safeguarded against by the proper use of PPE. **Brent Messina** is the supervisor responsible for ensuring the following work practices are enforced:

- *Brent Messina* will ensure that all employees are properly trained in the recognition and assessment of hazards and hazardous situations, the proper selection and use of PPE equipment required for the hazard and methods to avoid, prevent, or abate such hazards.
- PPE training will include: When PPE is necessary; what PPE is necessary; how to properly on, off, adjust, and wear PPE; the limitations of PPE; the proper care, maintenance, useful life and disposal of PPE.
- Retraining of employees is required when the workplace changes, making the earlier training obsolete; the type PPE changes; or when the employee demonstrates lack of use, improper use, or insufficient skill or understanding.
- Employees will be trained on initial hiring to use, maintain, clean and disinfect, store, and service PPE properly. Employees will receive refresher training on PPE at least annually, or as work requirements, changing job assignments, changing equipment, or environment warrants it. Any employee who demonstrates a lack of knowledge or understanding of any aspect of PPE use or maintenance will be re-trained. An employee must verify his/her understanding of training content as a condition of employment.
- All training will be documented and will include the employee name, the dates of training, and the certification subject.
- *Brent Messina* will do a hazard assessment of each jobsite prior to commencement of work to ascertain if hazards are present or likely to be encountered, what engineering controls may be implemented to minimize hazards, and what PPE is necessary for the performance of the job. The hazard assessment will include the certifier's name, signature, date(s), and identification of assessment documents. Affected employees will be notified of hazards, engineering controls needed, and PPE required.
(See Job-Site Hazard Assessment form at the end of this section)
- PPE will be provided for all work required by *Cain's Pipeline & Industrial Services, LLC.* and employees are required by company policy to use only proper company PPE at all times when required on the job or on company property. Failure to use PPE will result in disciplinary action against the violating employee.
- *Brent Messina* will ensure that if employee-owned PPE is used, it will be adequate for the application, properly maintained, and kept in sanitary condition.

- PPE will be issued and fitted to each affected employee individually. Employees must demonstrate proficiency in donning and doffing equipment, and proper techniques of cleaning and maintaining their respective equipment.
- Defective or damaged PPE will NOT be used. Defective or damaged PPE will be immediately tagged "OUT OF SERVICE", removed from service, and replaced with serviceable equipment. PPE will be inspected by the individual employee at the beginning of each work shift.
- PPE must be used, stored, and maintained in a sanitary condition. All PPE must be cleaned and/or disinfected and stored according to manufacturer's recommendations.

§1910.132 GENERAL PPE REQUIREMENTS.

(a) **Application.** Protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, shall be provided, used, and maintained in a sanitary and reliable condition wherever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact.

(b) **Employee-owned equipment.** Where employees provide their own protective equipment, the employer shall be responsible to assure its adequacy, including proper maintenance, and sanitation of such equipment.

(c) **Design.** All PPE shall be of safe design and construction for the work to be performed.

NOTE: This paragraph (1910.132(d)) applies only to eye and face, head, foot, and hand protection. See 1910.132(g).

(d) **Hazard assessment and equipment selection.**

(1) The employer shall assess the workplace to determine if hazards are present, or are likely to be present, which necessitate the use of personal protective equipment (PPE). If such hazards are present, or likely to be present, the employer shall:

- (i) Select, and have each affected employee use, the types of PPE that will protect the affected employee from the hazards identified in the hazard assessment;
- (ii) Communicate selection decisions to each affected employee; and,
- (iii) Select PPE that properly fits each affected employee.

NOTE: Non-mandatory Appendix B contains an example of procedures that would comply with the requirement for a hazard assessment.

(2) The employer shall verify that the required workplace hazard assessment has been performed through a written certification that identifies the workplace evaluated; the person certifying that the evaluation has been performed; the date(s) of the hazard assessment; and, which identifies the document as a certification of hazard assessment.

(e) **Defective and damaged equipment.** Defective or damaged PPE shall not be used.

NOTE: This paragraph (1910.132(f)) applies only to eye and face, head, foot, and hand protection..

(f) **Training.**

(1) The employer shall provide training to each employee who is required by this section to use PPE. Each such employee shall be trained to know at least the following:

- (i) When PPE is necessary;
- (ii) What PPE is necessary;
- (iii) How to properly don, doff, adjust, and wear PPE;
- (iv) The limitations of the PPE; and,
- (v) The proper care, maintenance, useful life and disposal of the PPE.

(2) Each affected employee shall demonstrate an understanding of the training specified in paragraph (f)(1) of this section, and the ability to use PPE properly, before being allowed to perform work requiring the use of PPE.

(3) When the employer has reason to believe that any affected employee who has already been trained does not have the understanding and skill required by paragraph (f)(2) of this section, the employer shall retrain each such employee.

Circumstances where retraining is required include, but are not limited to situations where:

- (i) Changes in the workplace render previous training obsolete; or
- (ii) Changes in the types of PPE to be used render previous training obsolete; or
- (iii) Inadequacies in an affected employee's knowledge or use of assigned PPE indicate that the employee has not retained the requisite understanding or skill.

(4) The employer shall verify that each affected employee has received and understood the required training through a written certification that contains the name of each employee trained, the date(s) of training, and that identifies the subject of the certification.

APPENDIX B TO §1910.132I

Non-mandatory Compliance Guidelines for Hazard Assessment and PPE Selection

NOTE: The Text of Appendix B was Adopted in its Entirety by Admin. Order 5-1994. This appendix is intended to provide compliance assistance for employers and employees in implementing requirements for a hazard assessment and the selection of personal protective equipment.

1. Controlling hazards. PPE devices alone should not be relied on to provide protection against hazards, but should be used in conjunction with guards, engineering controls, and sound manufacturing practices.

2. Assessment and selection. It is necessary to consider certain general guidelines for assessing the foot, head, eye and face, and hand hazard situations that exist in an occupational or educational operation or process, and to match the protective devices to the particular hazard. It should be the responsibility of the safety officer to exercise common sense and appropriate expertise to accomplish these tasks.

3. Assessment guidelines. In order to assess the need for PPE the following steps should be taken:

a. Survey. Conduct a walk-through survey of the areas in question. The purpose of the survey is to identify sources of hazards to workers and co-workers. Consideration should be given to the basic hazard categories:

(a) Impact	(d) Chemical	(g) Light (optical) radiation
(b) Penetration	(e) Heat	
(c) Compression (roll-over)	(f) Harmful dust	

b. Sources. During the walk-through survey the safety officer should observe:

- (a) Sources of motion; i.e., machinery or processes where any movement of tools, machine elements or particles could exist, or movement of personnel that could result in collision with stationary objects;
- (b) Sources of high temperatures that could result in burns, eye injury, or ignition of protective equipment.
- (c) Types of chemical exposures;
- (d) Sources of harmful dust;
- (e) Sources of light radiation, i.e. welding, brazing, cutting, furnaces, high intensity lights, etc;
- (f) Sources of falling objects or potential for dropping objects;
- (g) Sources of sharp objects which might pierce the feet or cut the hands;
- (h) Sources of rolling or pinching objects which could crush the feet;
- (i) Layout of workplace and location of co-workers; and
- (j) Any electrical hazards.

In addition, injury/accident data should be reviewed to help identify problem areas.

c. Organize data. Following the walk-through survey, it is necessary to organize the data and information for use in the assessment of hazards. The objective is to prepare for an analysis of the hazards in the environment to enable proper selection of protective equipment.

d. Analyze data. Having gathered and organized data on a workplace, an estimate of the potential for injuries should be made. Each of the basic hazards (paragraph 3.a) should be reviewed and a determination made as to the type, level of risk, and seriousness of potential injury from each of the hazards found in the area. The possibility of exposure to several hazards simultaneously should be considered.

4. Selection guidelines. After completion of the procedures in paragraph 3, the general procedure for selection of protective equipment is to: a) Become familiar with the potential hazards and the type of protective equipment that is available, and what it can do; i.e., splash protection, impact protection, etc.; b) compare the hazards associated with the environment; i.e., impact velocities, masses, projectile shape, radiation intensities, with the capabilities of the available protective equipment; c) select the protective equipment which ensures a level of protection greater than the minimum required to protect employees from the hazards; and d) fit the user with the protective device and give instructions on care and use of the PPE. It is very important that end users be made aware of all warning labels for and limitations of their PPE.

5. Fitting the device. Careful consideration must be given to comfort and fit. PPE that fits poorly will not afford the necessary protection. Continued wearing of the device is more likely if it fits the wearer comfortably. Protective devices are generally available in a variety of sizes. Care should be taken to ensure that the right size is selected.

6. Devices with adjustable features. Adjustments should be made on an individual basis for a comfortable fit that will maintain the protective device in the proper position. Particular care should be taken in fitting devices for eye protection against dust and chemical splash to ensure that the devices are sealed to the face. In addition, proper fitting of helmets is important to ensure that it will not fall off during work operations. In some cases a chin strap may be necessary to keep the helmet on an employee's head.

(Chin straps should break at a reasonable low force, however, so as to prevent a strangulation hazard). Where manufacturer's instructions are available, they should be followed carefully.

7. Reassessment of hazards. It is the responsibility of the safety officer to reassess the workplace hazard situation as necessary, by identifying and evaluating new equipment and processes, reviewing accident records, and reevaluating the suitability of previously selected PPE.

8. Selection chart guidelines for eye and face protection. Some occupations (not a complete list) for which eye protection should be routinely considered are: carpenters, electricians, machinists, mechanics and repairers, millwrights, plumbers and pipe fitters, sheet metal workers and tinsmiths, assemblers, sanders, grinding machine operators, lathe and milling machine operators, sawyers, welders, laborers, chemical process operators and handlers, and timber cutting and logging workers. The following chart provides general guidance for the proper selection of eye and face protection to protect against hazards associated with the listed hazard source operations.

Eye and Face Protection Selection Chart		
<i>Source</i>	<i>Assessment of Hazard</i>	<i>Protection</i>
IMPACT --- Chipping, grinding, machining, masonry work, woodworking, sawing, drilling, chiseling, powered fastening, riveting, and sanding	Flying fragments, objects, large chips, particles sand, dirt, etc.	Spectacles with side protection, goggles, face shields. For severe exposure, use face shield. See notes 1, 3, 5, 6, 10.
HEAT -- Furnace operations, pouring, casting, hot dipping, and welding	Hot sparks	Face shields, goggles, spectacles with side protection. For severe exposure use face shield. See notes 1, 2, 3.
	Splash from molten metals	Face shields worn over goggles. See notes 1, 2, 3.
	High temperature exposure	Screen face shields, reflective face shields. See notes 1, 2, 3.
CHEMICALS -- Acid and chemicals handling, degreasing, plating	Splash	Goggles, eyecup and cover types. For severe exposure, use face shield. See notes 3, 11.
	Irritating mists	Special-purpose goggles.
DUST -- Woodworking, buffing, general dusty conditions	Nuisance dust	Goggles, eyecup and cover types. See note 8.
LIGHT AND/OR RADIATION		
Welding: Electric arc	Optical radiation	Welding helmets or welding shields. Typical shades: 10-14. See notes 9, 12.
Welding: Gas	Optical radiation	Welding goggles or welding face shield. Typical shades: gas welding 4-8, cutting 3-6, brazing 3-4. See note 9.
Cutting, Torch brazing, Torch soldering	Optical radiation	Spectacles or welding face-shield. Typical shades, 1.5-3. See notes 3, 9
Glare	Poor vision	Spectacles with shaded or special-purpose lenses, as suitable. See notes 9, 10.

Notes to Eye and Face Protection Selection Chart:

- (1) Care should be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards should be provided. Protective devices do not provide unlimited protection.
- (2) Operations involving heat may also involve light radiation. As required by the standard, protection from both hazards must be provided.
- (3) Face shields should only be worn over primary eye protection (spectacles or goggles).
- (4) As required by the standard, filter lenses must meet the requirements for shade designations in §1910.133(a)(5). Tinted and shaded lenses are not filter lenses unless they are marked or identified as such.
- (5) As required by the standard, persons whose vision requires the use of prescription (Rx) lenses must wear either protective devices fitted with prescription (Rx) lenses or protective devices designed to be worn over regular prescription (Rx) eyewear.
- (6) Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment. It should be recognized that dusty and/or chemical environments might represent an additional hazard to contact lens wearers.
- (7) Caution should be exercised in the use of metal frame protective devices in electrical hazard areas.
- (8) Atmospheric conditions and the restricted ventilation of the protector can cause lenses to fog. Frequent cleansing may be necessary.
- (9) Welding helmets or face shields should be used only over primary eye protection (spectacles or goggles).
- (10) Non-sideshield spectacles are available for frontal protection only, but are unacceptable for the sources and operations listed for "impact".
- (11) Ventilation should be adequate, but well protected from splash entry. Eye and face protection should be designed and used so that it provides both adequate ventilation and protects the wearer from splash entry.
- (12) Protection from light radiation is directly related to filter lens density. See note (4). Select the darkest shade that allows task performance.

9. Selection guidelines for head protection. All head protection (helmets) is designed to provide protection from impact and penetration hazards caused by falling objects. Head protection is also available which provides protection from electric shock and burn. When selecting head protection, knowledge of potential electrical hazards is important. Class G (Old Class A) helmets, in addition to impact and penetration resistance, provide electrical protection from low-voltage conductors (they are proof tested to 2,200 volts). Class E (Old Class B) helmets, in addition to impact and penetration resistance, provide electrical protection from high-voltage conductors (they are proof tested to 20,000 volts.) Class C helmets provide impact and penetration resistance (they are usually made of aluminum which conducts electricity), and should not be used around electrical hazards. Where falling object hazards are present, helmets must be worn. Some examples include: working below other workers who are using tools and materials which could fall; working around or under conveyor belts which are carrying parts or materials; working below machinery or processes which might cause material or objects to fall; and working on exposed energized conductors. Some examples of occupations for which head protection should be routinely considered are: carpenters, electricians, linemen, mechanics and repairers, plumbers and pipe fitters, assemblers, packers, wrappers, sawyers, welders, laborers, freight handlers, timber cutting and logging, stock handlers, and warehouse laborers.

10. Selection guidelines for foot protection. Safety shoes and boots which meet the ANSI Z41-1991 Standard provide both impact and compression protection. Where necessary, safety shoes can be obtained which provide puncture protection. In some work situations, metatarsal protection should be provided, and in other special situations electrical conductive or insulating safety shoes would be appropriate. Safety shoes or boots with impact protection would be required for carrying or handling materials such as packages, objects, parts or heavy tools, which could be dropped; and for other activities where objects might fall onto the feet. Safety shoes or boots with compression protection would be required for work activities involving skid trucks (manual material handling carts) around bulk rolls (such as paper rolls) and around heavy pipes, all of which could potentially roll over an employee's feet. Safety shoes or boots with puncture protection would be required where sharp objects such as nails, wire, tacks, screws, large staples, scrap metal, etc., could be stepped on by employees causing a foot injury.

Some occupations (not a complete list) for which foot protection should be routinely considered are: shipping and receiving clerks, stock clerks, carpenters, electricians, machinists, mechanics and repairers, plumbers and pipe fitters, structural metal workers, craters, punch and stamping press operators, sawyers, welders, freight handlers, and timber cutting and logging workers.

11. Selection guidelines for hand protection. Gloves are often relied upon to prevent cuts, abrasions, burns, and skin contact with chemicals that are capable of causing local or systemic effects following dermal exposure. OSHA is unaware of any gloves that provide protection against all potential hand hazards, and commonly available glove materials provide only limited protection against many chemicals. Therefore, it is important to select the most appropriate glove for a particular application and to determine how long it can be worn, and whether it can be reused. It is also important to know the performance characteristics of gloves relative to the specific hazard anticipated; e.g., chemical hazards, cut hazards, flame hazards, etc. These performance characteristics should be assessed by using standard test procedures. Before purchasing gloves, the employer should request documentation from the manufacturer that the gloves meet the appropriate test standard(s) for the hazard(s) anticipated. Other factors to be considered for glove selection in general include:

(A) As long as the performance characteristics are acceptable, in certain circumstances, it may be more cost effective to regularly change cheaper gloves than to reuse more expensive types; and,

(B) The work activities of the employee should be studied to determine the degree of dexterity required, the duration, frequency, and degree of exposure of the hazard, and the physical stresses that will be applied.

With respect to selection of gloves for protection against chemical hazards:

(1) The toxic properties of the chemical(s) must be determined; in particular, the ability of the chemical to cause local effects on the skin and/or to pass through the skin and cause systemic effects;

(2) Generally, any chemical resistant glove can be used for dry powders;

(3) For mixtures and formulated products (unless specific test data are available), a glove should be selected on the basis of the chemical component with the shortest breakthrough time, since it is possible for solvents to carry active ingredients through polymeric materials; and,

(4) Employees must be able to remove the gloves in such a manner as to prevent skin contamination.

12. Cleaning and maintenance. It is important that all PPE be kept clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision. For the purposes of compliance with §1910.132(a) and (b), PPE should be inspected, cleaned, and maintained at regular intervals so that the PPE provides the requisite protection. It is also important to ensure that contaminated PPE which cannot be decontaminated is disposed of in a manner that protects employees from exposure to hazards.

JOB-SITE HAZARD ASSESSMENT

Cain's Pipeline & Industrial Services, LLC.

<i>A walk through inspection for assessment of hazards will be preformed at each job-site prior to commencement of work operations. An assessment for hazards will be performed prior to use of: new equipment, unfamiliar materials, tools, or chemicals.</i>					
Job Name/Number:				Date of Assessment:	
Job Location:					
Person Performing Assessment:				Position:	
Area(s) Inspected:					
Equipment:					
Tool(s):					
Chemical(s):					
Material(s):					
Observed Hazards and Risk Factor					
Type of Hazard	Source of Hazard	Low	Med	High	Recommended Controls or PPE
☐ Impact					
☐ Penetration					
☐ Compression (roll-over, crushing)					
☐ Chemical					
☐ Burn					
☐ Respiratory					
☐ Light (optical) radiation					
☐ Fall					
☐ Entanglement (Pinching, Crushing)					
☐ Electrical					
☐ Collision (Traffic, Vehicle)					
☐ Falling Objects					
☐ Other (Describe)					
☐ Other (Describe)					
Affected Employee(s):					Employee Notified ☒
Name:	Position:	PPE:	☐		
Name:	Position:	PPE:	☐		
Name:	Position:	PPE:	☐		
Name:	Position:	PPE:	☐		
Name:	Position:	PPE:	☐		
Name:	Position:	PPE:	☐		
Type PPE recommended and reason for selection:					
Additional Safety Concerns:					
Additional Engineering Controls Recommended:					
Signature of Person Performing Assessment:					Date:

Notes:

Handwriting practice lines consisting of 20 sets of three horizontal lines (top, middle dashed, bottom).

Chapter 28

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Process Safety Management

Cain's Pipeline & Industrial Services, LLC. has adopted this program for the prevention or minimizing of catastrophic releases of toxic or hazardous substances from the following OSHA regulations:

§1910.119 – Process Safety Management of Highly Hazardous Chemicals

Cain's Pipeline & Industrial Services, LLC. has implemented this policy to prevent or minimize the consequences of catastrophic releases, and to ensure that no employee is exposed to toxic or hazardous material at levels above the permissible exposure limits.

Brent Messina is the supervisor responsible for ensuring the following engineering controls and work practices are enforced:

- *Brent Messina* will ensure that all employees are trained in the processes and practices necessary to perform his/her job safely. *Cain's Pipeline & Industrial Services, LLC.* will keep a record containing the identity of the employee (permanent or contract), the date of training, and the means used to verify that the employee understood the training.
- *Cain's Pipeline & Industrial Services, LLC.* employees are instructed that the purpose of Process Safety Management is to prevent or minimize consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals in various industries such as refineries, etc.
- Hazard communications will encompass all known hazards in the workplace, including fire, explosion, and toxic release hazards, and instruction in the avoidance and abatement of those hazards. All employees of *Cain's Pipeline & Industrial Services, LLC.* are required to abide by all Company Safety Policy and Procedure as presented in this written program or by instruction of their immediate supervisor. Any contract employees must be advised of all hazards to which they may be exposed in the workplace.
- Material Safety Data Sheets will be used to convey process safety information. MSDS will be reviewed for every toxic or hazardous substance in the workplace to which employees might potentially be exposed. MSDS are available to all employees at the office.
- *Cain's Pipeline & Industrial Services, LLC.* responsibilities as a contract employer include the following:
 - *Brent Messina* will assure that each contract employee is trained in the work practices necessary to perform his/her job.
 - *Brent Messina* will assure that each contract employee is instructed in the known potential fire, explosion, or toxic release hazards related to his/her job and the process and the applicable provisions of the Emergency Action Plan.
 - *Brent Messina* will document that each employee has received and understood the required training. The contract employer will prepare a record which contains the identity of the contract employee, the date of training, and the means used to verify that the employee understood the training.

- *Cain's Pipeline & Industrial Services, LLC.* employees will abide by employers safety work practices during operations such as lockout/tagout, confined space entry, opening process equipment or piping and controls over entrance to facility.
 - *Brent Messina* will advise *Cain's Pipeline & Industrial Services, LLC.* of any unique hazards presented by the contract employer's work, or of any hazards found by the contract employer's work.
 - *Cain's Pipeline & Industrial Services, LLC.* employees will not perform hot work until a hot work permit is obtained from *Cain's Pipeline & Industrial Services, LLC.*. The permit will document that provisions of §1910.252(a) have been met.
 - *Cain's Pipeline & Industrial Services, LLC.* will respect the confidentiality of trade secret information when the process safety information is released to them.
- All hot work will be cleared by permit from the contractor. The contractor will be notified in a timely manner of any hot work required by employees of *Cain's Pipeline & Industrial Services, LLC.*.
 - *Cain's Pipeline & Industrial Services, LLC.* has an accident/incident investigation program in place and all employees are instructed to immediately report any accidents, incidents, or near misses to *Brent Messina*, who will initiate an accident investigation within 48 hours. Findings, resolutions, and corrective actions will be documented and maintained 5 years.
 - All *Cain's Pipeline & Industrial Services, LLC.* employees are instructed in the confidentiality of trade secret information, and the disciplinary action which will be a consequence of violation of confidentiality.
 - The highlighted areas of the following OSHA regulation are incorporated into the safety policy of *Cain's Pipeline & Industrial Services, LLC.*:

§1910.119 – Process Safety Management of Highly Hazardous Chemicals

Purpose. This section contains requirements for preventing or minimizing the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals. These releases may result in toxic, fire or explosion hazards.

(a) Application.

(1) This section applies to the following:

- (i) A process which involves a chemical at or above the specified threshold quantities listed in Appendix A to this section;
- (ii) A process which involves a flammable liquid or gas (as defined in 1910.1200(c) of this part) on site in one location, in a quantity of 10,000 pounds (4535.9 kg) or more except for:
 - (A) Hydrocarbon fuels used solely for workplace consumption as a fuel (e.g., propane used for comfort heating, gasoline for vehicle refueling), if such fuels are not a part of a process containing another highly hazardous chemical covered by this standard;
 - (B) Flammable liquids stored in atmospheric tanks or transferred which are kept below their normal boiling point without benefit of chilling or refrigeration.

(2) This section does **not** apply to:

- (i) Retail facilities;
- (ii) Oil or gas well drilling or servicing operations; or,
- (iii) Normally unoccupied remote facilities.

(d) **Process safety information.** In accordance with the schedule set forth in paragraph (e)(1) of this section, the employer shall 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 is to enable the employer and the employees involved in operating the process to identify and understand the hazards posed by those processes involving highly hazardous chemicals. This process safety information shall include information pertaining to the hazards of the highly hazardous chemicals used or produced by the process, information pertaining to the technology of the process, and information pertaining to the equipment in the process.

(1) Information pertaining to the hazards of the highly hazardous chemicals in the process. This information shall consist of at least the following:

- (i) Toxicity information;
- (ii) Permissible exposure limits;
- (iii) Physical data;
- (iv) Reactivity data;
- (v) Corrosivity data;
- (vi) Thermal and chemical stability data; and
- (vii) Hazardous effects of inadvertent mixing of different materials that could foreseeably occur.

Note: Material Safety Data Sheets meeting the requirements of 29 CFR 1910.1200(g) may be used to comply with this requirement to the extent they contain the information required by this subparagraph.

(2) Information pertaining to the technology of the process.

(i) Information concerning the technology of the process shall include at least the following:

- (A) A block flow diagram or simplified process flow diagram (see Appendix B to this section);
- (B) Process chemistry;
- (C) Maximum intended inventory;
- (D) Safe upper and lower limits for such items as temperatures, pressures, flows or compositions; and,
- (E) An evaluation of the consequences of deviations, including those affecting the safety and health of employees.

(ii) 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.

(3) Information pertaining to the equipment in the process.

(i) Information pertaining to the equipment in the process shall include:

- (A) Materials of construction;**
- (B) Piping and instrument diagrams (P&ID's);**
- (C) Electrical classification;**
- (D) Relief system design and design basis;**
- (E) Ventilation system design;**
- (F) Design codes and standards employed;**
- (G) Information pertaining to the equipment in the process shall include material and energy balances for processes built after May 26, 1992.**
- (H) Safety systems (e.g. interlocks, detection or suppression systems).**

(ii) The employer shall document that equipment complies with recognized and generally accepted good engineering practices.

(iii) 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 operating in a safe manner.

(e) Process hazard analysis.

(1) The employer shall perform an initial process hazard analysis (hazard evaluation) on processes covered by this standard. The process hazard analysis shall be appropriate to the complexity of the process and shall identify, evaluate, and control the hazards involved in the process. Employers shall determine and document the priority order for conducting process hazard analyses based on a rationale which includes such considerations as extent of the process hazards, number of potentially affected employees, age of the process, and operating history of the process. The process hazard analysis shall be conducted as soon as possible, but not later than the following schedule:

- (i)** No less than 25 percent of the initial process hazards analyses shall be completed by 05/24/94.
- (ii)** No less than 50 percent of the initial process hazards analyses shall be completed by 05/26/95.
- (iii)** No less than 75 percent of the initial process hazards analyses shall be completed by 05/26/96.
- (iv)** All initial process hazards analyses shall be completed by 05/26/97.
- (v)** Process hazards analyses completed after 05/26/87, which meet the requirements of this paragraph are acceptable as initial process hazards analyses. These process hazard analyses shall be updated and revalidated, based on their completion date, in accordance with paragraph (e)(6) of this section.

(2) The employer shall use one or more of the following methodologies that are appropriate to determine and evaluate the hazards of the process being analyzed.

- (i)** What-If;
- (ii)** Checklist;
- (iii)** What-If/Checklist;
- (iv)** Hazard and Operability Study (HAZOP);
- (v)** Failure Mode and Effects Analysis (FMEA);
- (vi)** Fault-Tree Analysis; or
- (vii)** An appropriate equivalent methodology.

(3) The process hazard analysis shall address:

- (i)** The hazards of the process;
- (ii)** The identification of any previous incident which had a likely potential for catastrophic consequences in the workplace;
- (iii)** Engineering and administrative controls applicable to the hazards and their inter-relationships 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.);
- (iv)** Consequences of failure of engineering and administrative controls;
- (v)** Facility siting;
- (vi)** Human factors; and
- (vii)** A qualitative evaluation of a range of the possible safety and health effects of failure of controls on employees in the workplace.

(4) The process hazard analysis shall be performed by a team with expertise in engineering and process operations, and the team shall include at least one employee who has experience and knowledge specific to

the process being evaluated. Also, one member of the team must be knowledgeable in the specific process hazard analysis methodology being used.

(5) The employer shall establish a system to promptly address the team's findings and recommendations; assure that the recommendations are resolved in a timely manner and that the resolution is documented; document what actions are to be taken; complete actions as soon as possible; develop a written schedule of when these actions are to be completed; 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.

(6) At least every five (5) years after the completion of the initial process hazard analysis, the process hazard analysis shall be updated and revalidated by a team meeting the requirements in paragraph (e)(4) of this section, to assure that the process hazard analysis is consistent with the current process.

(7) Employers shall retain process hazards analyses and updates or revalidations for each process covered by this section, as well as the documented resolution of recommendations described in paragraph (e)(5) of this section for the life of the process.

(f) Operating procedures.

(1) The employer shall develop and implement written operating procedures that provide clear instructions for safely conducting activities involved in each covered process consistent with the process safety information and shall address at least the following elements.

(i) Steps for each operating phase:

(A) Initial startup;

(B) Normal operations;

(C) Temporary operations;

(D) 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.

(E) Emergency operations;

(F) Normal shutdown; and,

(G) Startup following a turnaround, or after an emergency shutdown.

(ii) Operating limits:

(A) Consequences of deviation; and

(B) Steps required to correct or avoid deviation.

(iii) Safety and health considerations:

(A) Properties of, and hazards presented by, the chemicals used in the process;

(B) Precautions necessary to prevent exposure, including engineering controls, administrative controls, and personal protective equipment;

(C) Control measures to be taken if physical contact or airborne exposure occurs;

(D) Quality control for raw materials and control of hazardous chemical inventory levels; and,

(E) Any special or unique hazards.

(iv) Safety systems and their functions.

(2) Operating procedures shall be readily accessible to employees who work in or maintain a process.

(3) The operating procedures shall be reviewed as often as necessary to assure that they reflect current operating practice, including changes that result from changes in process chemicals, technology, and equipment, and changes to facilities. The employer shall certify annually that these operating procedures are current and accurate.

(4) The employer shall develop and implement safe work practices to provide for the control of hazards during operations 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 shall apply to employees and contractor employees.

(g) Training.

(1) Initial training.

(i) Each employee presently involved in operating a process, and each employee before being involved in operating a newly assigned process, shall be trained in an overview of the process and in the operating procedures as specified in paragraph (f) of this section. The training shall include emphasis on the specific safety and health hazards, emergency operations including shutdown, and safe work practices applicable to the employee's job tasks.

(ii) In lieu of initial training for those employees already involved in operating a process on May 26, 1992, an employer may certify in writing that the employee has the required knowledge, skills, and abilities to safely carry out the duties and responsibilities as specified in the operating procedures.

(2) Refresher training. Refresher training shall be provided at least every three years, and more often if necessary, to each employee involved in operating a process to assure 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, shall determine the appropriate frequency of refresher training.

(3) Training documentation. The employer shall ascertain that each employee involved in operating a process has received and understood the training required by this paragraph. The employer shall prepare a record which contains the identity of the employee, the date of training, and the means used to verify that the employee understood the training.

(h) Contractors.

(1) Application. This paragraph applies to contractors performing maintenance or repair, turnaround, major renovation, or specialty work on or adjacent to a covered process. It does not apply to contractors providing incidental services which do not influence process safety, such as janitorial work, food and drink services, laundry, delivery or other supply services.

(2) Employer responsibilities.

(i) The employer, when selecting a contractor, shall obtain and evaluate information regarding the contract employer's safety performance and programs.

(ii) The employer shall inform contract employers of the known potential fire, explosion, or toxic release hazards related to the contractor's work and the process.

(iii) The employer shall explain to contract employers the applicable provisions of the emergency action plan required by paragraph (n) of this section.

(iv) The employer shall develop and implement safe work practices consistent with paragraph (f)(4) of this section, to control the entrance, presence and exit of contract employers and contract employees in covered process areas.

(v) The employer shall periodically evaluate the performance of contract employers in fulfilling their obligations as specified in paragraph (h)(3) of this section.

(vi) The employer shall maintain a contract employee injury and illness log related to the contractor's work in process areas.

(3) Contract employer responsibilities.

(i) The contract employer shall assure that each contract employee is trained in the work practices necessary to safely perform his/her job.

(ii) The contract employer shall assure that each contract employee is instructed in the known potential fire, explosion, or toxic release hazards related to his/her job and the process, and the applicable provisions of the emergency action plan.

(iii) The contract employer shall document that each contract employee has received and understood the training required by this paragraph. The contract employer shall prepare a record which contains the identity of the contract employee, the date of training, and the means used to verify that the employee understood the training.

(iv) The contract employer shall assure that each contract employee follows the safety rules of the facility including the safe work practices required by paragraph (f)(4) of this section.

(v) The contract employer shall advise the employer of any unique hazards presented by the contract employer's work, or of any hazards found by the contract employer's work.

(i) Pre-startup safety review.

- (1)** The employer shall 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.
- (2)** The pre-startup safety review shall confirm that prior to the introduction of highly hazardous chemicals to a process:
 - (i)** Construction and equipment is in accordance with design specifications;
 - (ii)** Safety, operating, maintenance, and emergency procedures are in place and are adequate;
 - (iii)** For new facilities, a process hazard analysis has been performed and recommendations have been resolved or implemented before startup; and modified facilities meet the requirements contained in management of change, paragraph (l).
 - (iv)** Training of each employee involved in operating a process has been completed.

(j) Mechanical integrity.

- (1) Application.** Paragraphs (j)(2) through (j)(6) of this section apply to the following process equipment:
 - (i)** Pressure vessels and storage tanks;
 - (ii)** Piping systems (including piping components such as valves);
 - (iii)** Relief and vent systems and devices;
 - (iv)** Emergency shutdown systems;
 - (v)** Controls (including monitoring devices and sensors, alarms, and interlocks) and,
 - (vi)** Pumps.
- (2) Written procedures.** The employer shall establish and implement written procedures to maintain the on-going integrity of process equipment.
- (3) Training for process maintenance activities.** The employer shall train each employee involved in maintaining the on-going integrity of process equipment in an overview of that process and its hazards and in the procedures applicable to the employee's job tasks to assure that the employee can perform the job tasks in a safe manner.
- (4) Inspection and testing.**
 - (i)** Inspections and tests shall be performed on process equipment.
 - (ii)** Inspection and testing procedures shall follow recognized and generally accepted good engineering practices.
 - (iii)** The frequency of inspections and tests of process equipment shall be consistent with applicable manufacturers' recommendations and good engineering practices, and more frequently if determined to be necessary by prior operating experience.
 - (iv)** The employer shall document each inspection and test that has been performed on process equipment. The documentation shall identify 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.
- (5) Equipment deficiencies.** The employer shall correct deficiencies in equipment that are outside acceptable limits (defined by the process safety information in paragraph (d) of this section) before further use or in a safe and timely manner when necessary means are taken to assure safe operation.
- (6) Quality assurance.**
 - (i)** In the construction of new plants and equipment, the employer shall assure that equipment as it is fabricated is suitable for the process application for which they will be used.
 - (ii)** Appropriate checks and inspections shall be performed to assure that equipment is installed properly and consistent with design specifications and the manufacturer's instructions.
 - (iii)** The employer shall assure that maintenance materials, spare parts and equipment are suitable for the process application for which they will be used.

(k) Hot work permit.

- (1)** The employer shall issue a hot work permit for hot work operations conducted on or near a covered process.
- (2)** The permit shall document that the fire prevention and protection requirements in 29 CFR 1910.252(a) have been implemented prior to beginning the hot work operations; it shall indicate the date(s) authorized for hot work; and identify the object on which hot work is to be performed. The permit shall be kept on file until completion of the hot work operations.

(m) Incident investigation.

- (1) The employer shall investigate each incident which resulted in, or could reasonably have resulted in a catastrophic release of highly hazardous chemical in the workplace.**
- (2) An incident investigation shall be initiated as promptly as possible, but not later than 48 hours following the incident.**
- (3) An incident investigation team shall be established and consist of at least one person knowledgeable in the process involved, including a contract employee if the incident involved work of the contractor, and other persons with appropriate knowledge and experience to thoroughly investigate and analyze the incident.**
- (4) A report shall be prepared at the conclusion of the investigation which includes at a minimum:**
 - (i) Date of incident;**
 - (ii) Date investigation began;**
 - (iii) A description of the incident;**
 - (iv) The factors that contributed to the incident; and,**
 - (v) Any recommendations resulting from the investigation.**
- (5) The employer shall establish a system to promptly address and resolve the incident report findings and recommendations. Resolutions and corrective actions shall be documented.**
- (6) The report shall be reviewed with all affected personnel whose job tasks are relevant to the incident findings including contract employees where applicable.**
- (7) Incident investigation reports shall be retained for five years.**

(n) Emergency planning and response. The employer shall establish and implement an emergency action plan for the entire plant in accordance with the provisions of 29 CFR 1910.38(a). In addition, the emergency action plan shall include procedures for handling small releases. Employers covered under this standard may also be subject to the hazardous waste and emergency response provisions contained in 29 CFR 1910.120(a), (p) and (q).

(p) Trade secrets.

- (1) Employers shall make all information necessary to comply with the section available to those persons responsible for compiling the process safety information (required by paragraph (d) of this section), those assisting in the development of the process hazard analysis (required by paragraph (e) of this section), those responsible for developing the operating procedures (required by paragraph (f) of this section), and those involved in incident investigations (required by paragraph (m) of this section), emergency planning and response (paragraph (n) of this section) and compliance audits (paragraph (o) of this section) without regard to possible trade secret status of such information.**
- (2) Nothing in this paragraph shall preclude the employer from requiring the persons to whom the information is made available under paragraph (p)(1) of this section to enter into confidentiality agreements not to disclose the information as set forth in 29 CFR 1910.1200.**
- (3) Subject to the rules and procedures set forth in 29 CFR 1910.1200(i)(1) through 1910.1200(i)(12), employees and their designated representatives shall have access to trade secret information contained within the process hazard analysis and other documents required to be developed by this standard.**

Definitions

Atmospheric tank means a storage tank which has been designed to operate at pressures from atmospheric through 0.5 p.s.i.g. (pounds per square inch gauge, 3.45 Kpa).

Boiling point means the boiling point of a liquid at a pressure of 14.7 pounds per square inch absolute (p.s.i.a.) (760 mm.). For the purposes of this section, where an accurate boiling point is unavailable for the material in question, or for mixtures which do not have a constant boiling point, the 10 percent point of a distillation performed in accordance with the Standard Method of Test for Distillation of Petroleum Products, ASTM D-86-62, which is incorporated by reference as specified in §1910.6, may be used as the boiling point of the liquid.

Catastrophic release means a major uncontrolled emission, fire, or explosion, involving one or more highly hazardous chemicals, that presents serious danger to employees in the workplace.

Facility means the buildings, containers or equipment which contain a process.

Highly hazardous chemical means a substance possessing toxic, reactive, flammable, or explosive properties and specified by paragraph (a)(1) of this section.

Hot work means work involving electric or gas welding, cutting, brazing, or similar flame or spark-producing operations.

Normally unoccupied remote facility means a facility which is operated, maintained or serviced by employees who visit the facility only periodically to check its operation and to perform necessary operating or maintenance tasks. No employees are permanently stationed at the facility. Facilities meeting this definition are not contiguous with, and must be geographically remote from all other buildings, processes or persons.

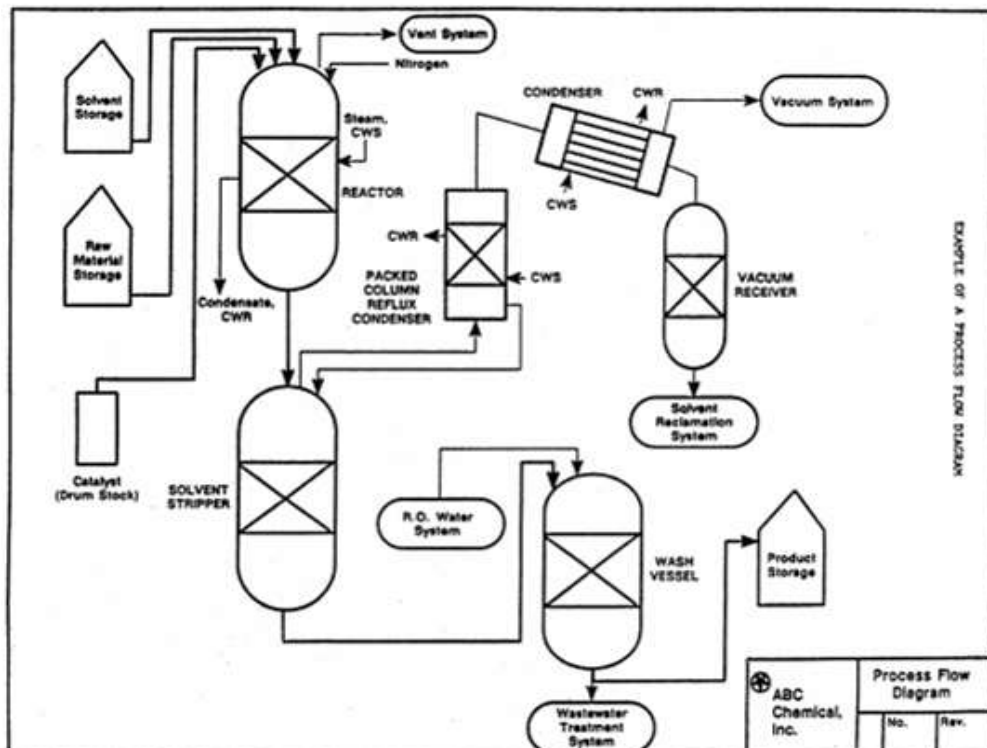
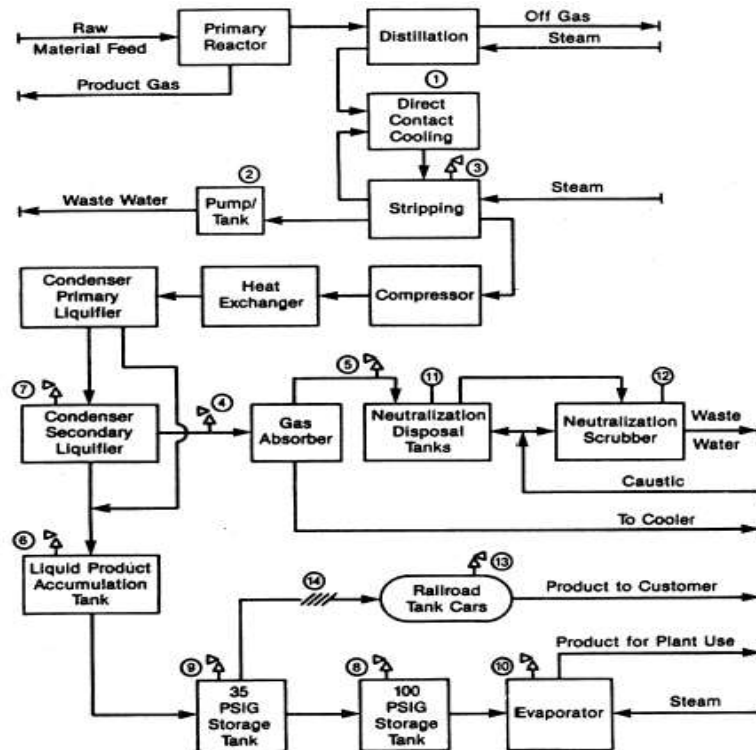
Process means any activity involving a highly hazardous chemical including any use, storage, manufacturing, handling, or the on-site movement of such chemicals, or combination of these activities. For purposes of this definition, any group of vessels which are interconnected and separate vessels which are located such that a highly hazardous chemical could be involved in a potential release shall be considered a single process.

Replacement in kind means a replacement which satisfies the design specification.

Trade secret means any confidential formula, pattern, process, device, information or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not know or use it. Appendix D contained in §1910.1200 sets out the criteria to be used in evaluating trade secrets.

APPENDIX B to §1910.119
BLOCK FLOW DIAGRAM AND SIMPLIFIED PROCESS FLOW DIAGRAM
(Non-mandatory)

Example of a Block Flow Diagram



Chapter 29

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Personal Protective Equipment Respiratory Protection Program

Cain's Pipeline & Industrial Services, LLC. has adopted this safety program for Respiratory Protection from the following OSHA regulations:

§1910.134 – Respiratory Protection

Cain's Pipeline & Industrial Services, LLC. has implemented this policy to ensure that no employee is exposed to airborne hazards in the workplace exceeding Permissible Exposure Limits (PEL), or oxygen deficient atmospheres. *Cain's Pipeline & Industrial Services, LLC.* will provide respirators which are applicable and suitable for the purpose intended when such equipment is necessary to protect the health of our employees. This Respiratory Protection Program provides training, medical evaluations, and respirators at no cost to our employees.

Brent Messina is the supervisor responsible for ensuring the following training, administrative controls, engineering controls, and safe work practices are enforced:

- *Brent Messina* is the Respiratory Protection Program administrator and will be responsible for recordkeeping and the periodic evaluation of the program. The evaluation will be based on results of the air quality monitoring program, medical evaluations, changing work environment, equipment changes, work requirements, and employee responses. Respiratory equipment will be NIOSH certified only, and selection will be made by *Brent Messina*, based on identified and potential hazards, estimated exposures, and contamination information.
- In any workplace where respirators are necessary to protect the health of our employees, *Cain's Pipeline & Industrial Services, LLC.* has established and implemented this written Respiratory Protection Program with worksite-specific procedures. This program will be updated as necessary to reflect any changes in workplace conditions that affect respirator use.
- The Respiratory Protection Program includes the following elements:
 - Procedures for selecting respirators for use in the workplace.
 - Medical evaluations of employees required to use respirators.
 - Fit testing procedures for tight-fitting respirators.
 - Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations.
 - Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators.
 - Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators.
 - Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations.

- Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance.
 - Procedures for regularly evaluating the effectiveness of the program.
- *Brent Messina* will ensure that effective training is provided to all employees who are required to use respirators. The training will be comprehensive, conducted in a manner that is understandable to our employees, and recur annually or more often if necessary. Before being allowed or required to wear breathing protection, each of our employees will be able to demonstrate knowledge of at least the following:
 - Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator.
 - What the limitations and capabilities of the respirator are.
 - How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions.
 - How to inspect, put on and remove, use, and check the seals of the respirator.
 - Procedures for cleaning, maintenance, and storage of respirators.
 - How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators.
 - The general requirements of §1910.134 – Respiratory Protection.
- Retraining will be administered annually or when the following situations occur:
 - Changes in the workplace or the type of respirator render previous training obsolete.
 - Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill.
 - Any other situation arises in which retraining appears necessary to ensure safe respirator use.
- Employees who choose to wear respirators when not required will be provided the basic information on respirators in Appendix D at the end of this chapter.
- Workplace evaluations will be conducted as necessary to ensure that the provisions of the current Respiratory Protection Program are being effectively carried out and that it continues to be effective.
- Employees required to use respirators will be regularly consulted to assess their views on program effectiveness and to identify any problems. Any problems that are identified during this assessment will be corrected. Factors to be assessed include, but are not limited to:
 - Respirator fit, including the ability to use the respirator without interfering with effective workplace performance.
 - Appropriate respirator selection for the hazards to which the employee is exposed.
 - Proper respirator use under the workplace conditions the employee encounters.
 - Proper respirator maintenance.
- *Brent Messina* will ensure that all filters, cartridges and canisters used in the workplace are labeled and color coded with the NIOSH approval label and that the label remains legible and is not removed.

- Proper respiratory equipment, replacement elements, and any parts or equipment necessary for the functioning of the respiratory equipment will be available to employees at no cost.
- All respiratory protection equipment will be maintained, cleaned, stored, and serviced per manufacturer's recommendations. Job foremen will supervise and ensure proper methods are used
- Respirator selection will be based on the hazards that the worker is exposed. Only NIOSH-certified respirators will be provided. Hazard evaluation is based on the estimate of exposures, type of contaminant, physical form, and chemical state. For no exposure estimate or data, the exposures will be addressed as immediately Dangerous to Life & Health (IDLH) and NIOSH-approved respirators for full-faced, pressure demand 30 minute SCBA, or SAR with auxiliary air supply will be provided. Respirator brands and models will be listed below.

<i>Respirator Models and Brand used by this Company</i>		
<i>Brand</i>	<i>Model</i>	<i>I.D. Number</i>

- *Cain's Pipeline & Industrial Services, LLC.* will provide each respirator user with a respirator that is clean, sanitary, and in good working order. *Brent Messina* will ensure that respirators are cleaned and disinfected using the procedures in Appendix B-2 of §1910.134, or procedures recommended by the respirator manufacturer, provided that such procedures are of equivalent effectiveness. The respirators will be cleaned and disinfected at the following intervals:
 - Respirators issued for the exclusive use of an employee will be cleaned and disinfected as often as necessary to be maintained in a sanitary condition
 - Respirators issued to more than one employee will be cleaned and disinfected before being worn by different individuals
 - Respirators maintained for emergency use will be cleaned and disinfected after each use.
 - Respirators used in fit testing and training will be cleaned and disinfected after each use.
- *Brent Messina* will ensure that respirators are stored as follows:
 - All respirators will be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and they will be packed or stored to prevent deformation of the facepiece and exhalation valve.

- In addition to the above requirements, emergency respirators will be:
 - ☑ Kept accessible to the work area.
 - ☑ Stored in compartments or in covers that are clearly marked as containing emergency respirators.
 - ☑ Stored in accordance with any applicable manufacturer instructions.
- *Brent Messina* will ensure that respirators are inspected as follows:
 - All respirators used in routine situations will be inspected before each use and during cleaning
 - All respirators maintained for use in emergency situations will be inspected at least monthly and in accordance with the manufacturer's recommendations, and will be checked for proper function before and after each use.
 - Emergency escape-only respirators will be inspected before being carried into the workplace for use.
- *Brent Messina* will ensure that respirator inspections include the following:
 - A check of respirator function, tightness of connections, and the condition of the various parts including, but not limited to, the facepiece, head straps, valves, connecting tube, and cartridges, canisters or filters.
 - A check of elastomeric parts for pliability and signs of deterioration.
- In addition to the requirements above, self-contained breathing apparatus will be inspected monthly. Air and oxygen cylinders will be maintained in a fully charged state and will be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level. *Brent Messina* will determine that the regulator and warning devices function properly.
- For respirators maintained for emergency use, *Brent Messina* will:
 - Certify the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator.
 - Provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information will be maintained until replaced following a subsequent certification.
- *Brent Messina* will ensure that respirators that fail an inspection, or are otherwise found to be defective, are removed from service and are discarded, repaired, or adjusted in accordance with the following procedures:
 - Repairs or adjustments to respirators will be made only by persons appropriately trained to perform such operations and will use only the respirator manufacturer's NIOSH-approved parts designed for the respirator.
 - Repairs will be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed.
 - Reducing and admission valves, regulators, and alarms will be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.
- A medical examination for employees required to use respiratory equipment is required before use of the equipment, and will be provided at no cost to the

employee. The medical questionnaire provided in Appendix C is mandatory for employees required to use respiratory protection.

- *Cain's Pipeline & Industrial Services, LLC.* will provide a medical evaluation to determine the employee's ability to use a respirator, before the employee is fit tested or required to use the respirator in the workplace. *Cain's Pipeline & Industrial Services, LLC.* may discontinue an employee's medical evaluations when the employee is no longer required to use a respirator.
- Medical evaluation procedures will include.
 - *Cain's Pipeline & Industrial Services, LLC.* will identify a physician or other licensed health care professional (PLHCP) to perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire.
 - The medical evaluation will obtain the information requested by the questionnaire in Sections 1 and 2, Part A of Appendix C of §1910.134.
- Follow-up medical examination will include:
 - *Cain's Pipeline & Industrial Services, LLC.* will ensure that a follow-up medical examination is provided for an employee who gives a positive response to any question among questions 1 through 8 in Section 2, Part A of Appendix C or whose initial medical examination demonstrates the need for a follow-up medical examination.
 - The follow-up medical examination will include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination.
- Administration of the medical questionnaire and examinations will include:
 - The medical questionnaire and examinations will be administered confidentially during the employee's normal working hours or at a time and place convenient to the employee. The medical questionnaire will be administered in a manner that ensures that the employee understands its content.
 - *Cain's Pipeline & Industrial Services, LLC.* will provide the employee with an opportunity to discuss the questionnaire and examination results with the PLHCP.
- Supplemental information for the PLHCP will include:
 - The following information will be provided to the PLHCP before the PLHCP makes a recommendation concerning an employee's ability to use a respirator:
 - ☑ The type and weight of the respirator to be used by the employee;
 - ☑ The duration and frequency of respirator use (including use for rescue and escape);
 - ☑ The expected physical work effort;
 - ☑ Additional protective clothing and equipment to be worn; and
 - ☑ Temperature and humidity extremes that may be encountered.
- *Cain's Pipeline & Industrial Services, LLC.* will provide the PLHCP with a copy of the written respiratory protection program and a copy of §1910.134.
- Fit testing of the equipment to individual employees will follow OSHA guidelines listed in §1910.134 (f)(1-8) and is required before use of the equipment.

- *Cain's Pipeline & Industrial Services, LLC.* will ensure employees pass OSHA-accepted qualitative fit test (QLFT) or quantitative fit test (QNFT) of tight-fitting facepieces before initial use, if a different respirator is used, and annually. SARs are required to be fit tested as well. (Refer to the Appendices).
- Facial hair, glasses, etc. which might affect the seal of the respirator face piece are prohibited, and seal will be checked each time equipment is donned.
- Periodic monitoring of the air quality in work areas will be performed to determine if, or where respiratory equipment will be required.
- Brent Messina will maintain appropriate surveillance, and ensure employees leave the area to wash, change cartridges, or if they detect break-through or resistance.
- If employees are required to work in Immediately Dangerous to Life or Health (IDLH) atmospheres, the following procedures and controls will be in place:
 - One employee more employee is located outside the IDLH atmosphere.
 - Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.
 - The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue.
 - *Brent Messina* is notified before personnel enter the IDLH atmosphere, or before employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue.
 - Employee(s) located outside the IDLH atmospheres will be equipped with:
 - ☑ Pressure demand or other positive pressure SCBA.
 - ☑ Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres
- SAR and SCBA equipment will only be filled by certified refilling facilities using grade D or better air. Oxygen will not be used in compressed air units and all cylinders will meet DOT requirements. Compressor will be located in a "clean" atmosphere, with in-line purification, and tagged to indicate date of changeout. A carbon monoxide monitor will be in place and set to alarm at 10 PPM or monitored frequently. All line fittings will be incompatible for non-respirable gases and containers.
- Where possible, ventilation will be required for all enclosed work areas to ensure that airborne hazards do not exceed permissible limits.
- The least hazardous or toxic materials which will allow the job required to be accomplished will be used in the performance of work.

- *Cain's Pipeline & Industrial Services, LLC.* will maintain written records and information regarding medical evaluations, fit testing, and the Respiratory Protection Program. These records will promote employee involvement in the respirator program, assist in auditing the adequacy of the program, and provide a record for OSHA compliance. Records will be retained at the main office and be made available upon request to affected employees and to OSHA. Written records include the following:
 - Required medical evaluations will be retained and made available in accordance with §1910.1020.
 - Qualitative and quantitative fit tests administered to an employee including:
 - ☑ The name or identification of the employee tested.
 - ☑ Type of fit test performed.
 - ☑ Specific make, model, style, and size of respirator tested.
 - ☑ Date of test.
 - ☑ The pass/fail results for qualitative fit tests or the fit factor and strip chart recording or other recording of the test results for quantitative fit tests.
 - Fit test records will be retained for respirator users until the next fit test is administered.

Cain's Pipeline & Industrial Services, LLC.

RESPIRATORY PROTECTION PROGRAM

Employee Acknowledgment

By my signature below, I acknowledge that I have received instruction and have read the *Cain's Pipeline & Industrial Services, LLC. Respiratory Protection Program*. I have been given the opportunity to ask questions and have received answers, instruction, and clarification to my questions. I understand the contents of and agree to follow *Cain's Pipeline & Industrial Services, LLC.* company policy regarding this Respiratory Protection Program.

Respiratory Protection Program received on _____ , 20 ____

Printed Name of Employee

Signature of Employee

Date

Social Security Number

Printed Name of Trainer

Signature of Trainer

Date

cc: Employee file

INFORMATION FOR EMPLOYEES USING RESPIRATORS

When Not Required Under 29 CFR 1910.134

To the employer: The statement below must be read by all employees using respirators not required under the Respiratory Protection Standard

To the employee: Can you read? Yes ☐ No ☐

Your employer is required to have you read the statement below if you are using respirators not required under the Respiratory Protection Regulation. Ensure you keep a copy of this form for your personal records.

EMPLOYEE INFORMATION

Employee Name:	Work Location:
Facility:	ID/Clock Number:
Job Title:	Dept./Phone:

CERTIFICATION: I certify that I have read and understand the below Respiratory Protection Statement as required by the Occupational Safety and Health Administration (OSHA).

Employee Signature: _____ **Date:** _____

OSHA RESPIRATORY PROTECTION STATEMENT

To The Respirator User:

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You Should Do The Following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.
3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.

Keep track of your respirator so that you do not mistakenly use someone else's respirator.

FORM RETENTION INFORMATION

ATTACHMENTS

Retention File:	Location:	*Yes ☐ No ☐
Date Filed:	Filed By:	*See Following Pages ☐

RESPIRATOR INSPECTION RECORD

OWNER INFORMATION		
Owner's Name (if individually issued):		
Company Name	Department	
Employee ID # (if applicable)	Work Phone	
RESPIRATOR INFORMATION		
Type of Respirator		
Manufacturer	Model #	
Size #	Respirator ID #	
Date of Inspection	Time	
INSPECTION CRITERIA		
Estimated Frequency (Check all that apply):		
☐ Hourly ☐ Twice each Shift ☐ Daily ☐ Weekly ☐ Monthly ☐ Before Use ☐ After Use		
This inspection is being conducted PRIOR to use.		Initials
This inspection is being conducted AFTER use.		Initials
COMPONENT:	DEFECTS FOUND:	CORRECTIVE ACTION TAKEN:
Cartridge Holder:		
Cartridge Threads/Fittings:		
Cartridge/Canister:		
Cartridge Filter:		
Connections:		
Elastomeric Parts Deteriorating?		
Elastomeric Parts Pliable?		
Exhalation Valve Assembly:		
Facepiece:		
Gaskets:		
Harness Assembly:		
Headbands:		
Hose Assembly:		
Inhalation Valve:		
Nose Cup Valves:		
Speaking Diaphragm:		
Other:		
Comments		
Inspector's Name		Title
Signature		Date
FORM RETENTION INFORMATION		ATTACHMENTS
Retention File: Location:		*Yes ☐ No ☐
Date Filed: Filed By:		*See Following Pages ☐

RESPIRATOR CLEANING RECORD

OWNER INFORMATION	
Owner's Name (if individually issued):	
Company Name	Department
Employee ID # (if applicable)	Work Phone
RESPIRATOR INFORMATION	
Type of Respirator	
Manufacturer	Model #
Size #	Respirator ID #
Date of Inspection	Time
CLEANING REQUIREMENTS FOR TIGHT FITTING RESPIRATORS	
Estimated Frequency (Check all that apply): ☐ Hourly ☐ Twice each Shift ☐ Daily ☐ Weekly ☐ Monthly ☐ Before Use ☐ After Use	
COMPONENT	CLEANING REQUIREMENTS
Cartridge Holder:	
Cartridge Threads/Fittings:	
Cartridge/Canister:	
Cartridge Filter:	
Connections:	
Elastomeric Parts Deteriorating?	
Elastomeric Parts Pliable?	
Exhalation Valve Assembly:	
Facepiece:	
Gaskets:	
Harness Assembly:	
Headbands:	
Hose Assembly:	
Inhalation Valve:	
Nose Cup Valves:	
Speaking Diaphragm:	
Respirator Cleaning Procedures (Mandatory) These procedures are provided for employee use when cleaning respirators. They are general in nature, and the employee as an alternative may use the cleaning recommendations provided by the manufacturer of the respirators, provided such procedures are as effective as those listed in 29 CFR 1910.134 Appendix B-2. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth below.	
Procedures for Cleaning Respirators:	
A. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure - demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.	
B. Wash components in warm (110 deg. F maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.	
C. Rinse components thoroughly in clean, warm (110 deg. F maximum), preferably running water. Drain.	
D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following: 1. Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 110 deg. F. 2. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 110 deg. F. 3. Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.	
E. Rinse components thoroughly in clean, warm (110 deg. F maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.	
F. Components should be hand-dried with a clean lint-free cloth or air-dried.	
G. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.	
H. Test the respirator to ensure that all components work properly.	
Inspector's Name	Title
Signature	Date
FORM RETENTION INFORMATION	ATTACHMENTS
Retention File: Location:	*Yes ☐ No ☐
Date Filed: Filed By:	*See Following Pages ☐

RESPIRATOR INSPECTION CHECKLIST

☐ **Half-Face Respirator Field Inspection Checklist**

Straps

- ☐ Check connections to face piece.
- ☐ Check for continued elasticity.
- ☐ Check connections for neck and top of head.

Face piece

- ☐ Check overall shape for deformities.
- ☐ Check all metal pieces for bending.
- ☐ Check sealing surfaces for elasticity.
- ☐ Assure that there are no tears, scratches or other damage to the sealing surface.

Valves

- ☐ Check inhalation valves for presence.
- ☐ Check inhalation valves for flexibility and proper seating.
- ☐ Check exhalation valve for presence, flexibility, and proper seating.
- ☐ Assure that exhalation valve sealing surfaces are smooth and undamaged.

Valve Cover

- ☐ Check for presence of exhalation valve cover.
- ☐ Check exhalation valve cover for cracks.

Gaskets

- ☐ Check cartridge holders for gasket presence.
- ☐ Check gasket surface for smoothness.
- ☐ Check cartridge fitting/housing for cracks or anything preventing proper cartridge seating.

Cartridges

- ☐ Check that cartridge is correct cartridge for the task/job.
- ☐ Check that cartridge edge or bead that seats against the cartridge holder gasket is smooth and undamaged.
- ☐ Check that cartridge has just been removed from sealed packaging or has adequate remaining use time for intended task/job.

Overall

- ☐ Check whole assembly for damage or wear.

☐ **Full-Face Respirator Field Inspection Checklist**

Straps

- ☐ Check connections to face piece.
- ☐ Check for continued elasticity.
- ☐ Check connections for neck and top of head.

Face piece

- ☐ Check overall shape for deformities.
- ☐ Check all metal pieces for bending.
- ☐ Check sealing surfaces for elasticity.
- ☐ Assure that there are no tears, scratches, or other damage to the sealing surface.

Lens

- ☐ Check lens for flaws or cracks.
- ☐ Check lens holder for cracks and deformities.
- ☐ Check lens holder for secure seal against lens edge.

Valves

- ☐ Check inhalation valves for presence, if accessible on this model respirator.
- ☐ Check inhalation valves for flexibility and proper seating, if accessible on this model respirator.
- ☐ Check exhalation valve for presence, flexibility, and proper seating, if accessible on this model.
- ☐ Assure that exhalation valve sealing surfaces are smooth and undamaged, if accessible.

Valve Cover

- ☐ Check exhalation valve cover for presence, if accessible on this model respirator.
- ☐ Check exhalation valve cover for cracks, if accessible on this model respirator.

Amplifier

- ☐ If equipped with voice amplifier, check for continued function.

Gaskets

- ☐ Check cartridge holders for gasket presence.
- ☐ Check gasket surface for smoothness.

- ☐ Check cartridge fitting/housing for cracks or anything that would prevent proper cartridge seating.

Cartridges

- ☐ Check that cartridge is correct cartridge for the task/job.
- ☐ Check that cartridge edge or bead that seats against the cartridge holder gasket is smooth and undamaged.
- ☐ Check that cartridge has just been removed from sealed packaging or that the use log on these cartridges reflects adequate remaining use time for the intended task/job.

Canister hose

- ☐ Check canister hose assembly for flexibility and wear.
- ☐ Check canister hose connections for damage and wear.

Canister belt

- ☐ Check canister belting and harness assembly for damage and wear.
- ☐ Check all connections for smooth operation.

Canister

- ☐ Check that canister is correct canister for the task/job.
- ☐ Check that the canister connection point is smooth and damaged.
- ☐ Check that the canister seal has just been removed or that the log on this canister reflects adequate remaining use time for the intended task/job.
- ☐ If Type N canister, check that the window shows the catalyst is still working.

Overall

- ☐ Check whole assembly for damage or wear.

Identify Respirators Checked:

Inspected by:

Date:

Cain's Pipeline & Industrial Services, LLC.
EMPLOYEE MEDICAL RELEASE
For Respiratory Protection Use

Physician's Full Name

Telephone Number

Street Address

City

State

Zip

I, _____, examined
Physician's Name

_____,
Employee's Name

_____, on _____.
Employee's Social Security Number Date of Examination

As a result of this examination, I find that this employee is:

Approved	Not Approved	For:
☐	☐	The use of negative pressure respiratory protection.
☐	☐	The use of positive pressure respiratory protection.
☐	☐	The use of self-contained breathing apparatus.
☐	☐	The wearing of protective clothing such as a Tyvek suit when wearing respiratory protection.

Comments/Observations: _____

Physician's Signature

Date

cc: Personnel file

§1910.134 – RESPIRATORY PROTECTION.

This section applies to General Industry (Part 1910), Shipyards (Part 1915), Marine Terminals (Part 1917), Longshoring (Part 1918), and Construction (Part 1926).

(a) Permissible practice.

(1) In the control of those occupational diseases caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors, the primary objective shall be to prevent atmospheric contamination. This shall be accomplished as far as feasible by accepted engineering control measures (for example, enclosure or confinement of the operation, general and local ventilation, and substitution of less toxic materials). When effective engineering controls are not feasible, or while they are being instituted, appropriate respirators shall be used pursuant to this section.

(2) Respirators shall be provided by the employer when such equipment is necessary to protect the health of the employee. The employer shall provide the respirators which are applicable and suitable for the purpose intended. The employer shall be responsible for the establishment and maintenance of a respiratory protection program which shall include the requirements outlined in paragraph (c) of this section.

(b) Definitions. (See Definitions at the end of this section)

(c) Respiratory protection program. This paragraph requires the employer to develop and implement a written respiratory protection program with required worksite-specific procedures and elements for required respirator use. The program must be administered by a suitably trained program administrator. In addition, certain program elements may be required for voluntary use to prevent potential hazards associated with the use of the respirator. The Small Entity Compliance Guide contains criteria for the selection of a program administrator and a sample program that meets the requirements of this paragraph.

(1) In any workplace where respirators are necessary to protect the health of the employee or whenever respirators are required by the employer, the employer shall establish and implement a written respiratory protection program with worksite specific procedures. The program shall be updated as necessary to reflect those changes in workplace conditions that affect respirator use. The employer shall include in the program the following provisions of this section, as applicable:

- (i) Procedures for selecting respirators for use in the workplace;
- (ii) Medical evaluations of employees require to use respirators;
- (iii) Fit testing procedures for tight-fitting respirators;
- (iv) Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations;
- (v) Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators;
- (vi) Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators;
- (vii) Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations;
- (viii) Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance; and
- (ix) Procedures for regularly evaluating the effectiveness of the program.

(2) Where respirator use is not required:

- (i) An employer may provide respirators at the request of employees or permit employees to use their own respirators, if the employer determines that such respirator use will not in itself create a hazard. If the employer determines that any voluntary respirator use is permissible, the employer shall provide the respirator users with the information contained in Appendix D to this section ("Information for Employees Using Respirators When Not Required Under the Standard"); and
- (ii) In addition, the employer must establish and implement those elements of a written respiratory protection program necessary to ensure that any employee using a respirator voluntarily is medically able to use that respirator, and that the respirator is cleaned, stored, and maintained so that its use does not present a health hazard to the user. **Exception:** Employers are not required to include in a written respiratory protection program those employees whose only use of respirators involves the voluntary use of filtering face pieces (dust masks).

(3) The employer shall designate a program administrator who is qualified by appropriate training or experience that is commensurate with the complexity of the program to administer or oversee the respiratory protection program and conduct the required evaluations of program effectiveness.

(4) The employer shall provide respirators, training, and medical evaluations at no cost to the employee.

(d) Selection of respirators. This paragraph requires the employer to evaluate respiratory hazard(s) in the workplace, identify relevant workplace and user factors, and base respirator selection on these factors. The paragraph also specifies appropriately protective respirators for use in IDLH atmospheres, and limits the selection and use of air-purifying respirators.

(1) General requirements.

(i) The employer shall select and provide an appropriate respirator based on the respiratory hazard(s) to which the worker is exposed and workplace and user factors that affect respirator performance and reliability.

(ii) The employer shall select a NIOSH-certified respirator. The respirator shall be used in compliance with the conditions of its certification.

(iii) The employer shall identify and evaluate the respiratory hazard(s) in the workplace; this evaluation shall include a reasonable estimate of employee exposures to respiratory hazard(s) and an identification of the contaminant's chemical state and physical form. Where the employer cannot identify or reasonably estimate the employee exposure, the employer shall consider the atmosphere to be IDLH.

(iv) The employer shall select respirators from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

(2) Respirators for IDLH atmospheres.

(i) The employer shall provide the following respirators for employee use in IDLH atmospheres:

(A) A full face piece pressure demand SCBA certified by NIOSH for a minimum service life of thirty minutes, or

(B) A combination full face piece pressure demand supplied-air respirator (SAR) with auxiliary self-contained air supply.

(ii) Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

(iii) All oxygen-deficient atmospheres shall be considered IDLH. **Exception:** If the employer demonstrates that, under all foreseeable conditions, the oxygen concentration can be maintained within the ranges specified in Table II of this section (i.e., for the altitudes set out in the table), then any atmosphere-supplying respirator may be used.

(3) Respirators for atmospheres that are not IDLH.

(i) The employer shall provide a respirator that is adequate to protect the health of the employee and ensure compliance with all other OSHA statutory and regulatory requirements, under routine and reasonably foreseeable emergency situations.

Table II	
Altitude (ft.)	Oxygen deficient Atmospheres (% O ₂) for which the employer may rely on atmosphere-supplying respirators
Less than 3,001	16.0-19.5
.....	16.4-19.5
3,001-4,000	17.1-19.5
.....	17.8-19.5
4,001-5,000	18.5-19.5
.....	19.3-19.5
5,001-6,000	
.....	
6,001-7,000	
.....	
7,001-8,000 ¹	
.....	

¹ Above 8,000 feet the exception does not apply. Oxygen-enriched breathing air must be supplied above 14,000 feet.

(e) **Medical evaluation.** Using a respirator may place a physiological burden on employees that varies with the type of respirator worn, the job and workplace conditions in which the respirator is used, and the medical status of the employee. Accordingly, this paragraph specifies the minimum requirements for medical evaluation that employers must implement to determine the employee's ability to use a respirator.

(1) **General.** The employer shall provide a medical evaluation to determine the employee's ability to use a respirator, before the employee is fit tested or required to use the respirator in the workplace. The employer may discontinue an employee's medical evaluations when the employee is no longer required to use a respirator.

(2) **Medical evaluation procedures.**

(i) The employer shall identify a physician or other licensed health care professional (PLHCP) to perform medical evaluations using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire.

(ii) The medical evaluation shall obtain the information requested by the questionnaire in Sections 1 and 2, Part A of Appendix C of this section.

(3) **Follow-up medical examination.**

(i) The employer shall ensure that a follow-up medical examination is provided for an employee who gives a positive response to any question among questions 1 through 8 in Section 2, Part A of Appendix C or whose initial medical examination demonstrates the need for a follow-up medical examination.

(ii) The follow-up medical examination shall include any medical tests, consultations, or diagnostic procedures that the PLHCP deems necessary to make a final determination.

(4) **Administration of the medical questionnaire and examinations.**

(i) The medical questionnaire and examinations shall be administered confidentially during the employee's normal working hours or at a time and place convenient to the employee. The medical questionnaire shall be administered in a manner that ensures that the employee understands its content.

(ii) The employer shall provide the employee with an opportunity to discuss the questionnaire and examination results with the PLHCP.

(f) **Fit testing.** This paragraph requires that, before an employee may be required to use any respirator with a negative or positive pressure tight-fitting face piece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used. This paragraph specifies the kinds of fit tests allowed, the procedures for conducting them, and how the results of the fit tests must be used.

(1) The employer shall ensure that employees using a tight-fitting face piece respirator pass an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT) as stated in this paragraph.

(2) The employer shall ensure that an employee using a tight-fitting face piece respirator is fit tested prior to initial use of the respirator, whenever a different respirator face piece (size, style, model or make) is used, and at least annually thereafter.

(3) The employer shall conduct an additional fit test whenever the employee reports, or the employer, PLHCP, supervisor, or program administrator makes visual observations of, changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.

(4) If after passing a QLFT or QNFT, the employee subsequently notifies the employer, program administrator, supervisor, or PLHCP that the fit of the respirator is unacceptable, the employee shall be given a reasonable opportunity to select a different respirator face piece and to be retested.

(5) The fit test shall be administered using an OSHA-accepted QLFT or QNFT protocol. The OSHA-accepted QLFT and QNFT protocols and procedures are contained in Appendix A of this section.

(6) QLFT may only be used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less.

(7) If the fit factor, as determined through an OSHA-accepted QNFT protocol, is equal to or greater than 100 for tight-fitting half face pieces, or equal to or greater than 500 for tight-fitting full face pieces, the QNFT has been passed with that respirator.

(8) Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by performing quantitative or qualitative fit testing in the negative pressure mode, regardless of the mode of operation (negative or positive pressure) that is used for respiratory protection.

(i) Qualitative fit testing of these respirators shall be accomplished by temporarily converting the respirator user's actual face piece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure air-purifying respirator face piece with the same sealing

surfaces as a surrogate for the atmosphere-supplying or powered air-purifying respirator face piece.

(ii) Quantitative fit testing of these respirators shall be accomplished by modifying the face piece to allow sampling inside the face piece in the breathing zone of the user, midway between the nose and mouth. This requirement shall be accomplished by installing a permanent sampling probe onto a surrogate face piece, or by using a sampling adapter designed to temporarily provide a means of sampling air from inside the face piece.

(iii) Any modifications to the respirator face piece for fit testing shall be completely removed, and the face piece restored to NIOSH-approved configuration, before that face piece can be used in the workplace.

(g) Use of respirators. This paragraph requires employers to establish and implement procedures for the proper use of respirators. These requirements include prohibiting conditions that may result in face piece seal leakage, preventing employees from removing respirators in hazardous environments, taking actions to ensure continued effective respirator operation throughout the work shift, and establishing procedures for the use of respirators in IDLH atmospheres or in interior structural firefighting situations.

(1) Face piece seal protection.

(i) The employer shall not permit respirators with tight-fitting face pieces to be worn by employees who have:

(A) Facial hair that comes between the sealing surface of the face piece and the face or that interferes with valve function; or

(B) Any condition that interferes with the face-to-face piece seal or valve function.

(ii) If an employee wears corrective glasses or goggles or other personal protective equipment, the employer shall ensure that such equipment is worn in a manner that does not interfere with the seal of the face piece to the face of the user.

(iii) For all tight-fitting respirators, the employer shall ensure that employees perform a user seal check each time they put on the respirator using the procedures in Appendix B-1 or procedures recommended by the respirator manufacturer that the employer demonstrates are as effective as those in Appendix B-1 of this section.

(2) Continuing respirator effectiveness.

(i) Appropriate surveillance shall be maintained of work area conditions and degree of employee exposure or stress. When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, the employer shall reevaluate the continued effectiveness of the respirator.

(ii) The employer shall ensure that employees leave the respirator use area:

(A) To wash their faces and respirator face pieces as necessary to prevent eye or skin irritation associated with respirator use; or

(B) If they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the face piece; or

(C) To replace the respirator or the filter, cartridge, or canister elements.

(iii) If the employee detects vapor or gas breakthrough, changes in breathing resistance, or leakage of the face piece, the employer must replace or repair the respirator before allowing the employee to return to the work area.

(3) Procedures for IDLH atmospheres. For all IDLH atmospheres, the employer shall ensure that:

(i) One employee or, when needed, more than one employee is located outside the IDLH atmosphere;

(ii) Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere;

(iii) The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue;

(iv) The employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue;

(v) The employer or designee authorized to do so by the employer, once notified, provides necessary assistance appropriate to the situation;

(vi) Employee(s) located outside the IDLH atmospheres are equipped with:

(A) Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either

(B) Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry; or

(C) Equivalent means for rescue where retrieval equipment is not required under paragraph (g)(3)(vi)(B).

(h) Maintenance and care of respirators. This paragraph requires the employer to provide for the cleaning and disinfecting, storage, inspection, and repair of respirators used by employees.

(1) Cleaning and disinfecting. The employer shall provide each respirator user with a respirator that is clean, sanitary, and in good working order. The employer shall ensure that respirators are cleaned and disinfected using the procedures in Appendix B-2 of this section, or procedures recommended by the respirator manufacturer, provided that such procedures are of equivalent effectiveness. The respirators shall be cleaned and disinfected at the following intervals:

(i) Respirators issued for the exclusive use of an employee shall be cleaned and disinfected as often as necessary to be maintained in a sanitary condition;

(ii) Respirators issued to more than one employee shall be cleaned and disinfected before being worn by different individuals;

(iii) Respirators maintained for emergency use shall be cleaned and disinfected after each use;

(iv) Respirators used in fit testing and training shall be cleaned and disinfected after each use.

(2) Storage. The employer shall ensure that respirators are stored as follows:

(i) All respirators shall be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and they shall be packed or stored to prevent deformation of the face piece and exhalation valve.

(ii) In addition to the requirements of paragraph (h)(2)(i) of this section, emergency respirators shall be:

(A) Kept accessible to the work area;

(B) Stored in compartments or in covers that are clearly marked as containing emergency respirators; and

(C) Stored in accordance with any applicable manufacturer instructions.

(3) Inspection.

(i) The employer shall ensure that respirators are inspected as follows:

(A) All respirators used in routine situations shall be inspected before each use and during cleaning;

(B) All respirators maintained for use in emergency situations shall be inspected at least monthly and in accordance with the manufacturer's recommendations, and shall be checked for proper function before and after each use; and

(C) Emergency escape-only respirators shall be inspected before being carried into the workplace for use.

(i) Breathing air quality and use. This paragraph requires the employer to provide employees using atmosphere-supplying respirators (supplied-air and SCBA) with breathing gases of high purity.

(1) The employer shall ensure that compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration accords with the following specifications:

(i) Compressed and liquid oxygen shall meet the United States Pharmacopoeia requirements for medical or breathing oxygen; and

(ii) Compressed breathing air shall meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:

(A) Oxygen content (v/v) of 19.5-23.5%;

(B) Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;

(C) Carbon monoxide (CO) content of 10 ppm or less;

(D) Carbon dioxide content of 1,000 ppm or less; and

(E) Lack of noticeable odor.

(2) The employer shall ensure that compressed oxygen is not used in atmosphere supplying respirators that have previously used compressed air.

(k) Training and information. This paragraph requires the employer to provide effective training to employees who are required to use respirators. The training must be comprehensive, understandable, and recur annually, and more often if necessary. This paragraph also requires the employer to provide

the basic information on respirators in Appendix D of this section to employees who wear respirators when not required by this section or by the employer to do so.

(1) The employer shall ensure that each employee can demonstrate knowledge of at least the following:

- (i) Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator;
- (ii) What the limitations and capabilities of the respirator are;
- (iii) How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions;
- (iv) How to inspect, put on and remove, use, and check the seals of the respirator;
- (v) What the procedures are for maintenance and storage of the respirator;
- (vi) How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and
- (vii) The general requirements of this section.

(2) The training shall be conducted in a manner that is understandable to the employee.

(3) The employer shall provide the training prior to requiring the employee to use a respirator in the workplace.

(4) An employer who is able to demonstrate that a new employee has received training within the last 12 months that addresses the elements specified in paragraph (k)(1)(i) through (vii) is not required to repeat such training provided that, as required by paragraph (k)(1), the employee can demonstrate knowledge of those element(s). Previous training not repeated initially by the employer must be provided no later than 12 months from the date of the previous training.

(5) Retraining shall be administered annually, and when the following situations occur:

- (i) Changes in the workplace or the type of respirator render previous training obsolete;
- (ii) Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or
- (iii) Any other situation arises in which retraining appears necessary to ensure safe respirator use.

(l) Program evaluation. This section requires the employer to conduct evaluations of the workplace to ensure that the written respiratory protection program is being properly implemented, and to consult employees to ensure that they are using the respirators properly.

(1) The employer shall conduct evaluations of the workplace as necessary to ensure that the provisions of the current written program are being effectively implemented and that it continues to be effective.

(2) The employer shall regularly consult employees required to use respirators to assess the employees' views on program effectiveness and to identify any problems. Any problems that are identified during this assessment shall be corrected. Factors to be assessed include, but are not limited to:

- (i) Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);
- (ii) Appropriate respirator selection for the hazards to which the employee is exposed;
- (iii) Proper respirator use under the workplace conditions the employee encounters; and
- (iv) Proper respirator maintenance.

(m) Recordkeeping. This section requires the employer to establish and retain written information regarding medical evaluations, fit testing, and the respirator program. This information will facilitate employee involvement in the respirator program, assist the employer in auditing the adequacy of the program, and provide a record for compliance determinations by OSHA.

(1) Medical evaluation. Records of medical evaluations required by this section must be retained and made available in accordance with 29 CFR 1910.1020.

(2) Fit testing.

(i) The employer shall establish a record of the qualitative and quantitative fit tests administered to an employee including:

- (A) The name or identification of the employee tested;**
- (B) Type of fit test performed;**
- (C) Specific make, model, style, and size of respirator tested;**
- (D) Date of test; and**
- (E) The pass/fail results for QLFTs or the fit factor and strip chart recording or other recording of the test results for QNFTs.**

(ii) Fit test records shall be retained for respirator users until the next fit test is administered.

(3) A written copy of the current respirator program shall be retained by the employer.

Definitions

The following definitions are important terms used in the respiratory protection standard in this section.

Air-purifying respirator means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Assigned protection factor (APF) [Reserved]

Atmosphere-supplying respirator means a respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

Canister or cartridge means a container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.

Demand respirator means an atmosphere-supplying respirator that admits breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

Emergency situation means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

Employee exposure means exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.

End-of-service-life indicator (ESLI) means a system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

Escape-only respirator means a respirator intended to be used only for emergency exit.

Filter or air purifying element means a component used in respirators to remove solid or liquid aerosols from the inspired air.

Filtering facepiece (dust mask) means a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

Fit factor means a quantitative estimate of the fit of a particular respirator to a specific individual, and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

Fit test means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test QLFT and Quantitative fit test QNFT.)

Helmet means a rigid respiratory inlet covering that also provides head protection against impact and penetration.

High efficiency particulate air (HEPA) filter means a filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

Hood means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

Immediately dangerous to life or health (IDLH) means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Interior structural firefighting means the physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures which are involved in a fire situation beyond the incipient stage. (See 29 CFR 1910.155)

Loose-fitting facepiece means a respiratory inlet covering that is designed to form a partial seal with the face.

Maximum use concentration (MUC) [Reserved]

Negative pressure respirator (tight fitting) means a respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

Oxygen deficient atmosphere means an atmosphere with an oxygen content below 19.5% by volume.

Physician or other licensed health care professional (PLHCP) means an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide, or be delegated the responsibility to provide, some or all of the health care services required by paragraph (e).

Positive pressure respirator means a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

Powered air-purifying respirator (PAPR) means an air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

Pressure demand respirator means a positive pressure atmosphere-supplying respirator that admits breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation.

Qualitative fit test (QLFT) means a pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

Quantitative fit test (QNFT) means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Respiratory inlet covering means that portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a facepiece, helmet, hood, suit, or a mouthpiece respirator with nose clamp.

Self-contained breathing apparatus (SCBA) means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

Service life means the period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.

Supplied-air respirator (SAR) or airline respirator means an atmosphere supplying respirator for which the source of breathing air is not designed to be carried by the user.

This section means this respiratory protection standard.

Tight-fitting facepiece means a respiratory inlet covering that forms a complete seal with the face.

User seal check means an action conducted by the respirator user to determine if the respirator is properly seated to the face.

APPENDIX B-1 TO §1910.134 – USER SEAL CHECK PROCEDURES (MANDATORY)

The individual who uses a tight-fitting respirator is to perform a user seal check to ensure that an adequate seal is achieved each time the respirator is put on. Either the positive and negative pressure checks listed in this appendix, or the respirator manufacturer's recommended user seal check method shall be used. User seal checks are not substitutes for qualitative or quantitative fit tests.

I. Face piece Positive and/or Negative Pressure Checks

A. Positive pressure check. Close off the exhalation valve and exhale gently into the face piece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the face piece without any evidence of outward leakage of air at the seal. For most respirators this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replacing it after the test.

B. Negative pressure check. Close off the inlet opening of the canister or cartridge(s) by covering with the palm of the hand(s) or by replacing the filter seal(s), inhale gently so that the face piece collapses slightly, and hold the breath for ten seconds. The design of the inlet opening of some cartridges cannot be effectively covered with the palm of the hand. The test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the face piece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

II. Manufacturer's Recommended User Seal Check Procedures

The respirator manufacturer's recommended procedures for performing a user seal check may be used instead of the positive and/or negative pressure check procedures provided that the employer demonstrates that the manufacturer's procedures are equally effective.

APPENDIX B-2 TO §1910.134 – RESPIRATOR CLEANING PROCEDURES (MANDATORY)

These procedures are provided for employer use when cleaning respirators. They are general in nature, and the employer as an alternative may use the cleaning recommendations provided by the manufacturer of the respirators used by their employees, provided such procedures are as effective as those listed here in Appendix B-2. Equivalent effectiveness simply means that the procedures used must accomplish the objectives set forth in Appendix B-2, i.e., must ensure that the respirator is properly cleaned and disinfected in a manner that prevents damage to the respirator and does not cause harm to the user.

I. Procedures for Cleaning Respirators

A. Remove filters, cartridges, or canisters. Disassemble face pieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.

B. Wash components in warm (43° C. [110° F.] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

C. Rinse components thoroughly in clean, warm (43° C. [110° F.] maximum), preferably running water. Drain.

D. When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for two minutes in one of the following:

- 1.** Hypochlorite solution (50 ppm of chlorine) made by adding approximately one milliliter of laundry bleach to one liter of water at 43° C. (110° F.); or,

- 2.** Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cc of 45% alcohol) to one liter of water at 110° F.

- 3.** Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.

E. Rinse components thoroughly in clean, warm (43° C. [110° F.] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on face pieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

F. Components should be hand-dried with a clean lint-free cloth or air-dried.

G. Reassemble face piece, replacing filters, cartridges, and canisters where necessary.

H. Test the respirator to ensure that all components work properly.

APPENDIX C TO §1910.134
OSHA RESPIRATOR MEDICAL EVALUATION QUESTIONNAIRE (MANDATORY)

To the employer: Answers to questions in Section 1, and to question 9 in Section 2 of Part A, do not require a medical examination.

To the employee: Your employer must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisor must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the health care professional who will review it.

Part A. Section 1. (Mandatory) The following information must be provided by every employee who has been selected to use any type of respirator (please print).

1. Today's date:
2. Your name:
3. Your age (to nearest year):
4. Sex (circle one): Male / Female
5. Your height: ft. in.
6. Your weight: lbs.
7. Your job title:
8. A phone number where you can be reached by the health care professional who reviews this questionnaire (include the Area Code): _____.
9. The best time to phone you at this number:
10. Has your employer told you how to contact the health care professional who will review this questionnaire (circle one): Yes / No
11. Check the type of respirator you will use (you can check more than one category):
 - a. N, R, or P disposable respirator (filter-mask, non-cartridge type only).
 - b. Other type (for example, half- or full-face piece type, powered-air purifying, supplied-air, self-contained breathing apparatus).
12. Have you worn a respirator (circle one): Yes / No

If "yes," what type(s):

Part A. Section 2. (Mandatory) Questions 1 through 9 below must be answered by every employee who has been selected to use any type of respirator (please circle "yes" or "no").

1. Do you *currently* smoke tobacco, or have you smoked tobacco in the last month: ____ Yes / No
2. Have you *ever had* any of the following conditions?
 - a. Seizures (fits): _____ Yes / No
 - b. Diabetes (sugar disease): _____ Yes / No
 - c. Allergic reactions that interfere with your breathing : _____ Yes / No
 - d. Claustrophobia (fear of closed-in places): _____ Yes / No
 - e. Trouble smelling odors : _____ Yes / No
3. Have you *ever had* any of the following pulmonary or lung problems?
 - a. Asbestosis: _____ Yes / No
 - b. Asthma: _____ Yes / No
 - c. Chronic bronchitis: _____ Yes / No
 - d. Emphysema: _____ Yes / No
 - e. Pneumonia: _____ Yes / No
 - f. Tuberculosis: _____ Yes / No
 - g. Silicosis: _____ Yes / No
 - h. Pneumothorax (collapsed lung): _____ Yes / No
 - i. Lung cancer: _____ Yes / No
 - j. Broken ribs: _____ Yes / No
 - k. Any chest injuries or surgeries: _____ Yes / No
 - l. Any other lung problem that you've been told about: _____ Yes / No
4. Do you *currently* have any of the following symptoms of pulmonary or lung illness?
 - a. Shortness of breath: _____ Yes / No
 - b. Shortness of breath when walking fast on level ground or walking up a slight hill or incline: ____ Yes / No
 - c. Shortness of breath when walking with other people at an ordinary pace on level ground: ____ Yes / No
 - d. Have to stop for breath when walking at your own pace on level ground: _____ Yes / No
 - e. Shortness of breath when washing or dressing yourself: _____ Yes / No
 - f. Shortness of breath that interferes with your job: _____ Yes / No
 - g. Coughing that produces phlegm (thick sputum): _____ Yes / No
 - h. Coughing that wakes you early in the morning: _____ Yes / No
 - i. Coughing that occurs mostly when you are lying down: _____ Yes / No

- j. Coughing up blood in the last month: _____ Yes / No
- k. Wheezing: _____ Yes / No
- l. Wheezing that interferes with your job: _____ Yes / No
- m. Chest pain when you breathe deeply: _____ Yes / No
- n. Any other symptoms that you think may be related to lung problems: _____ Yes / No
5. Have you ever *had* any of the following cardiovascular or heart problems?
- a. Heart attack: _____ Yes / No
- b. Stroke: _____ Yes / No
- c. Angina: _____ Yes / No
- d. Heart failure: _____ Yes / No
- e. Swelling in your legs or feet (not caused by walking): _____ Yes / No
- f. Heart arrhythmia (heart beating irregularly): _____ Yes / No
- g. High blood pressure: _____ Yes / No
- h. Any other heart problem that you've been told about: _____ Yes / No
6. Have you ever *had* any of the following cardiovascular or heart symptoms?
- a. Frequent pain or tightness in your chest: _____ Yes / No
- b. Pain or tightness in your chest during physical activity: _____ Yes / No
- c. Pain or tightness in your chest that interferes with your job: _____ Yes / No
- d. In the past two years, have you noticed your heart skipping or missing a beat: _____ Yes / No
- e. Heartburn or indigestion that is not related to eating: _____ Yes / No
- f. Any other symptoms that you think may be related to heart or circulation problems: _____ Yes / No
7. Do you *currently* take medication for any of the following problems?
- a. Breathing or lung problems: _____ Yes / No
- b. Heart trouble: _____ Yes / No
- c. Blood pressure: _____ Yes / No
- d. Seizures (fits): _____ Yes / No
8. If you've used a respirator, have you ever *had* any of the following problems? (If you've never used a respirator, check the following space and go to question 9:)
- a. Eye irritation: _____ Yes / No
- b. Skin allergies or rashes: _____ Yes / No
- c. Anxiety: _____ Yes / No
- d. General weakness or fatigue: _____ Yes / No
- e. Any other problem that interferes with your use of a respirator: _____ Yes / No
9. Would you like to talk to the health care professional who will review this questionnaire about your answers to this questionnaire: _____ Yes / No
- Questions 10 to 15 below must be answered by every employee who has been selected to use either a full-face piece respirator or a self-contained breathing apparatus (SCBA).
- For employees who have been selected to use other types of respirators, answering these questions is voluntary.
10. Have you ever *lost* vision in either eye (temporarily or permanently): _____ Yes / No
11. Do you *currently* have any of the following vision problems?
- a. Wear contact lenses: _____ Yes / No
- b. Wear glasses: _____ Yes / No
- c. Color blind: _____ Yes / No
- d. Any other eye or vision problem: _____ Yes / No
12. Have you ever *had* an injury to your ears, including a broken ear drum: _____ Yes / No
13. Do you *currently* have any of the following hearing problems?
- a. Difficulty hearing: _____ Yes / No
- b. Wear a hearing aid: _____ Yes / No
- c. Any other hearing or ear problem: _____ Yes / No
14. Have you ever *had* a back injury: _____ Yes / No
15. Do you *currently* have any of the following musculoskeletal problems?
- a. Weakness in any of your arms, hands, legs, or feet: _____ Yes / No
- b. Back pain: _____ Yes / No
- c. Difficulty fully moving your arms and legs: _____ Yes / No
- d. Pain or stiffness when you lean forward or backward at the waist: _____ Yes / No
- e. Difficulty fully moving your head up or down: _____ Yes / No
- f. Difficulty fully moving your head side to side: _____ Yes / No
- g. Difficulty bending at your knees: _____ Yes / No
- h. Difficulty squatting to the ground: _____ Yes / No
- i. Climbing a flight of stairs or a ladder carrying more than 25 lbs: _____ Yes / No
- j. Any other muscle or skeletal problem that interferes with using a respirator: _____ Yes / No

Part B. Any of the following questions, and other questions not listed, may be added to the questionnaire at the discretion of the health care professional who will review the questionnaire.

1. In your present job, are you working at high altitudes (over 5,000 feet) or in a place that has lower than normal amounts of oxygen: Yes / No

If "yes," do you have feelings of dizziness, shortness of breath, pounding in your chest, or other symptoms when you're working under these conditions: Yes / No

2. At work or at home, have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g., gases, fumes, or dust), or have you come into skin contact with hazardous chemicals: Yes / No

If "yes," name the chemicals if you know them: _____

3. Have you ever worked with any of the materials, or under any of the conditions, listed below:

a. Asbestos: _____ Yes / No

b. Silica (e.g., in sandblasting): _____ Yes / No

c. Tungsten/cobalt (e.g., grinding or welding this material): _____ Yes / No

d. Beryllium: _____ Yes / No

e. Aluminum: _____ Yes / No

f. Coal (for example, mining): _____ Yes / No

g. Iron: _____ Yes / No

h. Tin: _____ Yes / No

i. Dusty environments: _____ Yes / No

j. Any other hazardous exposures: _____ Yes / No

If "yes," describe these exposures: _____

4. List any second jobs or side businesses you have: _____

5. List your previous occupations: _____

6. List your current and previous hobbies: _____

7. Have you been in the military services? Yes / No

If "yes," were you exposed to biological or chemical agents (either in training or combat): Yes / No

8. Have you ever worked on a HAZMAT team? Yes / No

9. Other than medications for breathing and lung problems, heart trouble, blood pressure, and seizures mentioned earlier in this questionnaire, are you taking any other medications for any reason (including over-the-counter medications): Yes / No

If "yes," name the medications if you know them: _____

10. Will you be using any of the following items with your respirator(s)?

a. HEPA Filters: Yes / No

b. Canisters (for example, gas masks): Yes / No

c. Cartridges: Yes / No

11. How often are you expected to use the respirator(s) (circle "yes" or "no" for all answers that apply to you)?

a. Escape only (no rescue): Yes / No

b. Emergency rescue only: Yes / No

c. Less than 5 hours *per week*: Yes / No

d. Less than 2 hours *per day*: Yes / No

e. 2 to 4 hours *per day*: Yes / No

f. Over 4 hours *per day*: Yes / No

12. During the period you are using the respirator(s), is your work effort:

a. *Light* (less than 200 kcal per hour): Yes / No

If "yes," how long does this period last during the average shift: hrs. mins.

Examples of a light work effort are *sitting* while writing, typing, drafting, or performing light assembly work; or *standing* while operating a drill press (1-3 lbs.) or controlling machines.

b. *Moderate* (200 to 350 kcal per hour): Yes / No

If "yes," how long does this period last during the average shift: hrs. mins.

Examples of moderate work effort are *sitting* while nailing or filing; *driving* a truck or bus in urban traffic; *standing* while drilling, nailing, performing assembly work, or transferring a moderate load (about 35 lbs.) at trunk level; *walking* on a level surface about 2 mph or down a 5-degree grade about 3 mph; or *pushing* a wheelbarrow with a heavy load (about 100 lbs.) on a level surface.

c. *Heavy* (above 350 kcal per hour): Yes / No

If "yes," how long does this period last during the average shift: hrs. mins.

Examples of heavy work are *lifting* a heavy load (about 50 lbs.) from the floor to your waist or shoulder; *working* on a loading dock; *shoveling*; *standing* while bricklaying or chipping castings; *walking* up an 8-degree grade about 2 mph; *climbing* stairs with a heavy load (about 50 lbs.).

13. Will you be wearing protective clothing and/or equipment (other than the respirator) when you're using your respirator: Yes / No

If "yes," describe this protective clothing and/or equipment: _____

14. Will you be working under hot conditions (temperature exceeding 77° F.): Yes / No

15. Will you be working under humid conditions: Yes / No

16. Describe the work you'll be doing while you're using your respirator(s): _____

17. Describe any special or hazardous conditions you might encounter when you're using your respirator(s) (for example, confined spaces, life-threatening gases): _____

18. Provide the following information, if you know introductory text, for each toxic substance that you'll be exposed to when you're using your respirator(s):

Name of the first toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

Name of the second toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

Name of the third toxic substance: _____

Estimated maximum exposure level per shift: _____

Duration of exposure per shift: _____

The name of any other toxic substances that you'll be exposed to while using your respirator: _____

19. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of others (for example, rescue, security): _____

APPENDIX D TO §1910.134 – INFORMATION FOR EMPLOYEES USING RESPIRATORS WHEN NOT REQUIRED UNDER THE STANDARD (MANDATORY)

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard. You should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirators limitations.

2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.

3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.

4. Keep track of your respirator so that you do not mistakenly use someone else's respirator.

Chapter 30

Cain's Pipeline & Industrial Services, LLC.

Policy for Rigging Equipment for Material Handling / Offshore

Cain's Pipeline & Industrial Services, LLC. has adopted this program for the safety of employees when working on or around "Rigging Equipment for Material Handling" from the following OSHA regulations:

§1926.251 – Rigging Equipment for Material Handling

§1926.550 – Cranes and Derricks

This policy applies to rigging and slings used in conjunction with other material handling equipment for the movement of material by hoisting. The types of rigging and slings covered are those made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope, and synthetic web. ***Brent Messina*** is designated by ***Cain's Pipeline & Industrial Services, LLC.*** as the Competent Person in authority over all rigging and hoisting operations. ***Brent Messina*** will ensure that all safety measures and systems are in place, all safety procedures are adhered to, and ensure regular inspections of the operational site and rigging equipment are made. ***Cain's Pipeline & Industrial Services, LLC.*** has implemented and will enforce the following work practices and procedures to assure that no employee will be exposed to hazards during rigging and hoisting operations:

- ***Brent Messina*** will verify that all employees are trained in and familiar with required safe work practices and procedures in the use of any equipment required, proper PPE, and safety procedures which must be followed to safeguard personnel involved in hoisting and rigging operations or who work in the vicinity of such operations.
- Rigging equipment for material handling will be inspected prior to use on each shift and as necessary during its use to ensure that it is safe.
- Defective sling and rigging equipment will be immediately removed from service.
- Rigging equipment will not be loaded in excess of its recommended safe working load, as prescribed for the specific equipment and load rating identification will be attached to the rigging apparatus or equipment.
- Rigging equipment, when not in use, will be removed from the immediate work area so as not to present a hazard to employees.
- Special custom design grabs, hooks, clamps, or other lifting accessories will be marked to indicate the safe working loads and will be proof-tested prior to use to 125 percent of their rated load.
- Each day before being used, the sling and all fastenings and attachments will be inspected for damage or defects by the Competent Person designated by ***Brent Messina***. Additional inspections will be performed during sling use, where service conditions warrant.
- Tag lines will be used unless their use creates an unsafe condition.
- Hooks on overhaul ball assemblies, lower load blocks, or other attachment assemblies will be of a type that can be closed and locked, eliminating the hook throat opening. Alternatively, an alloy anchor type shackle with a bolt, nut, and retaining pin may be used.
- Employees will be kept clear of loads about to be lifted and of suspended loads.

General Requirements & Training for Hoisting and Rigging

The following requirements and training apply regarding the hazards associated with hoisting and rigging.

Pre-shift Visual Inspection of Cranes

- Cranes will be visually inspected prior to each shift by a Competent Person; the inspection will include observation for deficiencies during operation. At a minimum this inspection will include the following:
 - All control mechanisms for maladjustments.
 - Control and drive mechanism for excessive wear of components and contamination by lubricants, water or other foreign matter.
 - Safety devices, including but not limited to boom angle indicators, boom stops, boom kick out devices, anti-two block devices, and load moment indicators where required.
 - Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which flex in normal operation.
 - Hooks and latches for deformation, chemical damage, cracks, or wear.
 - Wire rope reeving for compliance with hoisting equipment manufacturer's specifications.
 - Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, or moisture accumulation.
 - Hydraulic system for proper fluid level.
 - Tires for proper inflation and condition.
 - Ground conditions around the hoisting equipment for proper support, including ground settling under and around outriggers, ground water accumulation, or similar conditions.
 - The hoisting equipment for level position.
 - The hoisting equipment for level position after each move and setup.
- If any deficiency is identified, an immediate determination will be made by the Competent Person as to whether the deficiency constitutes a hazard.
- If the deficiency is determined to constitute a hazard, the hoisting equipment will be removed from service until the deficiency has been corrected.
- The operator will be responsible for those operations under the operator's direct control. Whenever there is any doubt as to safety, the operator will have the authority to stop and refuse to handle loads until safety has been assured.
- A qualified rigger (a rigger who is also a qualified person) will inspect the rigging prior to each shift.
- The headache ball, hook, or load will not be used to transport personnel.
- Cranes or derricks may be used to hoist employees on a personnel platform provided that all provisions are met.
- Safety latches on hooks will not be deactivated or made inoperable except:
 - When a qualified rigger has determined that the hoisting and placing of purlins and single joists can be performed more safely by doing so.
 - When equivalent protection is provided in a site-specific erection plan.

Working Under Loads

Routes for suspended loads will be pre-planned to ensure that no employee is required to work directly below a suspended load except for:

- Employees engaged in the initial connection of the steel.
- Employees necessary for the hooking or unhooking of the load.

When working under suspended loads, the following criteria will be met:

- Materials being hoisted will be rigged to prevent unintentional displacement.
- Hooks with self-closing safety latches or their equivalent will be used to prevent components from slipping out of the hook.
- All loads will be rigged by a qualified rigger.

Multiple Lift Rigging Procedure

A multiple lift will only be performed if the following criteria are met:

- A multiple lift rigging assembly is used.
- A maximum of five members are hoisted per lift.
- Only beams and similar structural members are lifted.
- All employees engaged in the multiple lift have been trained in these procedures.
- No crane is permitted to be used for a multiple lift where such use is contrary to the manufacturer's specifications and limitations.

Components of the multiple lift rigging assembly will be specifically designed and assembled with a maximum capacity for total assembly and for each individual attachment point. This capacity, certified by the manufacturer or a qualified rigger, will be based on the manufacturer's specifications with a 5 to 1 safety factor for all components.

The total load will not exceed:

- The rated capacity of the hoisting equipment specified in the hoisting equipment load charts.
- The rigging capacity specified in the rigging rating chart.

The multiple lift rigging assembly will be rigged with members:

- Attached at their center of gravity and maintained reasonably level.
- Rigged from top down.
- Rigged at least 7 feet apart.

The members on the multiple lift rigging assembly will be set from the bottom up. Controlled load lowering will be used whenever the load is over the connectors.

Introduction to Slings

The ability to handle materials – to move them from one location to another, whether during transit or at the worksite – is vital to all segments of industry. Materials must be moved, for example, for industry to manufacture, sell, and utilize products. In short, without materials-handling capability, industry would cease to exist.

To varying degrees, all employees in numerous workplaces take part in materials handling. Consequently, some employees are injured. In fact, the mishandling of materials is the single largest cause of accidents and injuries in the workplace. Most of these accidents and injuries, as well as the pain and loss of salary and productivity that often result, can be readily avoided.

Whenever possible, mechanical means should be used to move materials to avoid employee injuries such as muscle pulls, strains, and sprains. In addition, many loads are too heavy and/or bulky to be safely moved manually. Various types of equipment, therefore, have been designed specifically to aid in the movement of materials: cranes, derricks, hoists, powered industrial trucks, and conveyors.

Because cranes, derricks, and hoists rely upon slings to hold their suspended loads, slings are the most commonly used materials-handling apparatus. This section provides information on the proper selection, maintenance, and use of slings to assist.

Importance of the Operator

The operator must exercise intelligence, care, and common sense when selecting and using slings. Slings must be selected in accordance with their intended use, based upon the size and type of load, and the environmental conditions of the workplace. All slings must be visually inspected before use to ensure their effectiveness.

A well-trained operator can prolong the service life of equipment and reduce costs by avoiding the potentially hazardous effects of overloading equipment, operating it at excessive speeds, taking up slack with a sudden jerk, and suddenly accelerating or decelerating equipment. The operator can look for causes and seek corrections whenever a danger exists. He or she should cooperate with coworkers and supervisors and become a leader in carrying out safety measures – not merely for the good of the equipment and the production schedule but, more importantly, for the safety of everyone concerned.

Sling Types

The dominant characteristics of a sling are determined by the components of that sling. For example, the strengths and weaknesses of a wire rope sling are essentially the same as the strengths and weaknesses of the wire rope of which it is made.

Slings are generally one of six types: Chain, wire rope, metal mesh, natural fiber rope, synthetic fiber rope, or synthetic web. In general, use and inspection procedures tend to place these slings into three groups: chain, wire rope and mesh, and fiber rope web. Each type has its own particular advantages and disadvantages. Factors to consider when choosing the best sling for the job include the size, weight, shape, temperature, and sensitivity of the material to be moved, as well as the environmental conditions under which the sling will be used.

Chains

Chains are commonly used because of their strength and ability to adapt to the shape of the load. Care should be taken, however, when using alloy chain slings because sudden shocks will damage them. Misuse of chain slings could damage the sling, resulting in sling failure and possible injury to an employee.

Chain slings are the best choice for lifting very hot materials. They can be heated to temperatures of up to 1,000° Fahrenheit; however, when alloy chain slings are consistently exposed to service temperatures in excess of 600° Fahrenheit, operators must reduce the working load limits in accordance with the manufacturer's recommendations.

All sling types must be visually inspected prior to use. When inspecting alloy steel chain slings, pay special attention to any stretching, wear in excess of the allowances made by the manufacturer, and nicks and gouges. These signs indicate that the sling may be unsafe and they must be removed from service.

Wire Rope

A second type of sling is made of wire rope. Wire rope is composed of individual wires that have been twisted to form strands. Strands are then twisted to form a wire rope. When wire rope has a fiber core, it is usually more flexible but is less resistant to environmental damage. Conversely, a core that is made of a wire rope strand tends to have greater strength and is more resistant to heat damage.

Wire rope may be further determined by the "lay." The lay of a wire rope describes the direction the wires and strands are twisted during the construction of the rope. Most wire rope is right lay, regular lay – which means that the strands pass from left to right across the rope and the wires in the rope are laid opposite in direction to the lay of the strands. This type of rope has the widest range of applications.

Lang lay (where the wires are twisted in the same direction as the strands) is recommended for many excavating, construction, and mining applications, including draglines, hoist lines, dredgelines, and other similar lines.

Lang lay ropes are more flexible and have greater wearing surface than regular lay ropes. In addition, since the outside wires in lang lay rope lie at an angle to the rope axis, internal stress due to bending over sheaves and drums is reduced causing lang lay ropes to be more resistant to bending fatigue.

A left lay rope is one in which the strands form a left-hand helix similar to the threads of a left-hand screw thread. Left lay rope has its greatest usage in oil fields on rod and tubing lines, blast hole rigs, and spudders where rotation of right lay would loosen couplings. The rotation of a left lay rope tightens a standard coupling.

Wire Rope Sling Selection

When selecting a wire rope sling to give the best service, there are four characteristics to consider: strength, ability to bend without distortion, ability to withstand abrasive wear, and ability to withstand abuse.

- 1. Strength** – The strength of a wire rope is a function of its size, grade, and construction. It must be sufficient to accommodate the applied maximum load. The maximum load limit is determined by means of an appropriate multiplier. This multiplier is the number by which the ultimate strength of a wire rope is divided to determine the working load limit. Thus, a wire rope sling with a strength of 10,000 pounds and total working load of 2,000 pounds has a design factor (multiplier) of 5. New wire rope slings have a design factor of 5. As a sling suffers from the rigors of continued service, however, both the design factor and the sling's ultimate strength are proportionately reduced. If a sling is loaded beyond its ultimate strength, it will fail. So, older slings must be more rigorously inspected to ensure that rope conditions adversely affecting the strength of the sling are considered in determining if a wire rope sling should be allowed to continue in service.
- 2. Fatigue (Bending without Failure)** – A wire rope must have the ability to withstand repeated bending without the wires failing from fatigue. Fatigue failure of the wires in a wire rope is the result of the development of small cracks from repeated applications of bending loads. It occurs when ropes make small radius bends. The best means of preventing fatigue failure of wire rope slings is to use blocking or padding to increase the radius of bend.
- 3. Abrasive Wear** – the ability of a wire rope to withstand abrasion is determined by the size, number of wires, and construction of the rope. Smaller wires bend more readily and therefore offer greater flexibility but are less able to withstand abrasive wear. Conversely, the larger wires of less flexible ropes are better able to withstand abrasion than are the smaller wires of more flexible ropes.

- 4. Abuse** – All other factors being equal, misuse or abuse of wire rope will cause a wire rope sling to become unsafe long before any other factor. Abusing a wire rope sling can cause serious structural damage to the wire rope, such as kinking or bird caging, which reduces the strength of the wire rope. (In bird caging, the wire rope strands are forcibly untwisted and become spread outward.) So, to prolong the life of the sling and protect the lives of employees, the manufacturer's suggestion for safe and proper use of wire rope slings must be strictly adhered to.

Wire Rope Life

Many operating conditions affect wire rope life. They are bending, stresses, loading conditions, speed of load application (jerking), abrasion, corrosion, sling design, materials handled, environmental conditions, and history of previous usage.

In addition to the above operating conditions, the weight, size, and shape of the loads to be handled also affect the service life of a wire rope sling. Flexibility also is a factor. Generally, more flexible ropes are selected when smaller radius bending is required. Less flexible ropes should be used when the rope must move through or over abrasive materials.

Wire Rope Sling Inspection

Wire rope slings must be visually inspected before each day's use. The operator should check the twists or lay of the sling. If ten randomly distributed wires in one lay are broken, or five wires in one strand of a rope lay are damaged, the sling must not be used. It is not sufficient, however, to check only the condition of the wire rope. End fittings and other components should also be inspected for any damage that could make the sling unsafe.

To ensure safe sling usage between scheduled inspections, all workers should participate in a safety awareness program. Each operator should keep a close watch on those slings he or she is using. If any accident involving the movement of materials occurs, the operator should immediately shut down the equipment and report the accident to a supervisor. The cause of the accident should be determined and corrected before resuming operations.

Field Lubrication

Although every rope sling is lubricated when manufactured, it also must be lubricated "in the field" to increase the sling's useful service life. There is no set rule on how much or how often this should be done. It depends on the conditions under which the sling is used. The heavier the loads, the greater the number of bends, or the more adverse the conditions under which the sling operates, the more frequently lubrication is required.

Storage

Wire rope slings should be stored in a well-ventilated, dry building or shed. To avoid corrosion and rust, never store wire rope slings on the ground or allow them to be continuously exposed to the elements. And, if it is necessary to store wire rope slings outside, make sure that they are set off the ground and protected.

Note: Using the sling several times a week, even with light loads, is a good practice. Records show that frequently or continuously used slings give useful service far longer than idle ones.

Discarding Slings

Wire rope slings can provide a margin of safety by showing early signs of failure. The following factors indicate when a wire sling needs to be discarded:

- Severe corrosion
- Localized wear (shiny worn spots) on the outside
- A one-third reduction in outer wire diameter
- Damage or displacement of end-fittings – hooks, rings, links, or collars – by overload or misapplication
- Distortion, kinking, bird caging, or other evidence of damage to the wire rope structure
- Excessive broken wires

Fiber Rope and Synthetic Web

Fiber rope and synthetic web slings are used primarily for temporary work, such as construction and painting jobs, and in marine operations. They also are the best choice for use on expensive loads, highly finished parts, fragile parts, and delicate equipment.

Fiber Rope Slings

Fiber rope deteriorates on contact with acids and caustics. Fiber rope slings, therefore, must not be used around these substances unless the manufacturer recommends them for that use.

When inspecting a fiber rope sling, look first at its surface. Look for cuts, gouges, or worn surface areas; dry, brittle, scorched, or discolored fibers; or melting or charring of any part of the sling. If any of these conditions are found, the supervisor must be notified and a determination made regarding the safety of the sling. If the sling is found to be unsafe, it must be discarded.

Next, check the sling's interior. It should be as clean as when the rope was new. A buildup of powder-like sawdust on the inside of the fiber rope indicates excessive internal wear and that the sling is unsafe.

Finally, scratch the fibers with a fingernail. If the fibers separate easily, the fiber sling has suffered some kind of chemical damage and must be discarded.

Synthetic Rope and Web Slings

The most commonly used synthetic web slings are made of nylon, polypropylene, and polyester. They have the following properties in common:

- *Strength* – can handle a load of up to 300,000 pounds.
- *Convenience* – can conform to any shape.
- *Safety* – will adjust to the load contour and hold it with a tight, non-slip grip.
- *Load protection* – will not mar, deface, or scratch polished or delicate surfaces.
- *Long life* – are unaffected by mildew, rot, or bacteria; resist some chemical action; and have excellent abrasion resistance.
- *Economy* – have a low initial cost plus a long service life.
- *Shock absorbency* – can absorb heavy shocks without damage.
- *Temperature resistance* – are unaffected by temperatures up to 180° F.

Because each synthetic material has unique properties, it should be used according to the manufacturer's instructions, especially when dealing with chemically active environments.

Possible Defects

Synthetic web slings must be removed from service if any of the following defects exist:

- Acid or caustic burns
- Melting or charring of any part of the surface
- Snags, punctures, tears, or cuts
- Broken or worn stitches
- Wear or elongation exceeding the amount recommended by the manufacturer
- Distortion of fittings

Safe Lifting Practices

Once the sling has been selected (based upon the characteristics of the load and the environmental conditions surrounding the lift) and inspected prior to use, the next step is knowing how to use it safely. There are four primary factors to consider when safely lifting a load:

- 1.** The size, weight, and center of gravity to the load.
- 2.** The number of legs and the angle the sling makes with the horizontal line.
- 3.** The rated capacity of the sling.
- 4.** The history of the care and usage of the sling.

Size, Weight, and Center of Gravity of the Load

The center of gravity of an object is that point at which the entire weight may be considered as concentrated. To make a level lift, the crane hook must be directly above this point. While slight variations are usually permissible, if the crane hook is too far to one side of the center of gravity, dangerous tilting will result causing unequal stresses in the different sling legs. This imbalance must be compensated for at once.

Number of Legs and Angle with the Horizontal

As the angle formed by the sling leg and the horizontal line decreases, the rated capacity of the sling also decreases. In other words, the smaller the angle between the sling leg and the horizontal, the greater the stress on the sling leg and the smaller (lighter) the load the sling can safely support. Larger (heavier) loads can be safely moved if the weight of the load is distributed among more sling legs.

Rated Capacity of the Sling

The rated capacity of a sling varies depending upon the type of sling, the size of the sling, and the type of hitch. Operators must know the capacity of the sling. Charts or tables that contain this information generally are available from sling manufacturers. The values given are for new slings. Older slings must be used with additional caution. Under no circumstances will a sling's rated capacity be exceeded.

History of Care and Usage

The mishandling and misuse of slings are the leading cause of sling-related accidents. The majority of injuries and accidents, however, can be avoided by becoming familiar with the essentials of proper sling care and use.

Proper care and use are essential for maximum service and safety. Slings must be protected with cover saddles, burlap padding, or wood blocking as well as from unsafe lifting procedures such as overloading to prevent sharp bends and cutting edges.

Before making a lift, check to be certain that the sling is properly secured around the load and that the weight and balance of the load have been accurately determined. If the load is on the ground, do not allow the load to drag along the ground. This could damage the sling. If the load is already resting on the sling, ensure that there is no sling damage prior to making the lift.

Next, position the hook directly over the load and seat the sling squarely within the hook bowl. This gives the operator maximum lifting efficiency without bending the hook or overstressing the sling.

Wire rope slings also are subject to damage resulting from contact with sharp edges of the loads being lifted. These edges can be blocked or padded to minimize damage to the sling.

After the sling is properly attached to the load, there are a number of good lifting techniques that are common to all slings. First, make sure that the load is not lagged, clamped, or bolted to the floor. Second, guard against shock loading by taking up the slack in the sling slowly. Apply power cautiously to prevent jerking at the beginning of the lift, and slowly accelerate or decelerate. Third, check the tension on the sling. Raise the load a few inches, stop, and check for proper balance and that all items are clear of the path of travel. Never allow anyone to ride on the hook or load. Fourth, keep all personnel clear while the load is being raised, moved, or lowered. Crane or hoist operators should watch the load at all times when it is in motion. Finally, obey the following "nevers." Never allow more than one person to control a lift or give signals to a crane or hoist operator except to warn of a hazardous situation. Never raise the load more than necessary. Never leave the load suspended in the air. And never work under a suspended load or allow anyone else to.

Once the lift has been completed, clean the sling, check it for damage, and store it in a clean, dry, airy place. It is best to hang it on a rack or wall.

Remember, damaged slings cannot lift as much weight as new or older well-cared for slings. Proper and safe use and storage of slings will increase their service life.

Maintenance of Slings

Chains

Chain slings must be cleaned prior to each inspection, as dirt or oil may hide damage. The operator must be certain to inspect the total length of the sling, periodically looking for stretching, binding, wear, or nicks and gouges. If a sling has stretched so that it is now more than three percent longer than when it was new, it is unsafe and must be discarded.

Binding is the term used to describe the condition that exists when a sling has become deformed to the extent that its individual links cannot move within each other freely. It indicates that the sling is unsafe. Generally, wear occurs on the load-bearing inside ends of the links. Pushing links together so that the inside surface becomes clearly visible is the best way to check for this type of wear. Wear may also occur, however, on the outside of links when the chain is dragged along abrasive surfaces or pulled out from under heavy loads. Either type of wear weakens slings and makes accidents more likely.

Heavy nicks and/or gouges must be filed smoothly, measured with calipers, and then compared with the manufacturer's minimum allowable safe dimensions. When in doubt, or in borderline situations, do not use the sling. In addition, never attempt to repair the welded components on a sling. If the sling needs repair of this nature, the supervisor must be notified.

Wire Rope Slings

Wire rope slings, like chain slings, must be cleaned prior to each inspection because they are subject to damage hidden by dirt or oil. In addition, they must be lubricated according to manufacturer's instructions. Lubrication prevents or reduces corrosion and wear due to friction and abrasion. Before applying any lubricant, however, the sling user should make certain that the sling is dry. Applying lubricant to a wet or damp sling traps moisture against the metal and hastens corrosion.

Corrosion deteriorates wire rope. It may be indicated by pitting, but it is sometimes hard to detect. If a wire rope sling shows any sign of significant deterioration, that sling must be removed until it can be examined by a person who is qualified to determine the extent of the damage.

By following these guidelines to proper sling use and maintenance, and by the avoidance of kinking, it is possible to greatly extend the useful service life of a wire rope sling.

Fiber and Synthetic Ropes

Fiber ropes and synthetic webs are generally discarded rather than service or repaired. Operators must always follow the manufacturer's recommendations.

In Summary

There are good practices to follow to protect yourself while using slings to move materials. First, accept the responsibility for your own actions. Become a competent and careful employee. Your own life or that of your fellow workers or others may depend on it. Second, learn as much as you can about the materials with which you will be working. Slings come in many different types, one of which is right for your purpose. Third, analyze the load to be moved – in terms of size, weight, shape, temperature, and sensitivity then choose the sling which best meets those needs. Fourth, always inspect all the equipment before and after a move. Always be sure to give equipment whatever "in service" maintenance it may need. Fifth, use safe lifting practices. Use the proper lifting technique for the type of sling and the type of load.

§1910.184 – Slings

Scope

This section applies to slings used in conjunction with other material handling equipment for the movement of material by hoisting, in employments covered by this part. The types of slings covered are those made from alloy steel chain, wire rope, metal mesh, natural or synthetic fiber rope (conventional three strand construction), and synthetic web (nylon, polyester, and polypropylene).

Definitions

Angle of loading – is the inclination of a leg or branch of a sling measured from the horizontal or vertical plane, provided that an angle of loading of five degrees or less from the vertical may be considered a vertical angle of loading.

Basket hitch – is a sling configuration whereby the sling is passed under the load and has both ends, end attachments, eyes or handles on the hook or a single master link.

Braided wire rope – is a wire rope formed by plaiting component wire ropes.

Bridle wire rope sling – is a sling composed of multiple wire rope legs with the top ends gathered in a fitting that goes over the lifting hook.

Cable laid endless sling-mechanical joint – is a wire rope sling made endless by joining the ends of a single length of cable laid rope with one or more metallic fittings.

Cable laid grommet-hand tucked – is an endless wire rope sling made from one length of rope wrapped six times around a core formed by hand tucking the ends of the rope inside the six wraps.

Cable laid rope – is a wire rope composed of six wire ropes wrapped around a fiber or wire rope core.

Cable laid rope sling-mechanical joint – is a wire rope sling made from a cable laid rope with eyes fabricated by pressing or swaging one or more metal sleeves over the rope junction.

Choker hitch – is a sling configuration with one end of the sling passing under the load and through an end attachment, handle or eye on the other end of the sling.

Coating – is an elastomer or other suitable material applied to a sling or to a sling component to impart desirable properties.

Cross rod – is a wire used to join spirals of metal mesh to form a complete fabric.

Designated – means selected or assigned by the employer or the employer's representative as being qualified to perform specific duties.

Equivalent entity – is a person or organization (including an employer) which, by possession of equipment, technical knowledge and skills, can perform with equal competence the same repairs and tests as the organization with which it is equated.

Fabric (metal mesh) – is the flexible portion of a metal mesh sling consisting of a series of transverse coils and cross rods.

Female handle (choker) – is a handle with a handle eye and a slot of such dimension as to permit passage of a male handle thereby allowing the use of a metal mesh sling in a choker hitch.

Handle – is a terminal fitting to which metal mesh fabric is attached.

Handle eye – is an opening in a handle of a metal mesh sling shaped to accept a hook, shackle or other lifting device.

Hitch – is a sling configuration whereby the sling is fastened to an object or load, either directly to it or around it.

Link – is a single ring of a chain.

Male handle (triangle) – is a handle with a handle eye.

Master coupling link – is an alloy steel welded coupling link used as an intermediate link to join alloy steel chain to master links.

Master link or gathering ring – is a forged or welded steel link used to support all members (legs) of an alloy steel chain sling or wire rope sling.

Mechanical coupling link – is a nonwelded, mechanically closed steel link used to attach master links, hooks, etc., to alloy steel chain.

Proof load – is the load applied in performance of a proof test.

Proof test – is a nondestructive tension test performed by the sling manufacturer or an equivalent entity to verify construction and workmanship of a sling.

Rated capacity or working load limit – is the maximum working load permitted by the provisions of this section.

Reach – is the effective length of an alloy steel chain sling measured from the top bearing surface of the upper terminal component to the bottom bearing surface of the lower terminal component.

Selvage edge – is the finished edge of synthetic webbing designed to prevent unraveling.

Sling – is an assembly which connects the load to the material handling equipment.

Sling manufacturer – is a person or organization that assembles sling components into their final form for sale to users.

Spiral – is a single transverse coil that is the basic element from which metal mesh is fabricated.

Strand laid endless sling-mechanical joint – is a wire rope sling made endless from one length of rope with the ends joined by one or more metallic fittings.

Strand laid grommet-hand tucked – is an endless wire rope sling made from one length of strand wrapped six times around a core formed by hand tucking the ends of the strand inside the six wraps.

Strand laid rope – is a wire rope made with strands (usually six or eight) wrapped around a fiber core, wire strand core, or independent wire rope core (IWRC).

Vertical hitch – is a method of supporting a load by a single, vertical part or leg of the sling.

Safe Operating Practices

Whenever any sling is used, the following practices will be observed:

- Slings that are damaged or defective will not be used.
- Slings will not be shortened with knots or bolts or other makeshift devices.
- Sling legs will not be kinked.
- Slings will not be loaded in excess of their rated capacities.
- Slings used in a basket hitch will have the loads balanced to prevent slippage.
- Slings will be securely attached to their loads.
- Slings will be padded or protected from the sharp edges of their loads.
- Suspended loads will be kept clear of all obstructions.
- All employees will be kept clear of loads about to be lifted and of suspended loads.
- Hands or fingers will not be placed between the sling and its load while the sling is being tightened around the load.
- Shock loading is prohibited.
- A sling will not be pulled from under a load when the load is resting on the sling.

Inspections

Each day before being used, the sling and all fastenings and attachments will be inspected for damage or defects by a Competent Person designated by the employer. Additional inspections will be performed during sling use, where service conditions warrant. Damaged or defective slings will be immediately removed from service.

Alloy Steel Chain Slings

Sling Identification

Alloy steel chain slings will have permanently affixed durable identification stating size, grade, rated capacity, and reach.

Attachments

- Hooks, rings, oblong links, pear shaped links, welded or mechanical coupling links or other attachments will have a rated capacity at least equal to that of the alloy steel chain with which they are used or the sling will not be used in excess of the rated capacity of the weakest component.
- Makeshift links or fasteners formed from bolts or rods, or other such attachments, will not be used.

Inspections

- In addition to the inspection required, a thorough periodic inspection of alloy steel chain slings in use will be made on a regular basis, to be determined on the basis of: frequency of sling use; severity of service conditions; nature of lifts being made; and experience gained on the service life of slings used in similar circumstances.
- Such inspections will in no event be at intervals greater than once every 12 months.
- The employer will make and maintain a record of the most recent month in which each alloy steel chain sling was thoroughly inspected, and will make such record available for examination.
- The thorough inspection of alloy steel chain slings will be performed by a Competent Person designated by the employer, and will include a thorough inspection for wear, defective welds, deformation and increase in length. Where such defects or deterioration are present, the sling will be immediately removed from service.

Proof Testing

The employer will ensure that before use, each new, repaired, or reconditioned alloy steel chain sling, including all welded components in the sling assembly, will be proof tested by the sling manufacturer or equivalent entity, in accordance with paragraph 5.2 of the American Society of Testing and Materials Specification A391-65, (ANSI G61.1-1968). The employer will retain a certificate of the proof test and will make it available for examination.

Sling Use

Alloy steel chain slings will not be used with loads in excess of the rated capacities. Slings will be used only in accordance with the manufacturer's recommendations.

Safe Operating Temperatures

Alloy steel chain slings will be permanently removed from service if they are heated above 1000° F. When exposed to service temperatures in excess of 600° F, maximum working load limits will be reduced in accordance with the chain or sling manufacturer's recommendations.

Repairing and Reconditioning Alloy Steel Chain Slings

- Worn or damaged alloy steel chain slings or attachments will not be used until repaired. When welding or heat testing is performed, slings will not be used unless repaired, reconditioned and proof tested by the sling manufacturer or an equivalent entity.
- Mechanical coupling links or low carbon steel repair links will not be used to repair broken lengths of chain.

Effects of Wear

If the chain size at any point of any link is less than minimum requirements, the sling will be removed from service.

Deformed Attachments

- Alloy steel chain slings with cracked or deformed master links, coupling links or other components will be removed from service.
- Slings will be removed from service if hooks are cracked, have been opened more than 15 percent of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook.

Wire Rope Slings

Sling Use

Wire rope slings will not be used with loads in excess of the rated capacities. Slings will be used only in accordance with the manufacturer's recommendations.

Minimum Sling Lengths

- Cable laid and 6 x 19 and 6 x 37 slings will have a minimum clear length of wire rope 10 times the component rope diameter between splices, sleeves or end fittings.
- Braided slings will have a minimum clear length of wire rope 40 times the component rope diameter between the loops or end fittings.
- Cable laid grommets, strand laid grommets and endless slings will have a minimum circumferential length of 96 times their body diameter.

Safe Operating Temperatures

Fiber core wire rope slings of all grades will be permanently removed from service if they are exposed to temperatures in excess of 200° F. When non-fiber core wire rope slings of any grade are used at temperatures above 400° F or below minus 60° F, recommendations of the sling manufacturer regarding use at that temperature will be followed.

End Attachments

- Welding of end attachments, except covers to thimbles, will be performed prior to the assembly of the sling.
- All welded end attachments will not be used unless proof tested by the manufacturer or equivalent entity at twice their rated capacity prior to initial use. The employer will retain a certificate of the proof test, and make it available for examination.

Removal from Service

Wire rope slings will be immediately removed from service if any of the following conditions are present:

- Ten randomly distributed broken wires in one rope lay, or five broken wires in one strand in one rope lay.
- Wear or scraping of one-third the original diameter of outside individual wires.
- Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure.
- Evidence of heat damage.
- End attachments that are cracked, deformed or worn.
- Hooks that have been opened more than 15 percent of the normal throat opening measured at the narrowest point or twisted more than 10 degrees from the plane of the unbent hook.
- Corrosion of the rope or end attachments.

Metal Mesh Slings

Sling Marking

Each metal mesh sling will have permanently affixed to it a durable marking that states the rated capacity for vertical basket hitch and choker hitch loadings.

Handles

Handles will have a rated capacity at least equal to the metal fabric and exhibit no deformation after proof testing.

Attachments of Handles to Fabric

The fabric and handles will be joined so that:

- The rated capacity of the sling is not reduced.
- The load is evenly distributed across the width of the fabric.
- Sharp edges will not damage the fabric.

Sling Coatings

Coatings which diminish the rated capacity of a sling will not be applied.

Sling Testing

All new and repaired metal mesh slings, including handles, will not be used unless proof tested by the manufacturer or equivalent entity at a minimum of 1½ times their rated capacity. Elastomer impregnated slings will be proof tested before coating.

Proper Use of Metal Mesh Slings

Metal mesh slings will not be used to lift loads in excess of their rated capacities. Slings not included in this table will be used only in accordance with the manufacturer's recommendations.

Safe Operating Temperatures

Metal mesh slings which are not impregnated with elastomers may be used in a temperature range from -20° F to +550° F without decreasing the working load limit.

Metal mesh slings impregnated with polyvinyl chloride or neoprene may be used only in a temperature range from zero degrees to plus 200° F. For operations outside these temperature ranges or for metal mesh slings impregnated with other materials, the sling manufacturer's recommendations will be followed.

Repairs

- Metal mesh slings which are repaired will not be used unless repaired by a metal mesh sling manufacturer or an equivalent entity.
- Once repaired, each sling will be permanently marked or tagged, or a written record maintained, to indicate the date and nature of the repairs and the person or organization that performed the repairs.

Records of repairs will be made available for examination.

Removal from Service

Metal mesh slings will be immediately removed from service if any of the following conditions are present:

- A broken weld or broken brazed joint along the sling edge.
- Reduction in wire diameter of 25% due to abrasion or 15% due to corrosion.
- Lack of flexibility due to distortion of the fabric.
- Distortion of the female handle so that the depth of the slot is increased more than 10%.
- Distortion of either handle so the width of the eye is decreased more than 10%.

- A 15% reduction of the original cross sectional area of metal at any point around the handle eye.
- Distortion of either handle out of its plane.

Natural and Synthetic Fiber Rope Slings

Sling Use

- Fiber rope slings made from conventional three strand construction fiber rope will not be used with loads in excess of the rated capacities prescribed.
- Fiber rope slings will have a diameter of curvature meeting at least the minimums specified.
- Slings not included in these tables will be used only in accordance with the manufacturer's recommendations.

Sling Operating Temperatures

Natural and synthetic fiber rope slings, except for wet frozen slings, may be used in a temperature range from -20° F to +180° F without decreasing the working load limit.

For operations outside this temperature range and for wet frozen slings, the sling manufacturer's recommendations will be followed.

Splicing

Spliced fiber rope slings will not be used unless they have been spliced in accordance with the following minimum requirements and in accordance with any additional recommendations of the manufacturer:

- In manila rope, eye splices will consist of at least three full tucks, and short splices will consist of at least six full tucks, three on each side of the splice center line.
- In synthetic fiber rope, eye splices will consist of at least four full tucks, and short splices will consist of at least eight full tucks, four on each side of the center line.
- Strand end tails will not be trimmed flush with the surface of the rope immediately adjacent to the full tucks. This applies to all types of fiber rope and both eye and short splices. For fiber rope under one inch in diameter, the tail will project at least six rope diameters beyond the last full tuck. For fiber rope one inch in diameter and larger, the tail will project at least six inches beyond the last full tuck. Where a projecting tail interferes with the use of the sling, the tail will be tapered and spliced into the body of the rope using at least two additional tucks (which will require a tail length of approximately six rope diameters beyond the last full tuck).
- Fiber rope slings will have a minimum clear length of rope between eye splices equal to 10 times the rope diameter.
- Knots will not be used in lieu of splices.
- Clamps not designed specifically for fiber ropes will not be used for splicing.
- For all eye splices, the eye will be of such size to provide an included angle of not greater than 60 degrees at the splice when the eye is placed over the load or support.

End Attachments

Fiber rope slings will not be used if end attachments in contact with the rope have sharp edges or projections.

Removal from Service

Natural and synthetic fiber rope slings will be immediately removed from service if any of the following conditions are present:

- Abnormal wear.
- Powdered fiber between strands.
- Broken or cut fibers.
- Variations in the size or roundness of strands.
- Discoloration or rotting.
- Distortion of hardware in the sling.

Repairs

Only fiber rope slings made from new rope will be used. Use of repaired or reconditioned fiber rope slings is prohibited.

Synthetic Web Slings

Sling Identification

Each sling will be marked or coded to show the rated capacities for each type of hitch and type of synthetic web material.

Webbing

Synthetic webbing will be of uniform thickness and width and selvage edges will not be split from the webbing's width.

Fittings

Fittings will be:

- Of a minimum breaking strength equal to that of the sling.
- Free of all sharp edges that could in any way damage the webbing.

Attachment of End Fittings to Webbing and Formation of Eyes

Stitching will be the only method used to attach end fittings to webbing and to form eyes. The thread will be in an even pattern and contain a sufficient number of stitches to develop the full breaking strength of the sling.

Sling Use

Synthetic web slings will not be used with loads in excess of the rated capacities. Slings not included in these tables will be used only in accordance with the manufacturer's recommendations.

Environmental Conditions

When synthetic web slings are used, the following precautions will be taken:

- Nylon web slings will not be used where fumes, vapors, sprays, mists or liquids of acids or phenolics are present.
- Polyester and polypropylene web slings will not be used where fumes, vapors, sprays, mists or liquids of caustics are present.
- Web slings with aluminum fittings will not be used where fumes, vapors, sprays, mists or liquids of caustics are present.

Safe Operating Temperatures

Synthetic web slings of polyester and nylon will not be used at temperatures in excess of 180° F. Polypropylene web slings will not be used at temperatures above 200° F.

Repairs

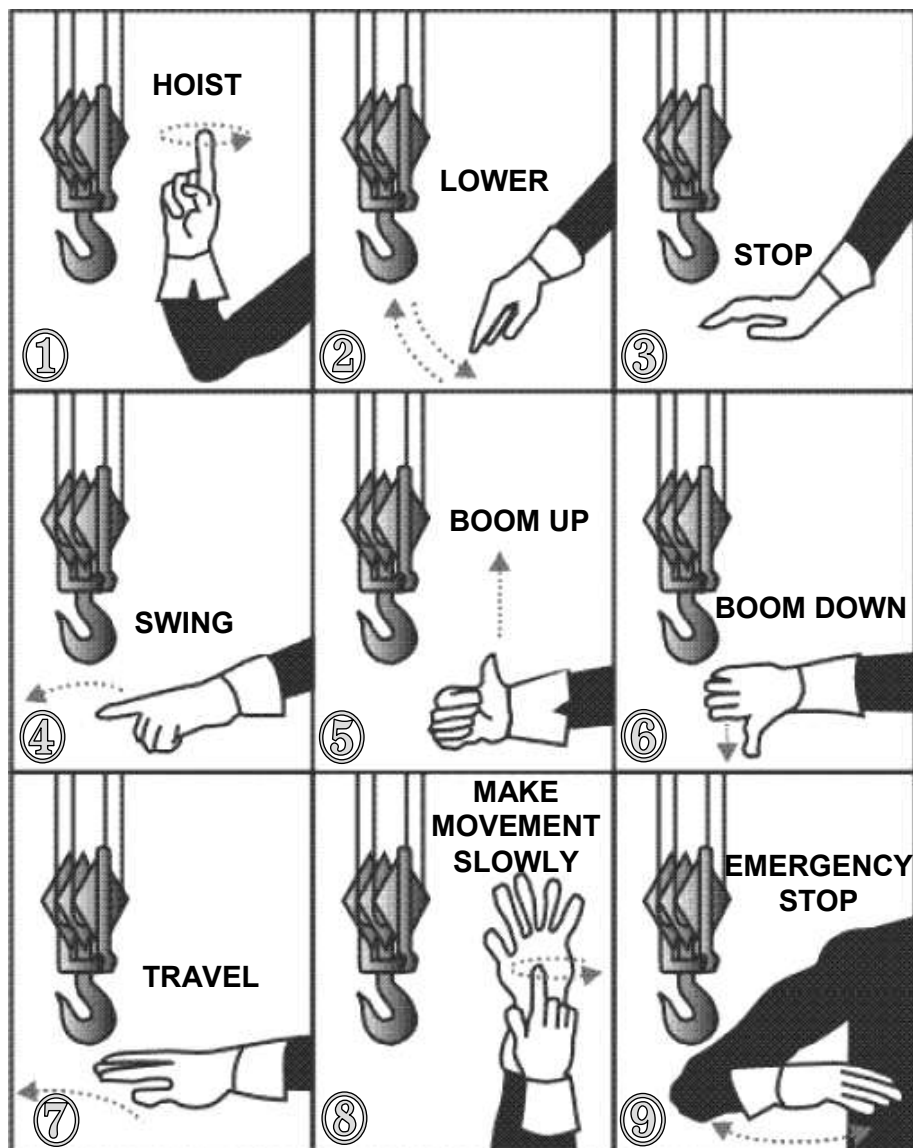
- Synthetic web slings which are repaired will not be used unless repaired by a sling manufacturer or an equivalent entity.
- Each repaired sling will be proof tested by the manufacturer or equivalent entity to twice the rated capacity prior to its return to service. The employer will retain a certificate of the proof test and make it available for examination.
- Slings, including webbing and fittings, which have been repaired in a temporary manner will not be used.

Removal from Service

Synthetic web slings will be immediately removed from service if any of the following conditions are present:

- Acid or caustic burns.
- Snags, punctures, tears, or cuts.
- Melting or charring of any part of the sling surface.
- Broken or worn stitches.
- Distortion of fittings.

RECOMMENDED HAND SIGNALS FOR CONTROLLING CRANE OPERATIONS



Chapter 31

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Scaffold Use

Cain's Pipeline & Industrial Services, LLC. has adopted this policy to ensure the safety of personnel who use scaffolding in the performance of work. The policy is adopted from the following OSHA regulations:

§1926.454 – Training Requirements

§1910.145 – Specifications for Accident Prevention Signs and Tags

§1926.200 – Accident Preventions Signs and Tags

The following engineering controls, training requirements, and safe work practices will be enforced by *Brent Messina* to protect our employees from hazards associated with the erecting and use of scaffolds:

- Training of all employees that work on scaffolds is conducted by "Qualified" persons.
- Each *Cain's Pipeline & Industrial Services, LLC.* employee who performs work erecting, disassembling, moving, or working with scaffolds in any way is trained under the supervision of *Brent Messina*, who is designated as the Qualified Person for *Cain's Pipeline & Industrial Services, LLC.*, to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards.
- Retraining is required when scaffold application, type of scaffold used, or when job conditions change.
- The training program, at a minimum, addresses the following hazards:
 - Assessment of any electrical hazards, fall hazards, and falling object hazards in the work area.
 - The correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the scaffolding and fall protection systems and falling object protection systems being used.
 - Proper use of the scaffold, and the safe handling of materials on the scaffold.
 - Maximum intended loads and the load carrying capacities of the scaffolds used.
 - The nature of scaffold hazards.
 - The correct procedures for erecting, disassembling, moving, operating, repairing, inspecting, and maintaining the type of scaffold being used.
 - The design criteria, maximum intended load carrying capacity, and intended use of the scaffold.
 - Any other safety topics deemed pertinent to the particular work-site, scaffold system, or fall protection systems being used.
- Unsafe equipment or conditions will be tagged out by *Brent Messina*, and mandatory employee compliance is required. Instructions for and examples of tagging systems used by *Cain's Pipeline & Industrial Services, LLC.* are provided to all employees.

- All scaffolding systems, components, and fall protection systems used will be inspected by *Brent Messina* prior to use, before each work shift begins, after erecting or moving, and periodically through the work day to ensure the system is erected properly, that there is no damage to components of the system, and that the system is being used properly and safely.
- Modifications of scaffold by non-qualified employees is prohibited. Only qualified and competent personnel are allowed to modify scaffolding systems. Disciplinary action for non-qualified modifications will be enforced.
- Any system or component of a system which is found to have a defect in manufacturing or design, damage, excessive wear, weathering, or corrosion, will be immediately removed from service and tagged to indicate that it is not to be used with a prominent tag, as shown below, which states:



- Any repairs or modifications to a scaffold system or component of a system must be approved by *Brent Messina* prior to implementation.
- Any violation of the above policy, misuse of scaffolds, or misconduct while working on scaffolds will be subject to disciplinary action within the scope of Company policy, up to and including termination of employment.

§1926.454 – TRAINING REQUIREMENTS.

This section supplements and clarifies the requirements of §1926.21(b)(2) as these relate to the hazards of work on scaffolds.

(a) The employer shall have each employee who performs work while on a scaffold trained by a person qualified in the subject matter to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards. The training shall include the following areas, as applicable:

- (1) The nature of any electrical hazards, fall hazards and falling object hazards in the work area;
- (2) The correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used;
- (3) The proper use of the scaffold, and the proper handling of materials on the scaffold;
- (4) The maximum intended load and the load carrying capacities of the scaffolds used; and
- (5) Any other pertinent requirements of this subpart.

(b) The employer shall have each employee who is involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting a scaffold trained by a competent person to recognize any hazards associated with the work in question. The training shall include the following topics, as applicable:

- (1) The nature of scaffold hazards;
- (2) The correct procedures for erecting, disassembling, moving, operating, repairing, inspecting, and maintaining the type of scaffold in question;
- (3) The design criteria, maximum intended load carrying capacity and intended use of the scaffold;
- (4) Any other pertinent requirements of this subpart.

(c) When the employer has reason to believe that an employee lacks the skill or understanding needed for safe work involving the erection, use or dismantling of scaffolds, the employer shall retrain each such employee so that the requisite proficiency is regained. Retraining is required in at least the following situations:

- (1) Where changes at the worksite present a hazard about which an employee has not been previously trained; or
- (2) Where changes in the types of scaffolds, fall protection, falling object protection, or other equipment present a hazard about which an employee has not been previously trained; or
- (3) Where inadequacies in an affected employee's work involving scaffolds indicate that the employee has not retained the requisite proficiency.

§1910.145 — SPECIFICATIONS FOR ACCIDENT PREVENTION SIGNS AND TAGS.

(a) Scope.

(1) These specifications apply to the design, application, and use of signs or symbols (as included in paragraphs (c) through (e) of this section) intended to indicate and, insofar as possible, to define specific hazards of a nature such that failure to designate them may lead to accidental injury to workers or the public, or both, or to property damage. These specifications are intended to cover all safety signs except those designed for streets, highways, railroads, and marine regulations. These specifications do not apply to plant bulletin boards or to safety posters.

(2) All new signs and replacements of old signs shall be in accordance with these specifications.

(d) Sign design.

(1) Design features. All signs shall be furnished with rounded or blunt corners and shall be free from sharp edges, burrs, splinters, or other sharp projections. The ends or heads of bolts or other fastening devices shall be located in such a way that they do not constitute a hazard.

(2) Danger signs. The colors red, black, and white shall be those of opaque glossy samples as specified in Table 1 of Fundamental Specification of Safety Colors for CIE Standard Source "C", American National Standard Z53.1-1967, which is incorporated by reference as specified in §1910.6.

(3) (Reserved)

(4) Caution signs. Standard color of the background shall be yellow; and the panel, black with yellow letters. Any letters used against the yellow background shall be black. The colors shall be those of opaque glossy samples as specified in Table 1 of American National Standard Z53.1-1967.

(5) (Reserved)

(6) Safety instruction signs. Standard color of the background shall be white; and the panel, green with white letters. Any letters used against the white background shall be black. The colors shall be those of opaque glossy samples as specified in Table 1 of American National Standard, Z53.1-1967.

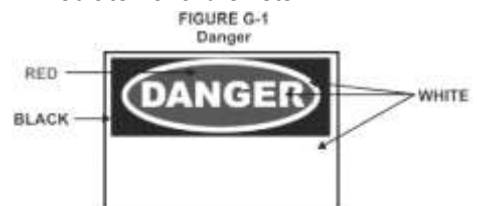
§1926.200 — ACCIDENT PREVENTION SIGNS AND TAGS.

(a) General. Signs and symbols required by this subpart shall be visible at all times when work is being performed, and shall be removed or covered promptly when the hazards no longer exist.

(b) Danger signs.

(1) Danger signs (see Figure G-1) shall be used only where an immediate hazard exists.

(2) Danger signs shall have red as the predominating color for the upper panel; black outline on the borders; and a white lower panel for additional sign wording.



(c) Caution signs.

(1) Caution signs (see Figure G-2) shall be used only to warn against potential hazards or to caution against unsafe practices.



(2) Caution signs shall have yellow as the predominating color; black upper panel and borders: yellow lettering of "caution" on the black panel; and the lower yellow panel for additional sign wording. Black lettering shall be used for additional wording.

(3) Standard color of the background shall be yellow; and the panel, black with yellow letters. Any letters used against the yellow background shall be black. The colors shall be those of opaque glossy samples as specified in Table 1 of American National Standard Z53.1-1967.

(e) Safety instruction signs. Safety instruction signs, when used, shall be white with green upper panel with white letters to convey the principal message. Any additional wording on the sign shall be black letters on the white background.

(h) Accident prevention tags.

(1) Accident prevention tags shall be used as a temporary means of warning employees of an existing hazard, such as defective tools, equipment, etc. They shall not be used in place of, or as a substitute for, accident prevention signs.

(2) Specifications for accident prevention tags similar to those in Table G-1 shall apply.

TABLE G-1

			
White tag – White letters on red square	White tag – White letters on red oval with a black square	Yellow tag – Yellow letters on a black background	White tag – White letters on black background
Basic Stock (Background)	Safety Colors (Ink)	Copy Specification (Letters)	
White	Red	Do Not Operate	
White	Black and Red	Danger	
Yellow	Black	Caution	
White	Black	Out Of Order Do Not Use	

Chapter 32

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Subcontractor Management Plans & Management of Change

Cain's Pipeline & Industrial Services, LLC. has adopted this policy for Subcontractor Management Plans and Management of Change from industry standards and best practices.

Brent Messina is the assigned Company Supervisor responsible for ensuring the following procedures, practices, and rules are implemented and enforced.

Subcontractor Safety Management Plan

- ***Prequalification*** – *Brent Messina* will ensure that all prospective subcontractors be pre-qualified through the review of their safety programs, safety training documents, and safety statistics. Proposed subcontractors will complete and submit a Contractors Prequalification Form from which a Subcontractor/Supplier Quality Rating Report will be completed. The Contractor's Prequalification Form must be complete and all requested attachments provided.
- ***Selection*** – *Brent Messina* will utilize acceptable safety matrixes to be used as a criteria for selecting subcontractors and will be based upon several considerations including but not limited to:
 - Prior working relationships
 - Quality Rating Report score
 - Audits of current work in progress
 - Availability of contractors in the area

The contractor that receives the best overall review will be forwarded to the Owner's representative for review and approval.

- ***Pre-Job*** – The selected subcontractor will provide a training matrix with individual employee names and the areas of completed training for employees. The subcontractor will also identify Competent Persons and the areas of their competency. The subcontractor will be included in pre-job meetings or kick-off meetings, and safety orientations.
- ***On-Site*** – The subcontractor will notify *Cain's Pipeline & Industrial Services, LLC.* Site Safety a minimum of 24 hours prior to the arrival of new employees on-site so that arrangements can be made to provide the required orientations. Employees must meet all of the requirements of the Site Safety Plan, including the training and orientation.
 - The Subcontractor will be required to meet all hazard analysis requirements and request the safe work permits as required by this plan. The subcontractor will be included in the audits and inspections on-site and are expected to immediately correct any "At Risk" behaviors or hazards identified that are within the subcontractor's scope of work and ability to correct. Employees of subcontractors have the right to refuse any work they deem to be hazardous.

- All subcontractors will be included in tailgate safety meetings, job safety analysis or hazard assessments, and on-the-job safety inspections.
- The subcontractor will be required to adjust their "Safe Work Practices" in order to prevent excessive Near Hits and/or Near Misses. If the subcontractor is unable to perform their scope of work without "At Risk" behavior or creating hazardous working conditions on the site, the subcontractor's working element will be required to leave the site until an abatement plan can be prepared and agreed upon.
- **Post-Contract** – Upon completion of the work, a post-job subcontractor safety performance review and evaluation will be completed to determine the safety performance of the subcontractor and provide reference for future job consideration.

Management of Change

- *Cain's Pipeline & Industrial Services, LLC.* will conduct a hazard assessment when a change occurs in the construction plan or external influences impact the manner in which the work will be conducted. This includes, but is not limited to:
 - Changes in policy or objectives.
 - Operating licenses and permits, legal, and regulatory requirements.
 - Changes in procedures, practices, and rules.
 - Changes to controlled documentation.
 - Work processes or methods.
 - Any change other than exact replacement in kind to equipment, processes, hardware, or software.
 - Changes to operating boundaries; e.g. operating envelopes.
 - Temporary changes that specify the period of time a change will be in effect.
- The management of change process covers all activities including the initial request, implementation, review, and closure of a change. Proposed changes will be managed by *Brent Messina* and forwarded to the Owner's management for approval or disapproval.

The following items will be included in the management of change proposal:

- Technical basis for the change.
- Impact of the change on the health and safety of personnel.
- Impact of change on the supplied tools and equipment.
- Necessary modifications to existing or new operating procedures.
- Methodology used to analyze the impact of the change.

Open Letter to All Subcontractors

Date: _____

Greetings Prospective Subcontractor:

As part of 's continuing commitment to safety, we are assessing our potential subcontractors' compliance with all applicable safety requirements. Enclosed are the materials you will need to complete this process, including a questionnaire that will assist us in assessing your safety programs. We are asking all subcontractors "Invited to Bid" to complete the attached questionnaire. The matrix included in this package is designed to assist you in determining which programs are applicable to your operations.

Please contact me _____

or _____ with any questions or concerns.

I am in and out of the office so please leave me a voice mail and I will get back to you when I return.

Please forward the completed forms and attach a copy of your safety manual by: _____

TO: **Company:** _____
 Attn: _____
 Address: _____
 City/State/Zip: _____
 Phone: _____
 FAX: _____
 eMail: _____

Regards,

Construction Manager

SUBCONTRACTOR SAFETY & HEALTH QUESTIONNAIRE

Date: _____

Company Name: _____ Number of Employees: _____

Address: _____

City, State, and Zip Code: _____

Company Contact: _____ Title: _____

Telephone #: () _____ FAX #: () _____

Form Completed By: _____

Officer Name & Signature: _____

Please describe the services that your Company provides:

1.) Has your Company received any inspections from a regulatory agency in the last three (3) years? ___ yes ___ no

If yes, provide details: _____

2.) Has your Company received any citations from a regulatory agency during the last three (3) years? ___ yes ___ no

3.) Does your Company have regularly scheduled, documented employee safety meetings? (Tailgate/Toolbox) ___ yes ___ no

If yes, how often? _____

What is covered at safety meetings? _____

4.) Does your Company perform equipment checks on all equipment? ___ yes ___ no

If yes, are records maintained? ___ yes ___ no

5.) Does your Company perform Job Hazard Analysis (JHA)? ___ yes ___ no

6.) Does your Company provide & require employees to use the following PPE?

<i>Personal Protective Equipment</i>	<i>Yes</i>	<i>No</i>
Hard Hats		
Safety Shoes/Boots		
Eye & Face Protection		
Hand Protection		
Hearing Protection		
Fall Protection		
Respiratory Protection		

7.)

8.) In addition to regulatory required Personal Protective Equipment, what other PPE is required or supplied? If any, please list:

9.) Indicate the circumstances in which your Company's employees may be subject to alcohol/drug screening:

☐ Never

 ☐ Reasonable Cause/Suspicion

 ☐ Periodic
☐ Random

 ☐ Post Accident

 ☐ Follow-Up
☐ Return to Duty

 ☐ Other: _____

Do you have a documented Substance Abuse Prevention Program available for review? ☐ yes ☐ no

10.) Does your Company have a policy requiring written accident/incident reports (injuries, property damage, etc.)? ☐ yes ☐ no

11.) Does your Company document, investigate, and discuss "Near Miss Incidents"? ☐ yes ☐ no

12.) Please respond to all items below with YES, NO, or N/A (not applicable). Do not leave any items unanswered.

OSHA Programs/Training	Program Written & Documented? Yes/No/NA	Training Conducted By (In-House or Outsourced)	Frequency of Employee Training	Documented Individual Employee Training? Yes/No/NA
OSHA Programs				
Confined Spaces				
Electrical Safety (qualified)				
Electrical Safety (non-qualified)				
Excavation & Shoring				
Fire Protection & Prevention				
Fall Protection				
First Aid/CPR				
HAZCOM				
Heat Stress Prevention				
Lifting/Mobile Equipment				
Lockout/Tagout				
Noise/Hearing Conservation				
Personal Protective Equipment				
Respiratory				
Scaffolds/Ladders				
Trenching/Shoring				
Welding, Cutting, & Hot Work				

13.)

14.) Please provide any additional information on other industry-specific programs or training, including written procedures, which your Company provides to employees:

15.) Does your Company have a Safety & Health Program with clearly written safety policy that is endorsed & enforced by upper management? ___ yes ___ no

16.) Does your Company perform documented safety audits/reviews? ___ yes ___ no

17.) Who in your Company is responsible for coordinating your health, safety, and environmental program?

18.) If your Company has more than ten (10) employees, please attach with this questionnaire your Company's OSHA 300 Log for the last three (3) years.

19.) Does your Company use subcontractors? ___ yes ___ no

If yes, explain: _____

Are your Subcontractor's written safety programs and procedures available for review? ___ yes ___ no

20.) Are all documents & records pertaining to this questionnaire available for audit? ___ yes ___ no

If no, please explain:

21.) Please attach your current/completed Health and Safety Program along with other written safety programs for review. A disk or CD-ROM is acceptable.

22.) Comments:

SAFETY CONTRACT

Following are Safety Requirements as stated in your subcontract agreement:

Subcontractor agrees to comply with prevailing safety regulations, whether OSHA, Contractor Policies, Owner Policies, or otherwise imposed while working on the project.

Subcontractor also agrees to be bound by any rule or regulation needed during the course of the project. Subcontractor further agrees:

- To provide a safe work area to all his employees by providing, and requiring the use of, the required Personal Protective Equipment such as: hard hats, safety glasses, respirators, dust masks, face shields, etc.
- Subcontractor's employees shall wear long or short sleeve shirts, long pants, and sturdy work shoes, boots, or when required, steel-toed boots.
- To provide this Contractor with proper documentation on employee training for specific tools and equipment such as powder actuated tools, air guns (nail guns), forklifts, scaffolding, scissors lifts, boom lifts, and any safety plan applicable to their scope of work (i.e. Fall Protection, Respiratory, or Assured Equipment Grounding Conductor Program).
- Be responsible for implementing and administering their safety program and must provide a copy of said program to this Contractor including a Job Hazard Analysis (inspections) and documentation on weekly job site safety meetings with its employees.
- To implement daily hazard recognition for its employees by using a Pre-Task Planner form for their daily scope of work.
- To provide its employees with safe tools and equipment, etc. and to perform the work under this agreement in a safe manner with high regard for the safety of its employees and others.
- To provide a designated person to participate in a weekly contractor safety coordination meeting.

Subcontractor shall:

- Immediately report to this Contractor in writing and remedy any accidents/illness, near misses, or unsafe conditions brought to its attention or discovered by subcontractor employees, involving its work and/or posing a danger to persons or property.
- Not permit its employees at the project to use publicly audible radios or to wear head sets except as are used for job site communications.
- Prior to bringing on site a substance or material for which a Material Safety Data Sheet (MSDS) is required by federal, state, and local regulations, subcontractor shall provide said MSDS to Contractor.

This Contractor is a Drug-free Company & provides such a workplace for its employees.

Subcontractor shall provide this Contractor, prior to beginning scope of work, with current documentation of subcontractor's drug testing policy or program (i.e. pre-hire and random testing). Contractor will conduct random drug testing for all Subcontractors and their employees throughout the course of the project.

All subcontractors' employees shall attend a Project Safety Orientation on the first day of work on the job site.

Subcontractor Name

Signature

Title

Date

Notes:

Handwriting practice lines consisting of 20 sets of three horizontal lines (top, middle, and bottom) for letter formation.

Chapter 33

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Trenching, Shoring, & Excavations

Cain's Pipeline & Industrial Services, LLC. has adopted this program for the safety of employees when working in or around trenches and excavations from the following OSHA regulations:

§1926.651 – *Specific Excavation Requirements*

§1926.652 – *Requirements for Protective Systems*

Brent Messina is designated as the Competent Person for *Cain's Pipeline & Industrial Services, LLC.* in authority over all excavation operations. *Brent Messina* will ensure that all safety measures and systems are in place and correctly installed, all safety procedures are adhered to, and make regular inspections of excavations, trenches, and the general work site.

General Excavation Procedures

Cain's Pipeline & Industrial Services, LLC. will implement and enforce the following engineering controls, procedures, and work practices to ensure that no employee is exposed to hazards from excavations being performed or existing at the jobsite:

- *Brent Messina* will ensure that all employees are trained in and familiar with required work practices and excavation procedures to safeguard personnel involved in trenching operations or who work in the vicinity of excavation operations.
- Employees conducting trenching and excavation operations will be protected from cave-in hazards through benching, sloping, shoring, scaling loose material, or trench shields/boxes.
- Utility operators will be contacted at least 48 hours before work is to begin and underground installations located prior to the commencement of any excavation work. When excavations are approaching any located utility line, equipment operations will be stopped no closer than 3 feet from the suspected location, and the utility will be positively located by careful hand digging, prior to the resumption of machine operations.
- Any utilities which are uncovered as a result of excavation operations will be protected and suitably supported during work progress, prominently marked for location and hazard, and will be carefully backfilled as soon as possible.
- Trench excavations will have access and egress ladders, ramps, or stairs provided for employees on any excavation which is 4 feet or more in depth. Ladders will be located within 25 feet of the workers and will extend to a height of at least 3 feet above the excavation. Lateral travel along the wall of a trench to a ladder or other means of egress will not exceed 25 feet
- Walkways will be provided where employees or equipment are required or permitted to cross over excavations. Regulation guardrails will be installed where walkways are elevated 6 feet or more above lower levels.
- Employees exposed to public vehicular traffic will be provided with, and will wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material. Barricades will be provided where possible to separate personnel from traffic patterns.

- Employee are not permitted underneath loads handled by lifting or digging equipment. Personnel will be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any equipment, spillage, or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped with adequate overhead protection for the operator during loading and unloading operations.
- Tests will be conducted for hazardous atmospheres and air contaminants (oxygen, flammable gases, etc.) and provide ventilation where necessary.
- In excavations where a hazardous atmosphere, to include an oxygen deficient atmosphere, exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation will be tested before employees enter excavations greater than 4 feet in depth.
- Proper respiratory protection will be provided where necessary for personnel exposed to hazardous atmospheres above Permissible Exposure Limits (PEL). Where ventilation is used to control exposure to hazardous atmospheres, continued testing will be used to monitor levels of hazardous atmospheres.
- Employees are not permitted to work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions such as special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline have been taken to protect employees against the hazards posed by water accumulation.
- An adequate system of shoring, benching, or sloping in accordance with specifications in §1926.652 and appendices A and C of OSHA standards for excavation operations will be provided for any excavation over 5 feet in depth, or any excavation which has been inspected and is believed unsafe to enter without a protective system. Inspections and determination of the type of protective system used shall be done by *Brent Messina* and based on soil type, density, moisture content, and other factors which might effect the performance of protective systems .
- Protection of employees with regard to soil classifications includes:
 - The determination of soil types and special considerations will be done in specific measures.
 - Shoring, sloping, shield, and excavation will be installed as needed.
 - Shoring equipment will not be subjected to excessive forces and be installed to protect employees from lateral loads.
 - Timber shoring or aluminum hydraulic shoring will be determined according to appendices A & C of the OSHA standard.
 - The devices used will be properly maintained and in good repair. If inspection reveals damage or defect, shoring equipment will be tagged and immediately removed from service.
 - Employees will be protected from hazards of falling, rolling, or sliding materials or equipment.
 - Personnel are prohibited from being within the shield when installing or removing the shield.
 - All shields used will be designed to resist calculated trench forces.

Inspections

- Brent Messina will conduct an inspection of worksites daily, prior to any employee entering an excavation to ensure that safety measures are in place and proper procedures for safety are being observed. Inspections of the excavation site will be made daily prior to commencement of work, regularly during work operations, in the event an occurrence takes place (such as inclement weather) which might pose a hazard to commencing, and at the cessation of work to ensure barricades and appropriate safety measures are in place before leaving the site.
- In the event an inspection reveals the possibility of a cave-in, failure of a protective system, hazardous atmosphere, or any threat to the safety of personnel, the excavation will immediately be evacuated until corrections are made to the satisfaction of Brent Messina.

Locating Underground Utility Installations

- *Cain's Pipeline & Industrial Services, LLC.* will not excavate in a street, highway, public place, a private easement of a public utility, or near the location of a public utility facility owned, maintained, or installed on a customer's premises, without having first ascertained the location of all underground facilities of a public or private utility in the proposed area of excavation.
- Upon receiving the information from the public utility, *Cain's Pipeline & Industrial Services, LLC.* personnel will exercise reasonable care when working in close proximity to the underground utilities. If the utilities are or likely to be exposed, only hand digging will be employed in such circumstances and any support reasonably necessary for protection of the utilities will be provided on the construction site.
- When any contact with or damage to any pipe, cable, or any other underground utility occurs, *Cain's Pipeline & Industrial Services, LLC.* will immediately notify the utility company. If an energized electrical cable is severed, an energized conductor is exposed, or dangerous fluids or gases are escaping from a broken line, *Brent Messina* will evacuate personnel from the immediate area until the utility company representative arrives.
- While an excavation is open, underground utilities will be protected, supported, or removed as necessary to safeguard employees.

Surface Encumbrances

- All surface encumbrances such as trees, boulders, rock fragments, or other obstructions whose movement could cause injury to an employee will be removed or supported.
- Excavations that personnel are required to enter will have spoil piles and other material stored and retained not less than 2 feet from the excavation edge.
- When a shoring system is used, the system will be designed and used to resist the added pressure when heavy equipment, material handling equipment, or material is located near an excavation.
- When mobile equipment is utilized or permitted adjacent to an excavation where the operator's vision is restricted, stop logs, barricades, or a signal person will be used.

Access and Egress

- Lateral travel along the wall of a trench to a ladder or other means of egress will not exceed 25 feet.
- An excavation four feet or more in depth and occupied by an employee will be provided with either a ladder extending not less than 3 feet above the top as a means of access or with a ramp meeting the following requirements:
 - Structural ramps that are used solely by employees as a means of access or egress from excavations will be designed by a competent person. Structural ramps used for access or egress of equipment will be designed by a competent person qualified in structural design, and will be constructed in accordance with the design.
 - Ramps and runways constructed of two or more structural members will have the members connected together to prevent displacement. Structural members used for ramps and runways will be of uniform thickness.
 - Cleats or other appropriate means used to connect runway structural members will be attached to the bottom of the runway or will be attached in a manner to prevent tripping.
 - Structural ramps used in lieu of steps will be provided with cleats or other surface treatments on the top surface to prevent slipping.
 - An earth ramp may be used in place of a ladder if:
 - ☑ The ramp material will be stable.
 - ☑ The sides of the excavation above the ramp will be maintained to the maximum allowable slope or sheeted or shored along the means of egress.
 - ☑ The degree of angle of the ramp will not be more than 45 degrees.
 - ☑ Vertical height between the floor of the trench and the toe of the ramp will not exceed 30 inches.

Exposure to Vehicle Traffic

- Employees exposed to public vehicular traffic will be provided with, and be required to, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.
- A sidewalk will not be undermined unless it is shored to support a live load of at least 125 pounds per square foot.
- Employees who are routed from a sidewalk or walkway into a roadway to detour excavations will be protected on all sides by regulation guardrails or barricades.
- If an employee or equipment is required or permitted to cross a trench or ditch, a walkway, ramp, or bridge will be provided and will have a designed capacity of not less than 3 times the imposed load. Regulation guardrails will be installed.
- If equipment is routed across or onto a roadway, protection will be provided using regulation signals, signs, or barricades.
- An open cut into a roadway will be provided with a regulation barricade on all sides. Warning lights will be provided during hours of darkness.

Walkways

- Walkways will be provided where employees or equipment are required or permitted to cross over excavations. Regulation guardrails will be provided where walkways are 6 feet or more above lower levels.
- A walkway or sidewalk will be kept clear of excavated material and other obstructions.
- The walkways and sidewalks will be lighted if used during hours of darkness.
- A walkway or sidewalk that is adjacent to an excavation will be separated from the excavation and protected by an appropriate guardrail.

Exposure to Falling Loads

Personnel will not be permitted under loads handled by lifting or digging equipment. Employees will be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped with regulation protection for the operator during loading and unloading operations.

Mobil Equipment Warning Systems

When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system will be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.

Hazardous Atmospheres

To prevent exposure to hazardous atmospheres and to assure acceptable breathing conditions, all of the following requirements will apply:

- Where an oxygen deficiency (an atmosphere that contains less than 19.5% oxygen) or a hazardous atmosphere exists, such as in excavations in areas where hazardous substances are stored nearby, the atmosphere in the excavation will be tested before employees enter excavations that are more than 4 feet deep.
- Precautions will be taken to prevent employee exposure to atmospheres that contain less than 19.5% oxygen and any other hazardous atmosphere. These precautions include providing regulation respiratory protection or ventilation.
- Precautions will be taken, such as providing ventilation, to prevent employee exposure to an atmosphere that contains a concentration of a flammable gas in excess of 20% of the lower flammable limit of the gas.
- When using controls intending to reduce levels of atmospheric contaminants to acceptable PEL, testing will be conducted as often as necessary to ensure that breathing air remains safe.
- Emergency rescue equipment, such as breathing apparatus, safety harness and line, or a basket stretcher, will be readily available where hazardous atmospheric conditions exist or could develop during work in an excavation. This equipment will be attended when in use.
- Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, will wear a harness with a lifeline securely attached to it. The lifeline will be separate from any line used to handle materials, and will be individually attended at all times while employee wearing it is in the excavation.

Protection from Water Accumulation Hazards

- Employees will not work in excavations where water has or is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by such water accumulation. Precautions necessary to protect employees vary with each situation and will include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.
- If water is controlled or prevented from accumulating by the use of water pumps, the pumping equipment and operations will be monitored by a competent person to ensure proper operation.
- If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means will be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person.
- An ongoing inspection of an excavation or trench will be made by a qualified person. After every rainstorm or other hazard-producing occurrence, an inspection will be made by a competent person for evidence of possible slides or cave-ins. Where these conditions are found, all work will cease until additional precautions, such as additional shoring or reducing the slope, have been accomplished.

Stability of Adjacent Structures

- Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees will not be permitted except when:
 - A support system, such as shoring, bracing, or underpinning, is provided to ensure the safety of employees and the stability of the structure.
 - The excavation is in stable rock.
 - A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity or that such excavation work will not pose a hazard to employees.
- Sidewalks, pavements, and appurtenant structure will not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.
- The shoring, bracing, and underpinning will be inspected daily or more often, as conditions warrant, by a competent person.

Employee Protection from Loose Rock or Soils

- Adequate protection will be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection will consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material or other means that provide equivalent protection.

- Employees will be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection will be provided by placing and keeping such materials or equipment at least 2 feet from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.
- If different textured soils are encountered in the side of an excavation, each soil type of the excavation will be cut to the proper maximum allowable slope, except that the slope will not steepen between the toe of the slope and the ground level where soft clay or running soil is encountered in the lower cut.
- If the excavation is a trench, a trench shoring system will be used or the sides will be properly benched or sloped to protect against a cave-in.
- An excavation that is cut into a rock formation will be scaled to remove loose material.
- When installed forms, walls, or similar structures create a trench between the form, wall, or structure and the side of the excavation, it will be treated as a trench.

General Classification of Soil and Rock Deposits

- Each soil and rock deposit will be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with OSHA definitions.
- The classification of the deposits will be made based on the results of at least one visual and at least one manual analysis. Such analyses will be conducted by a competent person using approved methods of soil classification and testing.
- The visual and manual analyses will be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits.
- Layered systems will be classified according to its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.
- If after classifying a deposit, the properties, factors, or conditions affecting its classification change in any way, the changes will be evaluated by a competent person. The deposit will be reclassified as necessary to reflect the changed circumstances.

Protection of Employees in Excavations

- Employees in an excavation will be protected from cave-ins by an adequate protective system designed in accordance with OSHA requirements, except when:
 - Excavations are made entirely in stable rock.
 - Excavations are less than 5 feet deep and examination of the ground by a competent person provides no indication of a potential cave-in.
- Protective systems will have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

- The slopes and configurations of sloping and benching systems will be selected and constructed by *Cain's Pipeline & Industrial Services, LLC.* and will be in accordance with OSHA requirements, or the following alternative options:

Option 1 - Allowable configurations and slopes.

- Excavations will be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless *Cain's Pipeline & Industrial Services, LLC.* uses one of the other options listed below.
- Specified slopes will be excavated to form configurations that are in accordance with the slopes shown for Type C soil.

Option 2 - Maximum allowable slopes, and allowable configurations for sloping and benching systems, will be determined in accordance with the conditions and requirements set forth in §1926 Subpart P – Appendices A and B.

Option 3 - Designs using other tabulated data.

- Designs of sloping or benching systems will be selected from and in accordance with tabulated data, such as tables and charts.
- The tabulated data will be in written form and will include all of the following:
 - ☑ Identification of the parameters that affect the selection of a sloping or benching system drawn from such data.
 - ☑ Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe.
 - ☑ Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.
- At least one copy of the tabulated data which identifies the registered professional engineer who approved the data, will be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data will be made available to OSHA upon request.

Option 4 - Design by a registered professional engineer.

- Sloping and benching systems not utilizing previous Options 1, 2, or 3 will be approved by a registered professional engineer.
- Designs will be in written form and will include at least the following:
 - ☑ The magnitude of the slopes that were determined to be safe for the particular project.
 - ☑ The configurations that were determined to be safe for the particular project.
 - ☑ The identity of the registered professional engineer approving the design.
- At least one copy of the design will be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy will be made available to OSHA upon request.

Design of Support Systems

- Designs of support systems, shield systems, and other protective systems will be selected and constructed by *Cain's Pipeline & Industrial Services, LLC.* and will be in accordance with OSHA requirements., or the following alternative options:

Option 1 - Designs for timber shoring in trenches will be determined in accordance with the conditions and requirements set forth in §1926 Subpart P – Appendices A and C. Designs for aluminum hydraulic shoring will be in accordance with Option 2 below, but if manufacturer's tabulated data cannot be utilized, designs will be in accordance with Appendix D.

Option 2 - Designs Using Manufacturer's Tabulated Data.

- Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data will be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.
- Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer will only be allowed after the manufacturer issues specific written approval.
- Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations will be in written form at the jobsite during construction of the protective system. After that time this data may be stored off the jobsite, but a copy will be made available to the Secretary upon request.

Option 3 - Designs using other tabulated data.

- Designs of support systems, shield systems, or other protective systems will be selected from and be in accordance with tabulated data, such as tables and charts.
- The tabulated data will be in written form and include all of the following:
 - ☑ Identification of the parameters that affect the selection of a protective system drawn from such data.
 - ☑ Identification of the limits of use of the data.
 - ☑ Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.
- At least one copy of the tabulated data, which identifies the registered professional engineer who approved the data, will be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data will be made available to OSHA upon request.

Option 4 - Design by a registered professional engineer.

- Support systems, shield systems, and other protective systems not utilizing previous Options 1, 2, or 3 will be approved by a registered professional engineer.
- Designs will be in written form and will include the following:
 - ☑ A plan indicating the sizes, types, and configurations of the materials to be used in the protective system.

- ✓ The identify of the registered professional engineer approving the design.
- At least one copy of the design will be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design will be made available to OSHA upon request.

Protective Systems Materials and Equipment.

- Materials and equipment used for protective systems will be free from damage or defects that might impair their proper function.
- Manufactured materials and equipment used for protective systems will be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.
- When equipment used for protective systems is damaged, a competent person will examine the equipment and evaluate its suitability for continued use. If the competent person cannot assure the equipment is able to support the intended loads or is otherwise suitable for safe use, then equipment will be removed from service be evaluated and approved by a registered professional engineer before being returned to service.
- General installation and removal of support systems:
 - Members of support systems will be securely connected together to prevent sliding, falling, kickouts, or other predictable failure.
 - Support systems will be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.
 - Individual members of support systems will not be subjected to loads exceeding those which those members were designed to withstand.
 - Excavation of material to a level no greater than 2 feet below the bottom of the members of a support system will be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.
 - Installation of a support system will be closely coordinated with the excavation of trenches.
 - Before temporary removal of individual members begins, additional precautions will be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.
 - Removal will begin at, and progress from, the bottom of the excavation. Members will be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.
 - Backfilling will progress together with the removal of support systems from excavations.
- Employees will not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.
- General shield systems requirements:
 - Shield systems will not be subjected to loads exceeding those which the

system was designed to withstand.

- Shields will be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.
 - Employees will be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.
 - Employees will not be allowed in shields when shields are being installed, removed, or moved vertically.
 - Excavations of earth material to a level not greater than 2 feet below the bottom of a shield will be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.
- Regulation guardrails or barricades will be provided at all remotely located excavations. All wells, pits, and shafts, temporary or otherwise, will be barricaded or covered. Temporary wells, pits, and shafts will be backfilled when exploration and similar operations are completed.

In addition to the above requirements, Company Safety Policy regarding excavation operations shall adhere to the requirements of the following OSHA regulations:

§1926.651 – SPECIFIC EXCAVATION REQUIREMENTS.

(a) Surface encumbrances. All surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary, to safeguard employees.

(b) Underground installations.

(1) The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.

(2) Utility owners or companies shall be contacted within established or customary local response times, advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of actual excavation. When utility owners or companies cannot respond to a request to locate underground utility installations within 24 hours (unless a longer period is required by state or local law), or cannot establish the exact location of these installations, the employer may proceed, provided the employer does so with caution, and provided detection equipment or other acceptable means to locate utility installations are used.

(3) When excavation operations approach the estimated location of underground installations, the exact location of the installations shall be determined by safe and acceptable means.

(4) While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.

(c) Access and egress.

(1) Structural ramps.

(i) Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.

(ii) Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement.

(iii) Structural members used for ramps and runways shall be of uniform thickness.

(iv) Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping.

(v) Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

(2) Means of egress from trench excavations. A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet (1.22 m) or more in depth so as to require no more than 25 feet (7.62 m) of lateral travel for employees.

- (d) **Exposure to vehicular traffic.** Employees exposed to public vehicular traffic shall be provided with, and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.
- (e) **Exposure to falling loads.** No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with §1926.601(b)(6), to provide adequate protection for the operator during loading and unloading operations.
- (f) **Warning system for mobile equipment.** When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.
- (g) **Hazardous atmospheres.**
- (1) **Testing and controls.** In addition to the requirements set forth in subparts D and E of this part (29 CFR 1926.50-1926.107) to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements shall apply:
 - (i) Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet (1.22 m) in depth.
 - (ii) Adequate precautions shall be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation in accordance with subparts D and E of this part respectively.
 - (iii) Adequate precaution shall be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 20 percent of the lower flammable limit of the gas.
 - (iv) When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.
 - (2) **Emergency rescue equipment.**
 - (i) Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be attended when in use.
 - (ii) Employees entering bell-bottom pier holes, or other similar deep and confined footing excavations, shall wear a harness with a life-line securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.
- (h) **Protection from hazards associated with water accumulation.**
- (1) Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.
 - (2) If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

(3) If excavation work interrupts the natural drainage of surface water (such as streams), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to runoff from heavy rains will require an inspection by a competent person and compliance with paragraphs (k)(1) and (k)(2) of this section.

(i) Stability of adjacent structures.

(1) Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

(2) Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when:

(i) A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or

(ii) The excavation is in stable rock; or

(iii) A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or

(iv) A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

(3) Sidewalks, pavements, and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures

(j) Protection of employees from loose rock or soil.

(1) Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the face to stop and contain falling material; or other means that provide equivalent protection.

(2) Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least 2 feet (.61 m) from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

(k) Inspections.

(1) Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrence. These inspections are only required when employee exposure can be reasonably anticipated.

(2) Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

(l) Fall protection.

(1) Walkways shall be provided where employees or equipment are required or permitted to cross over excavations. Guardrails which comply with §1926.502(b) shall be provided where walkways are 6 feet (1.8 m) or more above lower levels.

(2) Adequate barrier physical protection shall be provided at all remotely located excavations. All wells, pits, shafts, etc., shall be barricaded or covered. Upon completion of exploration and similar operations, temporary wells, pits, shafts, etc., shall be backfilled.

§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 designed in accordance with paragraph (b) or (c) of this section except when:

(i) Excavations are made entirely in stable rock; or

(ii) Excavations are less than 5 feet (1.52 m) in depth and examination of the ground by a competent person provides no indication of a potential cave-in.

(2) Protective systems shall have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

(b) Design of sloping and benching systems. The slopes and configurations of sloping and benching systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (b)(1); or, in the alternative, paragraph (b)(2); or, in the alternative, paragraph (b)(3), or, in the alternative, paragraph (b)(4), as follows:

(1) Option (1) – Allowable configurations and slopes.

(i) Excavations shall be sloped at an angle not steeper than one and one-half horizontal to one vertical (34 degrees measured from the horizontal), unless the employer uses one of the other options listed below.

(ii) Slopes specified in paragraph (b)(1)(i) of this section, shall be excavated to form configurations that are in accordance with the slopes shown for Type C soil in Appendix B to this subpart.

(2) Option (2) – Determination of slopes and configurations using Appendices A and B.

Maximum allowable slopes, and allowable configurations for sloping and benching systems, shall be determined in accordance with the conditions and requirements set forth in Appendices A and B to this subpart.

(3) Option (3) – Designs using other tabulated data.

(i) Designs of sloping or benching systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data shall be in written form and shall include all of the following:

(A) Identification of the parameters that affect the selection of a sloping or benching system drawn from such data;

(B) Identification of the limits of use of the data, to include the magnitude and configuration of slopes determined to be safe;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) At least one copy of the tabulated data which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

(4) Option (4) – Design by a registered professional engineer.

(i) Sloping and benching systems not utilizing Option (1) or Option (2) or Option (3) under paragraph (b) of this section shall be approved by a registered professional engineer.

(ii) Designs shall be in written form and shall include at least the following:

(A) The magnitude of the slopes that were determined to be safe for the particular project;

(B) The configurations that were determined to be safe for the particular project; and

(C) The identity of the registered professional engineer approving the design.

(iii) At least one copy of the design shall be maintained at the jobsite while the slope is being constructed. After that time the design need not be at the jobsite, but a copy shall be made available to the Secretary upon request.

(c) Design of support systems, shield systems, and other protective systems. Designs of support systems shield systems, and other protective systems shall be selected and constructed by the employer or his designee and shall be in accordance with the requirements of paragraph (c)(1); or, in the alternative, paragraph (c)(2); or, in the alternative, paragraph (c)(3); or, in the alternative, paragraph (c)(4) as follows:

(1) Option (1) – Designs using Appendices A, C and D.

Designs for timber shoring in trenches shall be determined in accordance with the conditions and requirements set forth in Appendices A and C to this subpart. Designs for aluminum hydraulic shoring shall be in accordance with paragraph (c)(2) of this section, but if manufacturer's tabulated data cannot be utilized, designs shall be in accordance with Appendix D.

(2) Option (2) – Designs Using Manufacturer's Tabulated Data.

(i) Design of support systems, shield systems, or other protective systems that are drawn from manufacturer's tabulated data shall be in accordance with all specifications, recommendations, and limitations issued or made by the manufacturer.

(ii) Deviation from the specifications, recommendations, and limitations issued or made by the manufacturer shall only be allowed after the manufacturer issues specific written approval.

(iii) Manufacturer's specifications, recommendations, and limitations, and manufacturer's approval to deviate from the specifications, recommendations, and limitations shall be in written

form at the jobsite during construction of the protective system. After that time this data may be stored off the jobsite, but a copy shall be made available to the Secretary upon request.

(3) Option (3) – Designs using other tabulated data.

(i) Designs of support systems, shield systems, or other protective systems shall be selected from and be in accordance with tabulated data, such as tables and charts.

(ii) The tabulated data shall be in written form and include all of the following:

(A) Identification of the parameters that affect the selection of a protective system drawn from such data;

(B) Identification of the limits of use of the data;

(C) Explanatory information as may be necessary to aid the user in making a correct selection of a protective system from the data.

(iii) At least one copy of the tabulated data, which identifies the registered professional engineer who approved the data, shall be maintained at the jobsite during construction of the protective system. After that time the data may be stored off the jobsite, but a copy of the data shall be made available to the Secretary upon request.

(4) Option (4) – Design by a registered professional engineer.

(i) Support systems, shield systems, and other protective systems not utilizing Option 1, Option 2 or Option 3, above, shall be approved by a registered professional engineer.

(ii) Designs shall be in written form and shall include the following:

(A) A plan indicating the sizes, types, and configurations of the materials to be used in the protective system; and

(B) The identity of the registered professional engineer approving the design.

(iii) At least one copy of the design shall be maintained at the jobsite during construction of the protective system. After that time, the design may be stored off the jobsite, but a copy of the design shall be made available to the Secretary upon request.

(d) Materials and equipment.

(1) Materials and equipment used for protective systems shall be free from damage or defects that might impair their proper function.

(2) Manufactured materials and equipment used for protective systems shall be used and maintained in a manner that is consistent with the recommendations of the manufacturer, and in a manner that will prevent employee exposure to hazards.

(3) When material or equipment that is used for protective systems is damaged, a competent person shall examine the material or equipment and evaluate its suitability for continued use. If the competent person cannot assure the material or equipment is able to support the intended loads or is otherwise suitable for safe use, then such material or equipment shall be removed from service, and shall be evaluated and approved by a registered professional engineer before being returned to service.

(e) Installation and removal of support.

(1) General.

(i) Members of support systems shall be securely connected together to prevent sliding, falling, kickouts, or other predictable failure.

(ii) Support systems shall be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the support system.

(iii) Individual members of support systems shall not be subjected to loads exceeding those which those members were designed to withstand.

(iv) Before temporary removal of individual members begins, additional precautions shall be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the support system.

(v) Removal shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation.

(vi) Backfilling shall progress together with the removal of support systems from excavations.

(2) Additional requirements for support systems for trench excavations.

(i) Excavation of material to a level no greater than 2 feet (.61 m) below the bottom of the members of a support system shall be permitted, but only if the system is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the support system.

- (ii) Installation of a support system shall be closely coordinated with the excavation of trenches.
- (f) Sloping and benching systems. Employees shall not be permitted to work on the faces of sloped or benched excavations at levels above other employees except when employees at the lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.
- (g) Shield systems.

(1) General.

- (i) Shield systems shall not be subjected to loads exceeding those which the system was designed to withstand.
- (ii) Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.
- (iii) Employees shall be protected from the hazard of cave-ins when entering or exiting the areas protected by shields.
- (iv) Employees shall not be allowed in shields when shields are being installed, removed, or moved vertically.
- (2) Additional requirement for shield systems used in trench excavations. Excavations of earth material to a level not greater than 2 feet (.61 m) below the bottom of a shield shall be permitted, but only if the shield is designed to resist the forces calculated for the full depth of the trench, and there are no indications while the trench is open of a possible loss of soil from behind or below the bottom of the shield.

Appendix A to Subpart P

SOIL CLASSIFICATION

(a) Scope and application.

(1) **Scope.** This appendix describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. The appendix contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.

(2) **Application.** This appendix applies when a sloping or benching system is designed in accordance with the requirements set forth in §1926.652(b)(2) as a method of protection for employees from cave-ins. This appendix also applies when timber shoring for excavations is designed as a method of protection from cave-ins in accordance with appendix C to subpart P of part 1926, and when aluminum hydraulic shoring is designed in accordance with appendix D. This Appendix also applies if other protective systems are designed and selected for use from data prepared in accordance with the requirements set forth in §1926.652(c), and the use of the data is predicated on the use of the soil classification system set forth in this appendix.

(b) **Definitions.** The definitions and examples given below are based on, in whole or in part, the following:

American Society for Testing Materials (ASTM) Standards D653-85 and D2488; The Unified Soils Classification System, The U.S. Department of Agriculture (USDA) Textural Classification Scheme; and The National Bureau of Standards Report BSS-121.

Cemented soil means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

Cohesive soil means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sideslopes, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

Dry soil means soil that does not exhibit visible signs of moisture content.

Fissured means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

Layered system means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

Granular soil means gravel, sand, or silt, (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

Moist soil means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

Plastic means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

Saturated soil means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or shear vane.

Soil classification system means, for the purpose of this subpart, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B, and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the environmental conditions of exposure.

Stable rock means natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

Submerged soil means soil which is underwater or is free seeping.

Type A means cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) (144 kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered

Type A. However, no soil is Type A if:

- (i) The soil is fissured; or
- (ii) The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
- (iii) The soil has been previously disturbed; or
- (iv) The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or
- (v) The material is subject to other factors that would require it to be classified as a less stable material.

Type B means:

- (i) Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or
- (ii) Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam.
- (iii) Previously disturbed soils except those which would otherwise be classed as Type C soil.
- (iv) Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; or
- (v) Dry rock that is not stable; or
- (vi) Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

Type C means:

- (i) Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or
- (ii) Granular soils including gravel, sand, and loamy sand; or
- (iii) Submerged soil or soil from which water is freely seeping; or
- (iv) Submerged rock that is not stable, or
- (v) Material in a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or steeper.

Unconfined compressive strength means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.

Wet soil means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.

(c) Requirements.

(1) Classification of soil and rock deposits. Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in paragraph (b) of this appendix.

(2) Basis of classification. The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis. Such analyses shall be conducted by a competent person using tests described in paragraph (d) below, or in other recognized methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

(3) Visual and manual analyses. The visual and manual analyses, such as those noted as being acceptable in paragraph (d) of this appendix, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits.

(4) Layered systems. In a layered system, the system shall be classified in accordance with its weakest layer. However, each layer may be classified individually where a more stable layer lies under a less stable layer.

(5) Reclassification. If, after classifying a deposit, the properties, factors, or conditions affecting its classification change in any way, the changes shall be evaluated by a competent person. The deposit shall be reclassified as necessary to reflect the changed circumstances.

(d) Acceptable visual and manual tests.

(1) Visual tests. Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.

(i) Observe samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine-grained material is cohesive material. Soil composed primarily of coarse-grained sand or gravel is granular material.

(ii) Observe soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular.

(iii) Observe the side of the opened excavation and the surface area adjacent to the excavation. Crack-like openings such as tension cracks could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.

(iv) Observe the area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.

(v) Observe the opened side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.

(vi) Observe the area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water table.

(vii) Observe the area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

(2) Manual tests. Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

(i) Plasticity. Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8-inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of 1/8-inch thread can be held on one end without tearing, the soil is cohesive.

(ii) Dry strength. If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.

(iii) **Thumb penetration.** The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. (This test is based on the thumb penetration test described in American Society for Testing and Materials (ASTM) Standard designation D2488 – "Standard Recommended Practice for Description of Soils (Visual – Manual Procedure).") Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.

(iv) **Other strength tests.** Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand-operated shear vane.

(v) **Drying test.** The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry:

(A) If the sample develops cracks as it dries, significant fissures are indicated.

(B) Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as a unfissured cohesive material and the unconfined compressive strength should be determined.

(C) If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.

Appendix B to Subpart P SLOPING AND BENCHING

(a) **Scope and application.** This appendix contains specifications for sloping and benching when used as methods of protecting employees working in excavations from cave-ins. The requirements of this appendix apply when the design of sloping and benching protective systems is to be performed in accordance with the requirements set forth in §1926.652(b)(2).

(b) Definitions.

Actual slope means the slope to which an excavation face is excavated.

Distress means that the soil is in a condition where a cave-in is imminent or is likely to occur. Distress is evidenced by such phenomena as the development of fissures in the face of or adjacent to an open excavation; the subsidence of the edge of an excavation; the slumping of material from the face or the bulging or heaving of material from the bottom of an excavation; the spalling of material from the face of an excavation; and raveling, i.e., small amounts of material such as pebbles or little clumps of material suddenly separating from the face of an excavation and trickling or rolling down into the excavation.

Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V).

Short term exposure means a period of time less than or equal to 24 hours that an excavation is open.

(c) Requirements.

(1) **Soil classification.** Soil and rock deposits shall be classified in accordance with appendix A to subpart P of part 1926.

(2) **Maximum allowable slope.** The maximum allowable slope for a soil or rock deposit shall be determined from Table B-1 of this appendix.

(3) Actual slope.

(i) The actual slope shall not be steeper than the maximum allowable slope.

(ii) The actual slope shall be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope shall be cut back to an actual slope which is at least 1/2 horizontal to one vertical (1/2 H:1V) less steep than the maximum allowable slope.

(iii) When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person shall determine the degree to which the actual slope must be reduced below the maximum allowable slope, and shall assure that such reduction is achieved. Surcharge loads from adjacent structures shall be evaluated in accordance with §1926.651(i).

(4) **Configurations.** Configurations of sloping and benching systems shall be in accordance with Figure B-1.

Table B-1 - Maximum Allowable Slopes	
Soil or Rock Type	Maximum Allowable Slopes (H:V) ¹ For Excavations Less Than 20 Feet Deep ³
Stable Rock	Vertical (90 Deg.)
Type A ²	3/4:1 (53 Deg.)
Type B	1:1 (45 Deg.)
Type C	1 1/2:1 (34 Deg.)

¹ Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.

² A short-term maximum allowable slope of 1/2H:1V (63 degrees) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53°).

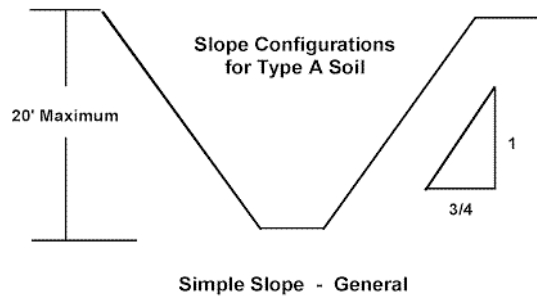
³ Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

Figure B-1
Slope Configurations

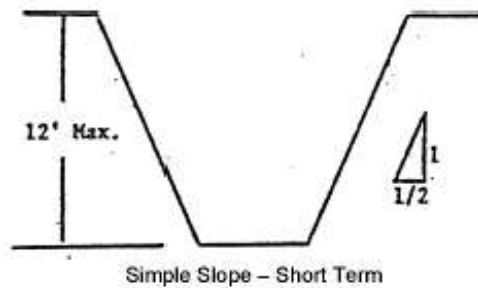
(All slopes stated below are in the horizontal to vertical ratio)

B-1.1 Excavations made in Type A soil.

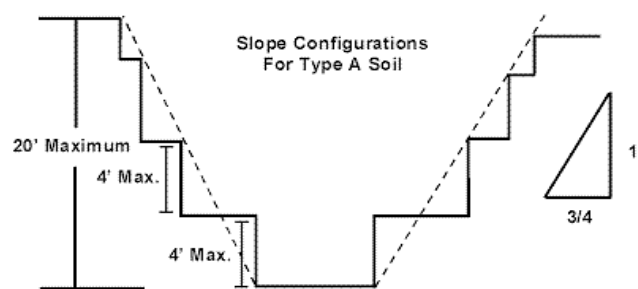
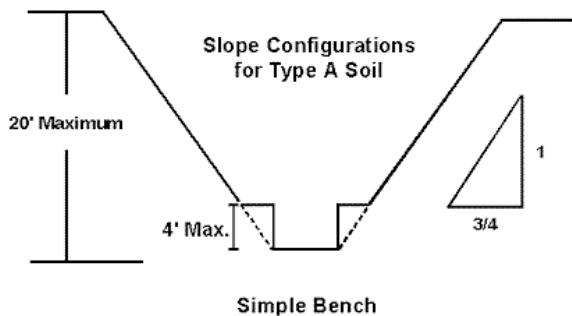
1. All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of 3/4:1.



Exception: Simple slope excavations which are open 24 hours or less (short term) and which are 12 feet or less in depth shall have a maximum allowable slope of 1/2:1.



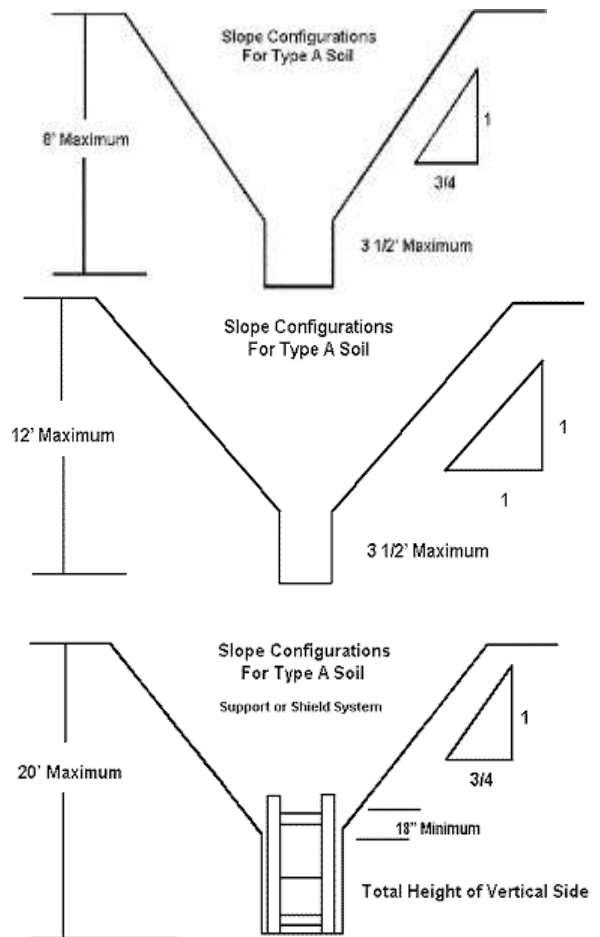
2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 3/4 to 1 and maximum bench dimensions as follows:



3. All excavations 8 feet or less in depth which have unsupported vertically sided lower portions shall have a maximum vertical side of 3½ feet.

All excavations more than 8 feet but not more than 12 feet in depth which unsupported vertically sided lower portions shall have a maximum allowable slope of 1:1 and a maximum vertical side of 3½ feet.

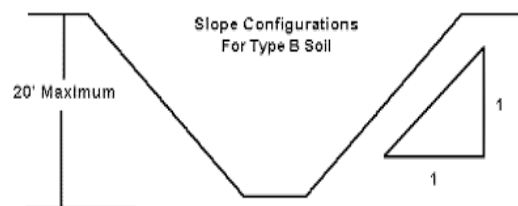
All excavations 20 feet or less in depth which have vertically sided lower portions that are supported or shielded shall have a maximum allowable slope of 3/4:1. The support or shield system must extend at least 18 inches above the top of the vertical side.



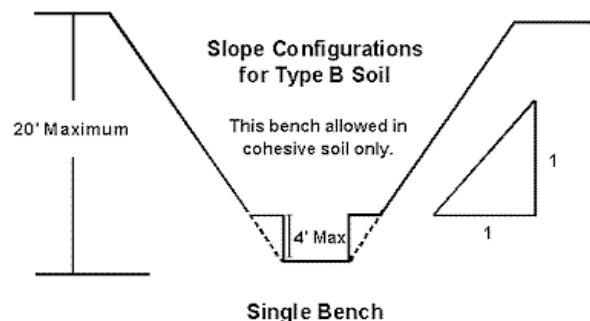
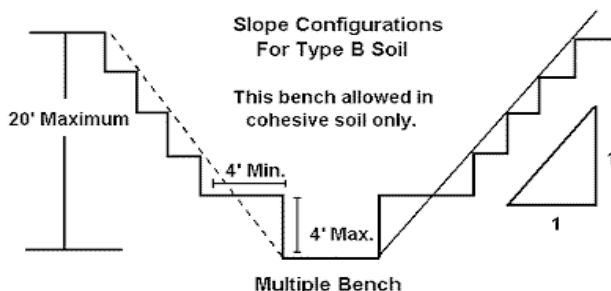
4. All other simple slope, compound slope, and vertically sided lower portion excavations shall be in accordance with the other options permitted under §1926.652(b).

B-1.2 Excavations made in Type B Soil.

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1.

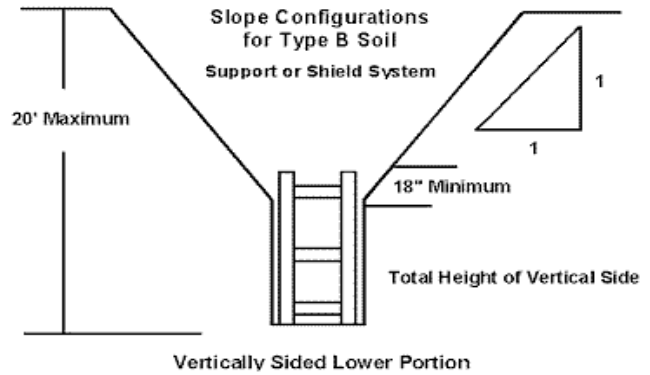


2. All benched excavations 20 feet or less in depth shall have a maximum allowable slope of 1:1 and maximum bench dimensions as follows:



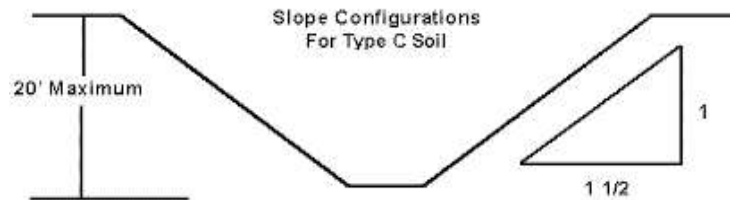
3. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1:1.

4. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

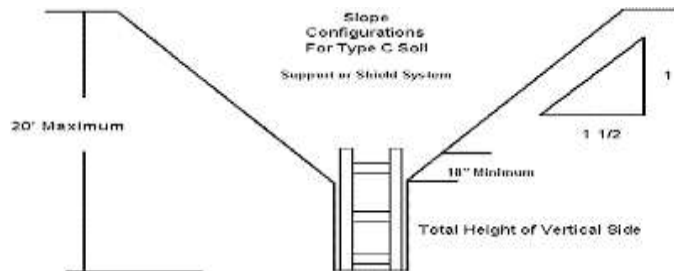


B-1.3 Excavations made in Type C Soil.

1. All simple slope excavations 20 feet or less in depth shall have a maximum allowable slope of 1½ :1.



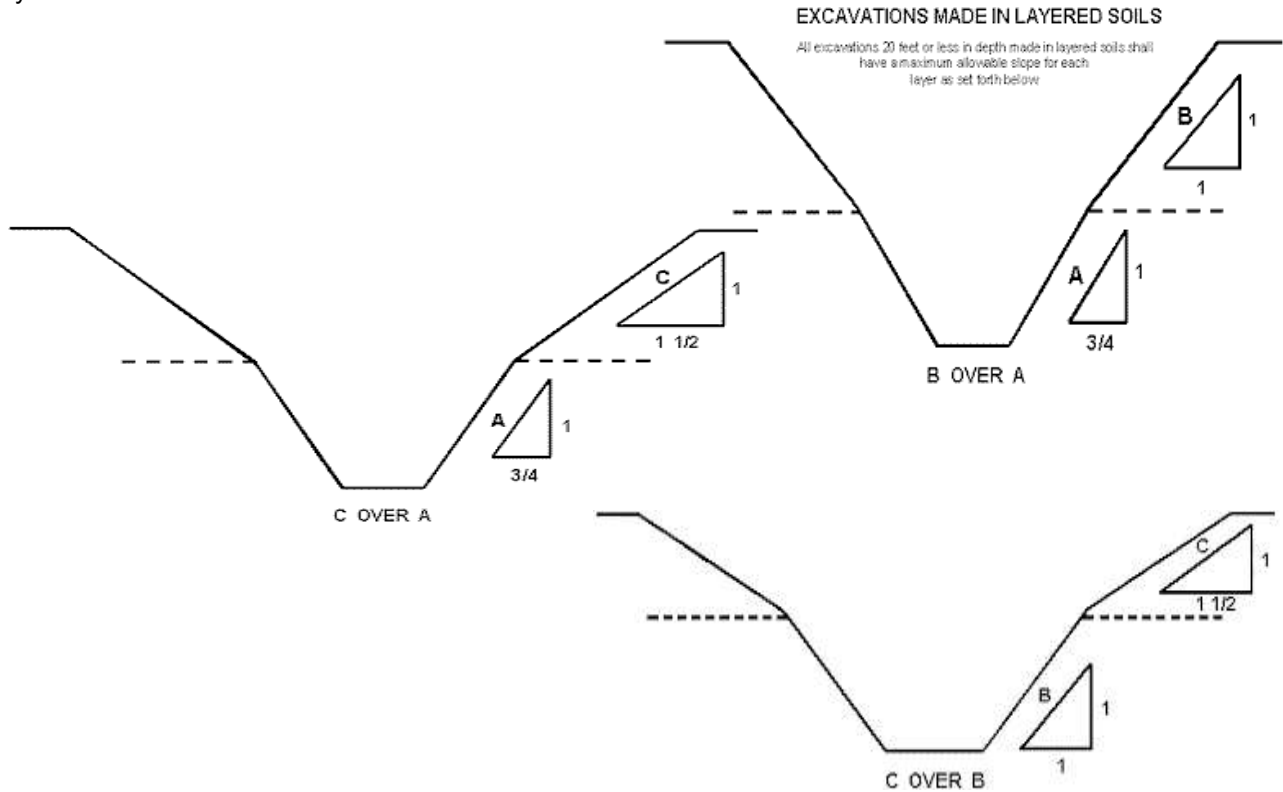
2. All excavations 20 feet or less in depth which have vertically sided lower portions shall be shielded or supported to a height at least 18 inches above the top of the vertical side. All such excavations shall have a maximum allowable slope of 1½:1.



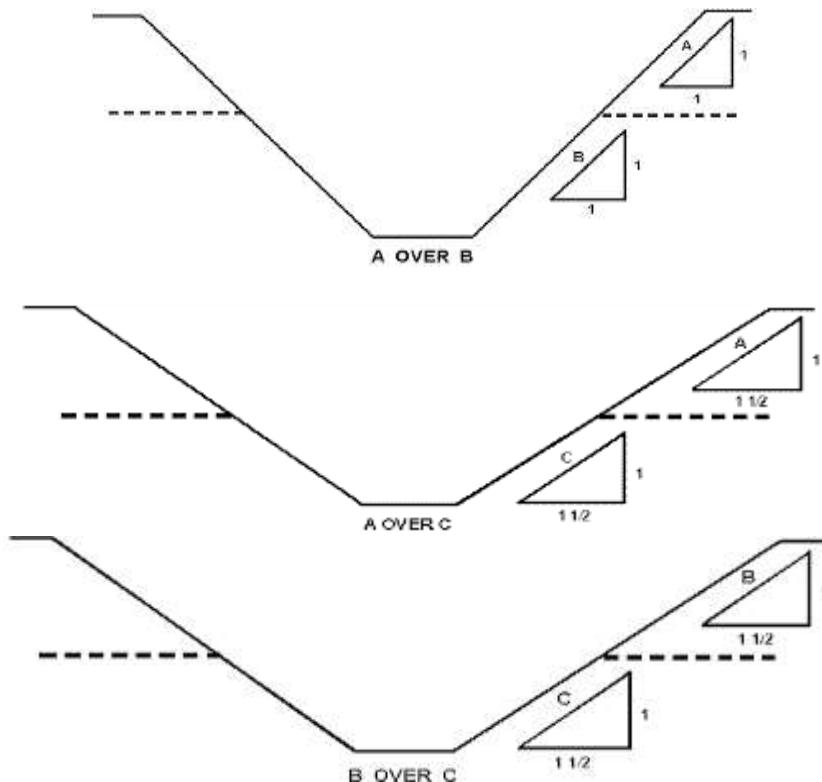
3. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).

B-1.4 Excavations made in Layered Soils.

1. All excavations 20 feet or less in depth made in layered soils shall have a maximum allowable slope for each layer as set forth below.



2. All other sloped excavations shall be in accordance with the other options permitted in §1926.652(b).



Appendix C to Subpart P

TIMBER SHORING FOR TRENCHES

(a) Scope. This appendix contains information that can be used timber shoring is provided as a method of protection from cave-ins in trenches that do not exceed 20 feet (6.1 m) in depth. This appendix must be used when design of timber shoring protective systems is to be performed in accordance with §1926.652(c)(1). Other timber shoring configurations; other systems of support such as hydraulic and pneumatic systems; and other protective systems such as sloping, benching, shielding, and freezing systems must be designed in accordance with the requirements set forth in §1926.652(b) and §1926.652(c).

(b) Soil Classification. In order to use the data presented in this appendix, the soil type or types in which the excavation is made must first be determined using the soil classification method set forth in appendix A of subpart P of this part.

(c) Presentation of Information. Information is presented in several forms as follows:

(1) Information is presented in tabular form in Tables C-1.1, C-1.2, and C-1.3, and Tables C-2.1, C-2.2 and C-2.3 following paragraph (g) of the appendix. Each table presents the minimum sizes of timber members to use in a shoring system, and each table contains data only for the particular soil type in which the excavation or portion of the excavation is made. The data are arranged to allow the user the flexibility to select from among several acceptable configurations of members based on varying the horizontal spacing of the cross braces. Stable rock is exempt from shoring requirements and therefore, no data are presented for this condition.

(2) Information concerning the basis of the tabular data and the limitations of the data is presented in paragraph (d) of this appendix, and on the tables themselves.

(3) Information explaining the use of the tabular data is presented in paragraph (e) of this appendix.

(4) Information illustrating the use of the tabular data is presented in paragraph (f) of this appendix.

(5) Miscellaneous notations regarding Tables C- 1.1 through C-1.3 and Tables C-2.1 through C-2.3 are presented in paragraph (g) of this Appendix.

(d) Basis and limitations of the data.

(1) Dimensions of timber members.

(i) The sizes of the timber members listed in Tables C-1.1 through C-1.3 are taken from the National Bureau of Standards (NBS) report, "Recommended Technical Provisions for Construction Practice in Shoring and Sloping of Trenches and Excavations." In addition, where NBS did not recommend specific sizes of members, member sizes are based on an analysis of the sizes required for use by existing codes and on empirical practice.

(ii) The required dimensions of the members listed in Tables C-1.1 through C-1.3 refer to actual dimensions and not nominal dimensions of the timber. Employers wanting to use nominal size shoring are directed to Tables C-2.1 through C-2.3, or have this choice under §1926.652(c)(3), and are referred to The Corps of Engineers, The Bureau of Reclamation or data from other acceptable sources.

(2) Limitation of application.

(i) It is not intended that the timber shoring specification apply to every situation that may be experienced in the field. These data were developed to apply to the situations that are most commonly experienced in current trenching practice. Shoring systems for use in situations that are not covered by the data in this appendix must be designed as specified in §1926.652(c).

(ii) When any of the following conditions are present, the members specified in the tables are not considered adequate. Either an alternate timber shoring system must be designed or another type of protective system designed in accordance with §1926.652.

(A) When loads imposed by structures or by stored material adjacent to the trench weigh in excess of the load imposed by a two-foot soil surcharge. The term "adjacent" as used here means the area within a horizontal distance from the edge of the trench equal to the depth of the trench.

(B) When vertical loads imposed on cross braces exceed a 240-pound gravity load distributed on a one-foot section of the center of the crossbrace.

(C) When surcharge loads are present from equipment weighing in excess of 20,000 pounds.

(D) When only the lower portion of a trench is shored and the remaining portion of the trench is sloped or benched unless: The sloped portion is sloped at an angle less steep than three horizontal to one vertical; or the members are selected from the tables for use at a depth which is determined from the top of the overall trench, and not from the toe of the sloped portion.

(e) Use of Tables. The members of the shoring system that are to be selected using this information are the cross braces, the uprights, and the wales, where wales are required. Minimum sizes of members are specified for use in different types of soil. There are six tables of information, two for each soil type. The soil type must first be determined in accordance with the soil classification system described in appendix A to subpart P of part 1926. Using the appropriate table, the selection of the size and spacing of the members is then made. The selection is based on the depth and width of the trench where the members are to be installed and, in most instances, the selection is also based on the horizontal spacing of the crossbraces. Instances where a choice of horizontal spacing of crossbracing is available, the horizontal spacing of the crossbraces must be chosen by the user before the size of any member can be determined. When the soil type, the width and depth of the trench, and the horizontal spacing of the crossbraces are known, the size and vertical spacing of the crossbraces, the size and vertical spacing of the wales, and the size and horizontal spacing of the uprights can be read from the appropriate table.

(f) Examples to Illustrate the Use of Tables C-1.1 through C-1.3.

(1) Example 1.

A trench dug in Type A soil is 13 feet deep and five feet wide. From Table C-1.1, for acceptable arrangements of timber can be used.

Arrangement #1

Space 4 x 4 crossbraces at six feet horizontally and four feet vertically. Wales are not required. Space 3 x 8 uprights at six feet horizontally. This arrangement is commonly called "skip shoring."

Arrangement #2

Space 4 x 6 crossbraces at eight feet horizontally and four feet vertically. Space 8 x 8 wales at four feet vertically. Space 2 x 6 uprights at four feet horizontally.

Arrangement #3

Space 6 x 6 crossbraces at 10 feet horizontally and four feet vertically. Space 8 x 10 wales at four feet vertically. Space 2 x 6 uprights at five feet horizontally.

Arrangement #4

Space 6 x 6 crossbraces at 12 feet horizontally and four feet vertically. Space 10 x 10 wales at four feet vertically. Space 3 x 8 uprights at six feet horizontally.

(2) Example 2.

A trench dug in Type B soil is 13 feet deep and five feet wide. From Table C-1.2 three acceptable arrangements of members are listed.

Arrangement #1

Space 6 x 6 crossbraces at six feet horizontally and five feet vertically. Space 8 x 8 wales at five feet vertically. Space 2 x 6 uprights at two feet horizontally.

Arrangement #2

Space 6 x 8 crossbraces at eight feet horizontally and five feet vertically. Space 10 x 10 wales at five feet vertically. Space 2 x 6 uprights at two feet horizontally.

Arrangement #3

Space 8 x 8 crossbraces at 10 feet horizontally and five feet vertically. Space 10 x 12 wales at five feet vertically. Space 2 x 6 uprights at two feet horizontally.

(3) Example 3.

A trench dug in Type C soil is 13 feet deep and five feet wide. From Table C-1.3 two acceptable arrangements of members can be used.

Arrangement #1

Space 8 x 8 crossbraces at six feet horizontally and five feet vertically. Space 10 x 12 wales at five feet vertically. Position 2 x 6 uprights as closely together as possible. If water must be retained use special tongue and groove uprights to form tight sheeting.

Arrangement #2

Space 8 x 10 crossbraces at eight feet horizontally and five feet vertically. Space 12 x 12 wales at five feet vertically. Position 2 x 6 uprights in a close sheeting configuration unless water pressure must be resisted. Tight sheeting must be used where water must be retained.

(4) Example 4.

A trench dug in Type C soil is 20 feet deep and 11 feet wide. The size and spacing of members for the section of trench that is over 15 feet in depth is determined using Table C-1.3. Only one arrangement of members is provided. Space 8 x 10 crossbraces at six feet horizontally and five feet vertically. Space 12 x 12 wales at five feet vertically. Use 3 x 6 tight sheeting. Use of Tables C-2.1 through C-2.3 would follow the same procedures.

(g) Notes for all Tables.

1. Member sizes at spacings other than indicated are to be determined as specified in §1926.652(c), "Design of Protective Systems."
2. When conditions are saturated or submerged use Tight Sheeting. Tight Sheeting refers to the use of specially-edged timber planks (e.g., tongue and groove) at least three inches thick, steel sheet piling, or similar construction that when driven or placed in position provide a tight wall to resist the lateral pressure of water and to prevent the loss of backfill material. Close Sheeting refers to the placement of planks side-by-side allowing as little space as possible between them.
3. All spacing indicated is measured center to center.
4. Wales to be installed with greater dimension horizontal.
5. If the vertical distance from the center of the lowest crossbrace to the bottom of the trench exceeds two and one-half feet, uprights shall be firmly embedded or a mudsill shall be used. Where uprights are embedded, the vertical distance from the center of the lowest crossbrace to the bottom of the trench shall not exceed 36 inches. When mudsills are used, the vertical distance shall not exceed 42 inches. Mudsills are wales that are installed at the toe of the trench side.
6. Trench jacks may be used in lieu of or in combination with timber crossbraces.
7. Placement of crossbraces. When the vertical spacing of crossbraces is four feet, place the top crossbrace no more than two feet below the top of the trench. When the vertical spacing of crossbraces is five feet, place the top crossbrace no more than 2.5 feet below the top of the trench.

TABLE C-1.1

TIMBER TRENCH SHORING – MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE A $P_a = 25 \times H + 72$ psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 8	UP TO 12	UP TO 15				CLOSE	4	5	6	8
5 TO 10	UP TO 6	4x4	4x4	4x6	6x6	6x6	4	Not Req'd	—				2x6	
	UP TO 8	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	—					2X8
	UP TO 10	4X6	4X6	4X6	6X6	6X6	4	8X8	4			2X6		
	UP TO 12	4X6	4X6	6X6	6X6	6X6	4	8X8	4				2X6	
10 TO 15	UP TO 6	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	—				3X8	
	UP TO 8	4X6	4X6	6X6	6X6	6X6	4	8X8	4		2X6			
	UP TO 10	6X6	6X6	6X6	6X8	6X8	4	8X10	4			2X6		
	UP TO 12	6X6	6X6	6X6	6X8	6X8	4	10X10	4				3X8	
15 TO 20	UP TO 6	6X6	6X6	6X6	6X8	6X8	4	6X8	4	3X6				
	UP TO 8	6X6	6X6	6X6	6X8	6X8	4	8X8	4	3X6				
	UP TO 10	8X8	8X8	8X8	8X8	8X10	4	8X10	4	3X6				
	UP TO 12	8X8	8X8	8X8	8X8	8X10	4	10X10	4	3X6				
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-1.2**TIMBER TRENCH SHORING – MINIMUM TIMBER REQUIREMENTS ***SOIL TYPE B $P_a = 45 \times H + 72$ psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	2	3		
5 TO 10	UP TO 6	4x6	4x6	6x6	6x6	6x6	5	6x8	5			2x6		
	UP TO 8	6x6	6x6	6x6	6x8	6x8	5	8x10	5			2x6		
	UP TO 10	6x6	6x6	6x6	6x8	6x8	5	10x10	5			2x6		
	See Note 1													
10 TO 15	UP TO 6	6x6	6x6	6x6	6x8	6x8	5	8x8	5		2x6			
	UP TO 8	6x8	6x8	6x8	8x8	8x8	5	10x10	5		2x6			
	UP TO 10	8x8	8x8	8x8	8x8	8x10	5	10x12	5		2x6			
	See Note 1													
15 TO 20	UP TO 6	6x8	6x8	6x8	8x8	8x8	5	8x10	5	3x6				
	UP TO 8	8x8	8x8	8x8	8x8	8x10	5	10x12	5	3x6				
	UP TO 10	8x10	8x10	8x10	8x10	10x10	5	12x12	5	3x6				
	See Note 1													
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-1.3

TIMBER TRENCH SHORING – MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE C $P_s = 80 \times H + 72$ psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET) (See Note 2)				
		UP TO 4	UP TO 6	UP TO 8	UP TO 12	UP TO 15				CLOSE				
5 TO 10	UP TO 6	6x8	6x8	6x8	8x8	8x8	5	8x10	5	2X8				
	UP TO 8	8x8	8x8	8x8	8x8	8x10	5	10x12	5	2X8				
	UP TO 10	8x10	8x10	8x10	8x10	10x10	5	12X12	5	2X8				
	See Note 1													
10 TO 15	UP TO 6	8x8	8x8	8x8	8x8	8x10	5	10x12	5	2x6				
	UP TO 8	8x10	8x10	8x10	8x10	10x10	5	12x12	5	2x6				
	See Note 1													
	See Note 1													
15 TO 20	UP TO 6	8x10	8x10	8x10	8x10	10x10	5	12x12	5	3X8				
	See Note 1													
	See Note 1													
	See Note 1													
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.1

TIMBER TRENCH SHORING – MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE A $P_a = 25 \times H + 72$ psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	4	5	6	8
5 TO 10	UP TO 6	4x4	4x4	4x4	4x4	4x6	4	Not Req'd	Not Req'd				4x6	
	UP TO 8	4x4	4x4	4x4	4x6	4x6	4	Not Req'd	Not Req'd					4x8
	UP TO 10	4x6	4x6	4x6	6x6	6x6	4	8x8	4			4x6		
	UP TO 12	4x6	4x6	4x6	6x6	6x6	4	8x8	4				4x6	
10 TO 15	UP TO 6	4x4	4x4	4x4	6x6	6x6	4	Not Req'd	Not Req'd				4x10	
	UP TO 8	4x6	4x6	4x6	6x6	6x6	4	6x8	4		4x6			
	UP TO 10	6x6	6x6	6x6	6x6	6x6	4	8x8	4			4x8		
	UP TO 12	6x6	6x6	6x6	6x6	6x6	4	8x10	4		4x6		4x10	
15 TO 20	UP TO 6	6x6	6x6	6x6	6x6	6x6	4	6x8	4	3x6				
	UP TO 8	6x6	6x6	6x6	6x6	6x6	4	8x8	4	3x6	4x12			
	UP TO 10	6x6	6x6	6x6	6x6	6x8	4	8x10	4	3x6				
	UP TO 12	6x6	6x6	6x6	6x8	6x8	4	8x12	4	3x6	4x12			
OVER 20	SEE NOTE 1													

* Douglas fir equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.2**TIMBER TRENCH SHORING – MINIMUM TIMBER REQUIREMENTS ***SOIL TYPE B $P_s = 45 \times H + 72$ psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	2	3	4	6
5 TO 10	UP TO 6	4x6	4x6	4x6	6x6	6x6	5	6x8	5			3x12 4x8		4x12
	UP TO 8	4x6	4x6	6x6	6x6	6x6	5	8x8	5		3x8		4x8	
	UP TO 10	4x6	4x6	6x6	6x6	6x6	5	8x10	5			4x8		
	See Note 1													
10 TO 15	UP TO 6	6x6	6x6	6x6	6x8	6x8	5	8x8	5	3x6	4x10			
	UP TO 8	6x8	6x8	6x8	8x8	8x8	5	10x10	5	3x6	4x10			
	UP TO 10	6x8	6x8	8x8	8x8	8x8	5	10x12	5	3x6	4x10			
	See Note 1													
15 TO 20	UP TO 6	6x8	6x8	6x8	6x8	8x8	5	8x10	5	4x6				
	UP TO 8	6x8	6x8	6x8	8x8	8x8	5	10x12	5	4x6				
	UP TO 10	8x8	8x8	8x8	8x8	8x8	5	12x12	5	4x6				
	See Note 1													
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

TABLE C-2.3**TIMBER TRENCH SHORING – MINIMUM TIMBER REQUIREMENTS ***SOIL TYPE C $P_s = 80 \times H + 72$ psf (2 ft. Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (S4S) AND SPACING OF MEMBERS **													
	CROSS BRACES							WALES		UPRIGHTS				
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE				
5 TO 10	UP TO 6	6x6	6x6	6x6	6x6	8x8	5	8x8	5	3x6				
	UP TO 8	6x6	6x6	6x6	8x8	8x8	5	10x10	5	3x6				
	UP TO 10	6x6	6x6	8x8	8x8	8x8	5	10x12	5	3x6				
	See Note 1													
10 TO 15	UP TO 6	6x8	6x8	6x8	8x8	8x8	5	10x10	5	4x6				
	UP TO 8	8x8	8x8	8x8	8x8	8x8	5	12x12	5	4x6				
	See Note 1													
	See Note 1													
15 TO 20	UP TO 6	8x8	8x8	8x8	8x10	8x10	5	10x12	5	4x6				
	See Note 1													
	See Note 1													
	See Note 1													
OVER 20	SEE NOTE 1													

* Douglas fir or equivalent with a bending strength not less than 1500 psi.

** Manufactured members of equivalent strength may be substituted for wood.

Appendix D to Subpart P
ALUMINUM HYDRAULIC SHORING FOR TRENCHES

(a) Scope. This appendix contains information that can be used when aluminum hydraulic shoring is provided as a method of protection against cave-ins in trenches that do not exceed 20 feet (6.1m) in depth. This appendix must be used when design of the aluminum hydraulic protective system cannot be performed in accordance with §1926.652(c)(2).

(b) Soil Classification. In order to use data presented in this appendix, the soil type or types in which the excavation is made must first be determined using the soil classification method set forth in appendix A of subpart P of part 1926.

(c) Presentation of Information. Information is presented in several forms as follows:

(1) Information is presented in tabular form in Tables D-1.1, D-1.2, D-1.3 and D-1.4. Each table presents the maximum vertical and horizontal spacings that may be used with various aluminum member sizes and various hydraulic cylinder sizes. Each table contains data only for the particular soil type in which the excavation or portion of the excavation is made. Tables D-1.1 and D-1.2 are for vertical shores in Types A and B soil. Tables D-1.3 and D-1.4 are for horizontal waler systems in Types B and C soil.

(2) Information concerning the basis of the tabular data and the limitations of the data is presented in paragraph (d) of this appendix.

(3) Information explaining the use of the tabular data is presented in paragraph (e) of this appendix.

(4) Information illustrating the use of the tabular data is presented in paragraph (f) of this appendix.

(5) Miscellaneous notations (footnotes) regarding Table D-1.1 through D-1.4 are presented in paragraph (g) of this appendix.

(6) Figures, illustrating typical installations of hydraulic shoring, are included just prior to the Tables. The illustrations page is entitled "Aluminum Hydraulic Shoring; Typical Installations."

(d) Basis and limitations of the data.

(1) Vertical shore rails and horizontal wales are those that meet the Section Modulus requirements in the D-1 Tables. Aluminum material is 6061-T6 or material of equivalent strength and properties.

(2) Hydraulic cylinders specifications.

(i) 2-inch cylinders shall be a minimum 2- inch inside diameter with a minimum safe working capacity of no less than 18,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufacturer.

(ii) 3-inch cylinders shall be a minimum 3- inch inside diameter with a safe working capacity of not less than 30,000 pounds axial compressive load at extensions as recommended by product manufacturer.

(3) Limitation of application.

(i) It is not intended that the aluminum hydraulic specification apply to every situation that may be experienced in the field. These data were developed to apply to the situations that are most commonly experienced in current trenching practice. Shoring systems for use in situations that are not covered by the data in this appendix must be otherwise designed as specified in §1926.652(c).

(ii) When any of the following conditions are present, the members specified in the Tables are not considered adequate. In this case, an alternative aluminum hydraulic shoring system or other type of protective system must be designed in accordance with §1926.652.

(A) When vertical loads imposed on cross braces exceed a 100 pound gravity load distributed on a one foot section of the center of the hydraulic cylinder.

(B) When surcharge loads are present from equipment weighing in excess of 20,000 pounds.

(C) When only the lower portion or a trench is shored and the remaining portion of the trench is sloped or benched unless: The sloped portion is sloped at an angle less steep than three horizontal to one vertical; or the members are selected from the tables for use at a depth which is determined from the top of the overall trench, and not from the toe of the sloped portion.

(e) Use of Tables D-1.1, D-1.2, D-1.3 and D-1.4. The members of the shoring system that are to be selected using this information are the hydraulic cylinders, and either the vertical shores or the horizontal wales. When a waler system is used the vertical timber sheeting to be used is also selected from these tables. The Tables D-1.1 and D-1.2 for vertical shores are used in Type A and B soils that do not require sheeting. Type B soils that may require sheeting, and Type C soils that always require sheeting are found in the horizontal wale Tables D-1.3 and D-1.4. The soil type must first be determined in accordance with the soil classification system described in appendix A to subpart P of part 1926. Using the appropriate table, the selection of the size and spacing of the members is made.

The selection is based on the depth and width of the trench where the members are to be installed. In these tables the vertical spacing is held constant at four feet on center. The tables show the maximum horizontal spacing of cylinders allowed for each size of wale in the waler system tables, and in the vertical shore tables, the hydraulic cylinder horizontal spacing is the same as the vertical shore spacing.

(f) Example to Illustrate the Use of the Tables:

(1) Example 1:

A trench dug in Type A soil is 6 feet deep and 3 feet wide. From Table D-1.1: Find vertical shores and 2 inch diameter cylinders spaced 8 feet on center (o.c.) horizontally and 4 feet on center (o.c.) vertically. (See Figures 1 & 3 for typical installations.)

(2) Example 2:

A trench is dug in Type B soil that does not require sheeting, 13 feet deep and 5 feet wide. From Table D-1.2: Find vertical shores and 2 inch diameter cylinders spaced 6.5 feet o.c. horizontally and 4 feet o.c. vertically. (See Figures 1 & 3 for typical installations.)

(3) A trench is dug in Type B soil that does not require sheeting, but does experience some minor raveling of the trench face. The trench is 16 feet deep and 9 feet wide. From Table D-1.2: Find vertical shores and 2 inch diameter cylinder (with special oversleeves as designated by footnote #2) spaced 5.5 feet o.c. horizontally and 4 feet o.c. vertically, plywood (per footnote (g)(7) to the D-1 Table) should be used behind the shores. (See Figures 2 & 3 for typical installations.)

(4) Example 4: A trench is dug in previously disturbed Type B soil, with characteristics of a Type C soil, and will require sheeting. The trench is 18 feet deep and 12 feet wide. 8 foot horizontal spacing between cylinders is desired for working space. From Table D-1.3: Find horizontal wale with a section modulus of 14.0 spaced at 4 feet o.c. vertically and 3 inch diameter cylinder spaced at 9 feet maximum o.c. horizontally. 3x12 timber sheeting is required at close spacing vertically. (See Figure 4 for typical installation.)

(5) Example 5: A trench is dug in Type C soil, 9 feet deep and 4 feet wide. Horizontal cylinder spacing in excess of 6 feet is desired for working space. From Table D-1.4: Find horizontal wale with a section modulus of 7.0 and 2 inch diameter cylinders spaced at 6.5 feet o.c. horizontally. Or, find horizontal wale with a 14.0 section modulus and 3 inch diameter cylinder spaced at 10 feet o.c. horizontally. Both wales are spaced 4 feet o.c. vertically. 3x12 timber sheeting is required at close spacing vertically. (See Figure 4 for typical installation.)

(g) Footnotes, and general notes, for Tables D-1.1, D-1.2, D-1.3, and D-1.4.

(1) For applications other than those listed in the tables, refer to §1926.652(c)(2) for use of manufacturer's tabulated data. For trench depths in excess of 20 feet, refer to §1926.652(c)(2) and §1926.652(c)(3).

(2) 2 inch diameter cylinders, at this width, shall have structural steel tube (3.5x3.5x0.1875) oversleeves, or structural oversleeves of manufacturer's specification, extending the full, collapsed length.

(3) Hydraulic cylinders capacities.

(i) 2 inch cylinders shall be a minimum 2- inch inside diameter with a safe working capacity of not less than 18,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufacturer.

(ii) 3-inch cylinders shall be a minimum 3- inch inside diameter with a safe work capacity of not less than 30,000 pounds axial compressive load at maximum extension. Maximum extension is to include full range of cylinder extensions as recommended by product manufacturer.

(4) All spacing indicated is measured center to center.

(5) Vertical shoring rails shall have a minimum section modulus of 0.40 inch.

(6) When vertical shores are used, there must be a minimum of three shores spaced equally, horizontally, in a group.

(7) Plywood shall be 1.125 in. thick softwood or 0.75 inch. thick, 14 ply, arctic white birch (Finland form). Please note that plywood is not intended as a structural member, but only for prevention of local raveling (sloughing of the trench face) between shores.

(8) See appendix C for timber specifications.

(9) Wales are calculated for simple span conditions.

(10) See appendix D, item (d), for basis and limitations of the data.

ALUMINUM HYDRAULIC SHORING TYPICAL INSTALLATIONS

FIGURE NO. 1

VERTICAL ALUMINUM
HYDRAULIC SHORING
(SPOT BRACING)

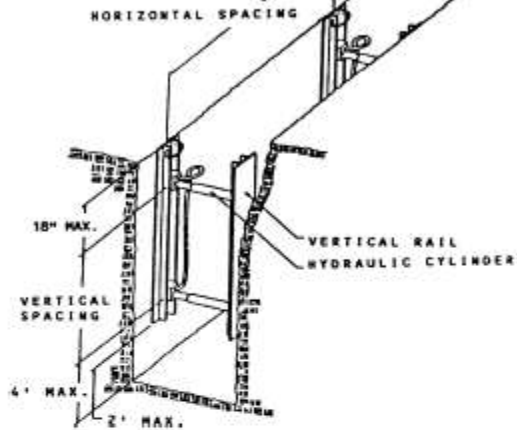


FIGURE NO. 2

VERTICAL ALUMINUM
HYDRAULIC SHORING
(WITH PLYWOOD)

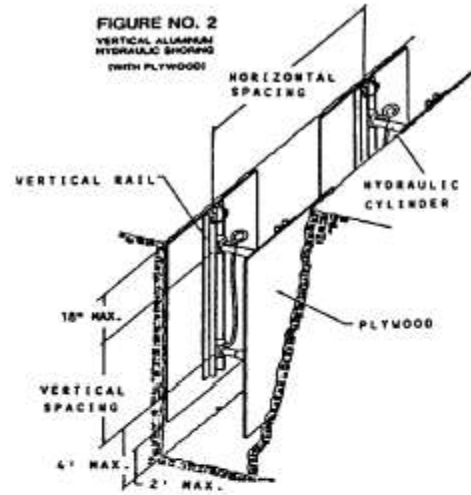


FIGURE NO. 3

VERTICAL ALUMINUM
HYDRAULIC SHORING
(STACKED)

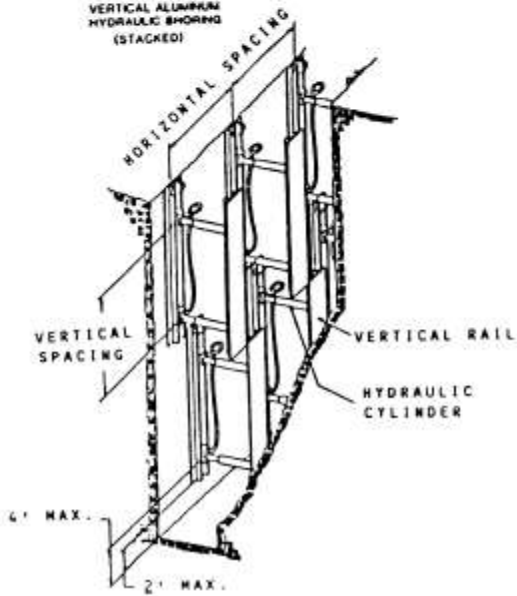


FIGURE NO. 4

ALUMINUM HYDRAULIC SHORING
WALER SYSTEM
(TYPICAL)

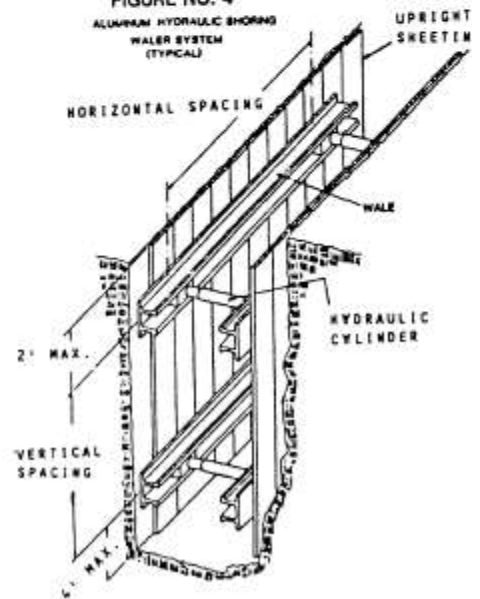


**TABLE D-1.1
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES
FOR SOIL TYPE A**

DEPTH OF TRENCH (FEET)	HYDRAULIC CYLINDERS				
	MAXIMUM HORIZONTAL SPACING (FEET)	MAXIMUM VERTICAL SPACING (FEET)	WIDTH OF TRENCH (FEET)		
			UP TO 8	OVER 8 UP TO 12	OVER 12 UP TO 15
OVER 5 UP TO 10	8	4	2 INCH DIAMETER	2 INCH DIAMETER NOTE (2)	3 INCH DIAMETER
OVER 10 UP TO 15	8				
OVER 15 UP TO 20	7				
OVER 20	NOTE (1)				

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g).

Note (1): See Appendix D, Item (g)(1)

Note (2): See Appendix D, Item (g)(2)

**TABLE D-1.2
ALUMINUM HYDRAULIC SHORING
VERTICAL SHORES
FOR SOIL TYPE B**

DEPTH OF TRENCH (FEET)	HYDRAULIC CYLINDERS				
	MAXIMUM HORIZONTAL SPACING (FEET)	MAXIMUM VERTICAL SPACING (FEET)	WIDTH OF TRENCH (FEET)		
			UP TO 8	OVER 8 UP TO 12	OVER 12 UP TO 15
OVER 5 UP TO 10	8	4	2 INCH DIAMETER	2 INCH DIAMETER NOTE (2)	3 INCH DIAMETER
OVER 10 UP TO 15	6.5				
OVER 15 UP TO 20	5.5				
OVER 20	NOTE (1)				

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g).

Note (1): See Appendix D, Item (g)(1)

Note (2): See Appendix D, Item (g)(2)

**TABLE D-1.3
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS
FOR SOIL TYPE B**

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS						TIMBER UPRIGHTS		
	VERTICAL SPACING (FEET)	* SECTION MODULUS (IN ²)	WIDTH OF TRENCH (FEET)						MAX. HORIZ. SPACING (ON CENTER)		
			UP TO 8		OVER 8 UP TO 12		OVER 12 UP TO 15		SOLID SHEET	2 FT.	3 FT.
			HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. DIAMETER	CYLINDER DIAMETER	HORIZ. DIAMETER	CYLINDER DIAMETER			
OVER 5 UP TO 10	4	3.5	8.0	2 IN	8.0	2 IN NOTE (2)	8.0	3 IN	---	---	3X12
		7.0	9.0	2 IN	9.0	2 IN NOTE (2)	9.0	3 IN			
		14.0	12.0	3 IN	12.0	3 IN	12.0	3 IN			
OVER 10 UP TO 15	4	3.5	6.0	2 IN	6.0	2 IN NOTE (2)	6.0	3 IN	---	3X12	---
		7.0	8.0	3 IN	8.0	3 IN	8.0	3 IN			
		14.0	10.0	3 IN	10.0	3 IN	10.0	3 IN			
OVER 15 UP TO 20	4	3.5	5.5	2 IN	5.5	2 IN NOTE (2)	5.5	3 IN	3X12	---	---
		7.0	6.0	3 IN	6.0	3 IN	6.0	3 IN			
		14.0	9.0	3 IN	9.0	3 IN	9.0	3 IN			
OVER 20	NOTE (1)										

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)

Notes (1): See Appendix D, Item (g)(1)

Notes (2): See Appendix D, Item (g)(2)

* Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

**TABLE D-1.4
ALUMINUM HYDRAULIC SHORING
WALER SYSTEMS
FOR SOIL TYPE C**

DEPTH OF TRENCH (FEET)	WALES		HYDRAULIC CYLINDERS						TIMBER UPRIGHTS		
	VERTICAL SPACING (FEET)	* SECTION MODULUS (IN ²)	WIDTH OF TRENCH (FEET)						MAX. HORIZ. SPACING (ON CENTER)		
			UP TO 8		OVER 8 UP TO 12		OVER 12 UP TO 15		SOLID SHEET	2 FT.	3 FT.
			HORIZ. SPACING	CYLINDER DIAMETER	HORIZ. DIAMETER	CYLINDER DIAMETER	HORIZ. DIAMETER	CYLINDER DIAMETER			
OVER 5 UP TO 10	4	3.5	6.0	2 IN	6.0	2 IN NOTE (2)	6.0	3 IN	3x12	---	---
		7.0	6.5	2 IN	6.5	2 IN NOTE (2)	6.5	3 IN			
		14.0	10.0	3 IN	10.0	3 IN	10.0	3 IN			
OVER 10 UP TO 15	4	3.5	4.0	2 IN	4.0	2 IN NOTE (2)	4.0	3 IN	3x12	---	---
		7.0	5.5	3 IN	5.5	3 IN	5.5	3 IN			
		14.0	8.0	3 IN	8.0	3 IN	8.0	3 IN			
OVER 15 UP TO 20	4	3.5	3.5	2 IN	3.5	2 IN NOTE (2)	3.5	3 IN	3X12	---	---
		7.0	5.0	3 IN	5.0	3 IN	5.0	3 IN			
		14.0	6.0	3 IN	6.0	3 IN	6.0	3 IN			
OVER 20	NOTE (1)										

Footnotes to tables, and general notes on hydraulic shoring, are found in Appendix D, Item (g)

Notes (1): See Appendix D, Item (g)(1)

Notes (2): See Appendix D, Item (g)(2)

* Consult product manufacturer and/or qualified engineer for Section Modulus of available wales.

INSPECTION OF TRENCHES & EXCAVATIONS

Cain's Pipeline & Industrial Services, LLC.			
Project:		Date:	Weather:
Trench Depth:		Length:	Width:
Type of Protective System:			
Project Supervisor:			
Assigned Competent Person :			
Crew Members:			
Excavation equipment type(s):			
Equipment Operator(s):			
Excavation			
Yes	No	N/A	
☐	☐	☐	Excavations and Protective Systems inspected by Competent Person daily, before start of work.
☐	☐	☐	Competent Person has authority to remove workers from excavation immediately.
☐	☐	☐	Surface encumbrances supported or removed.
☐	☐	☐	Employees protected from loose rock or soil.
☐	☐	☐	Hard hats worn by all employees.
☐	☐	☐	Spoils, materials, and equipment set back a minimum of 2' from edge of excavation.
☐	☐	☐	Barriers provided at all remote excavations, wells, pits, shafts, etc.
☐	☐	☐	Ingress/egress within excavation provided at 25' intervals.
☐	☐	☐	Walkways and bridges over excavations 6' or more in depth equipped with guardrails.
☐	☐	☐	Warning vests, or other highly visible PPE provided and worn by all employees exposed to vehicular traffic.
☐	☐	☐	Employees prohibited from working or walking under suspended loads.
☐	☐	☐	Employees prohibited from working on faces of sloped or benched excavations above other employees.
☐	☐	☐	Warning system established and used when mobile equipment is operating near edge of excavation.
Utilities			
☐	☐	☐	Utility companies contacted and/or utilities located.
☐	☐	☐	Exact location of utilities marked when near excavation.
☐	☐	☐	Underground installations protected, supported, or removed when excavation is open.
Wet Conditions			
☐	☐	☐	Precautions taken to protect employees from accumulation of water.
☐	☐	☐	Water removal equipment monitored by Competent Person .
☐	☐	☐	Surface water controlled or diverted.
☐	☐	☐	Inspection made after each rainstorm.
Hazardous Atmosphere			
☐	☐	☐	Atmosphere tested when there is a possibility of oxygen deficiency or build-up of hazardous gases.
☐	☐	☐	Oxygen content is between 19.5% and 21%.
☐	☐	☐	Ventilation provided to prevent flammable gas build-up to 20% of lower explosive limit of the gas.
☐	☐	☐	Testing conducted to ensure that atmosphere remains safe.
☐	☐	☐	Emergency Response Equipment readily available where a hazardous atmosphere could or does exist.
☐	☐	☐	Employees trained in the use of Personal Protective and Emergency Response Equipment.
☐	☐	☐	Safety harness and life line individually attended when employees enter deep confined excavation.
Comments:			
Signature of Competent Person :			
			Date:

Notes:

Handwriting practice lines consisting of 20 sets of three horizontal lines (top, middle, and bottom) for letter formation.

Chapter 34

Cain's Pipeline & Industrial Services, LLC.

Company Policy for Welding, Cutting, & Hot Work

Cain's Pipeline & Industrial Services, LLC. has adopted this policy for the prevention of employee exposure to hazards resulting either directly or indirectly from "Hot Work" (welding, cutting, and brazing) in the workplace from the following OSHA regulations:

§1910.252 – General Requirements

§1910.253 – Oxygen-fuel Gas Welding and Cutting

§1910.254 – Arc Welding and Cutting

Cain's Pipeline & Industrial Services, LLC. has implemented this policy to ensure that employees are properly trained, aware of hazards associated with hot work, and correctly informed of Company policies, practices, and procedures to prevent, or if possible, eliminate these hazards. ***Brent Messina*** is the supervisor responsible for ensuring the following engineering controls, work practices, and safety procedures are enforced:

- *Brent Messina* will ensure that welders, cutters, and their supervisors involved in the performance of hot work operations is properly trained in the safe operations of any equipment required, the safe use of the process, proper PPE, and safety procedures which will be followed.
- Before cutting or welding processes are permitted, the area will be inspected and cleared by Brent Messina before authorization to proceed is granted. Written "Hot Work" permits will be utilized to ensure appropriate safe work practices are observed. (See page 15 of this Section.)
- Operators will report any equipment defect or safety hazard to his supervisor and the use of the equipment will be discontinued until its safety has been assured. Repairs will be performed only by qualified personnel.
- Where possible, all hot work operations will be performed outside of buildings or structures, clear of any foreseeable fire hazards. If the object to be welded or cut cannot readily be moved, all moveable fire hazards will be removed.
- Where hot work must be performed indoors or in the vicinity of fire hazards, the area will be cleared, if possible, of any and all material and equipment which may present a hazard of fire or explosion from flame, sparks, arcs, or slag.
- Where fire hazards exist in the area of hot work operations which cannot be removed, they will be guarded to prevent fire, and the hot work operation will be shielded to confine the heat sparks and slag and to protect the immovable fire hazards and prevent hot materials from falling to a lower level.
- Fire watchers will have fire extinguishers readily available. A fire watch will be maintained for at least a half hour after the welding or cutting operation is completed to prevent or extinguish any fire resulting from these operations.
- The employee(s) assigned to fire watch will be trained in the proper use of fire extinguishers and fire prevention measures, ensure that appropriate fire fighting equipment and fire extinguishers are readily available, and be responsible for sounding of fire alarms in the event of a fire which is not readily extinguishable.

- All arc welding operations in occupied areas will be screened to prevent other personnel from being exposed to flash hazards.
- *Cain's Pipeline & Industrial Services, LLC.* will be responsible for inspecting work areas prior to any hot work being performed, designate precautions to be followed prior to work commencing, and assign a fire watch where advisable or required when any of the following conditions exist:
 - Locations where other than a minor fire might develop.
 - Appreciable combustible material, in building construction or contents, closer than 35 feet to the point of operation.
 - Appreciable combustibles are more than 35 feet away, but are easily ignited by sparks.
 - Wall or floor openings within a 35-foot radius that expose combustible material in adjacent areas including concealed spaces in walls or floors.
 - Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.
- If the requirements for fire hazards and guarding as stated above cannot be fully met, *Cain's Pipeline & Industrial Services, LLC.* personnel will not perform the welding and cutting operations until hazardous conditions are fully resolved.
- Any hot work to be performed in confined spaces will conform to Permit-required Confined Space procedures and the following requirements:
 - Adequate ventilation is a prerequisite to work in confined spaces.
 - When welding or cutting is being performed in any confined spaces the gas cylinders and welding machines will kept outside of the space. Before operations are started, gas cylinders will be secured, heavy portable equipment mounted on wheels will be securely blocked to prevent accidental movement, and warning signs will be posted.
 - Where a welder must enter a confined space through a manhole or other small opening, means will be provided for quickly removing him in case of emergency. When safety belts and lifelines are used for this purpose they will be so attached to the welder's body that his body cannot be jammed in a small exit opening. An attendant with a preplanned rescue procedure will be stationed outside to observe the welder at all times and be capable of putting rescue operations into effect.
 - When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes will be removed from the holders and the holders stored so that accidental contact cannot occur and the machine disconnected from the power source.
 - In order to eliminate the possibility of gas escaping through leaks of improperly closed valves when gas welding or cutting, the torch valves will be closed and the fuel-gas and oxygen supply to the torch positively shut off at some point outside the confined area, whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. Where practicable, the torch and hose will also be removed from the confined space.

- Any welding or brazing materials used in hot work which might possibly generate hazardous fumes, gases, or dust to the metals involved will be suitably labeled to indicate the hazard, and appropriate measures for ventilation or respiratory protection provided to ensure that no employee is exposed to higher than permissible levels of hazardous fumes.
- Welding, cutting, or burning of metals containing lead, zinc, cadmium, mercury, beryllium, or other exotic metals, paints, coatings, or preservatives will require that regulation ventilation or respiratory protection be utilized.
- After welding or cutting operations are completed, the welder will mark the hot metal or provide some other means of warning other workers.
- First aid kits and equipment are readily available at all times for employee use during welding and cutting operations. First aid kits are kept in all company vehicles and are regularly inspected by *Brent Messina* to ensure that contents are kept fully stocked and that the appropriate items are available.
- Personnel in charge of fuel-gas and oxygen supply equipment (including distribution piping systems and generators) will be fully instructed and determined competent for handling, use, and storage of compressed gas cylinders and related equipment.
- The manufacturer's recommendations covering the operation and maintenance of oxygen or fuel-gas supply equipment including generators, and oxygen or fuel-gas distribution piping systems will be followed and readily available to employees.
- Fuel gas and oxygen cylinders must be transported, moved, stored, and used in an upright position, secured to prevent tipping, and located to prevent accidental collision with the cylinders. Cylinders must be kept away from any heat or combustion sources, and at least 20 feet from any flammable gases or petroleum products. When not in use, cylinders must have their valves closed, any regulators or attachments removed, and their valve covers in place.
- Personnel assigned to operate or maintain arc welding equipment will be properly trained & qualified to operate such equipment and in safety procedures and familiar with OSHA §1910.252(a)(b) & (c) and §1910.254 requirements for arc welding and equipment handling to include the following areas:
 - Machine hook up.
 - Grounding.
 - Electric shock.
 - There shall be no leaks of cooling water, shielding gas or engine fuel.
 - Switches.
 - Manufacturers' instructions.
 - Electrode holders.
- If gas shielded arc welding operations are being performed, operators will be familiar with the American Welding Society Standard A6-1-1966.
- Machines which have become wet will be thoroughly dried and tested before being used.
- Cables with damaged insulation or exposed bare conductors will be replaced. Joining lengths of work and electrode cables will be done by the use of connecting means specifically intended for the purpose. The connecting means will have insulation adequate for the service conditions.

The above policies and procedures will be enforced at *Cain's Pipeline & Industrial Services, LLC*. and in addition, all requirements of the following regulations will be adhered to.

§1910.252 — General Requirements

(a) Fire prevention and protection.

(1) Basic precautions. For elaboration of these basic precautions and of the special precautions of paragraph (a)(2) of this section as well as a delineation of the fire protection and prevention responsibilities of welders and cutters, their supervisors (including outside contractors) and those in management on whose property cutting and welding is to be performed, see Standard for Fire Prevention in Use of Cutting and Welding Processes, NFPA Standard 51B, 1962, which is incorporated by reference as specified in §1910.6. The basic precautions for fire prevention in welding or cutting work are:

(i) Fire hazards. If the object to be welded or cut cannot readily be moved, all movable fire hazards in the vicinity shall be taken to a safe place.

(ii) Guards. If the object to be welded or cut cannot be moved and if all the fire hazards cannot be removed, then guards shall be used to confine the heat, sparks, and slag, and to protect the immovable fire hazards.

(iii) Restrictions. If the requirements stated in paragraphs (a)(1)(i) and (a)(1)(ii) of this section cannot be followed then welding and cutting shall not be performed.

(2) Special precautions. When the nature of the work to be performed falls within the scope of paragraph (a)(1)(ii) of this section certain additional precautions may be necessary:

(i) Combustible material. Wherever there are floor openings or cracks in the flooring that cannot be closed, precautions shall be taken so that no readily combustible materials on the floor below will be exposed to sparks which might drop through the floor. The same precautions shall be observed with regard to cracks or holes in walls, open doorways and open or broken windows.

(ii) Fire extinguishers. Suitable fire extinguishing equipment shall be maintained in a state of readiness for instant use. Such equipment may consist of pails of water, buckets of sand, hose or portable extinguishers depending upon the nature and quantity of the combustible material exposed.

(iii) Fire watch.

(A) Fire watchers shall be required whenever welding or cutting is performed in locations where other than a minor fire might develop, or any of the following conditions exist:

(1) Appreciable combustible material, in building construction or contents, closer than 35 feet (10.7 m) to the point of operation.

(2) Appreciable combustibles are more than 35 feet (10.7 m) away but are easily ignited by sparks.

(3) Wall or floor openings within a 35-foot (10.7 m) radius expose combustible material in adjacent areas including concealed spaces in walls or floors.

(4) Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.

(B) Fire watchers shall have fire extinguishing equipment readily available and be trained in its use. They shall be familiar with facilities for sounding an alarm in the event of a fire. They shall watch for fires in all exposed areas, try to extinguish them only when obviously within the capacity of the equipment available, or otherwise sound the alarm. A fire watch shall be maintained for at least a half hour after completion of welding or cutting operations to detect and extinguish possible smoldering fires.

(iv) Authorization. Before cutting or welding is permitted, the area shall be inspected by the individual responsible for authorizing cutting and welding operations. He shall designate precautions to be followed in granting authorization to proceed preferably in the form of a written permit.

(v) Floors. Where combustible materials such as paper clippings, wood shavings, or textile fibers are on the floor, the floor shall be swept clean for a radius of 35 feet (10.7 m). Combustible floors shall be kept wet, covered with damp sand, or protected by fire-resistant shields. Where floors have been wet down, personnel operating arc welding or cutting equipment shall be protected from possible shock.

(vi) Prohibited areas. Cutting or welding shall not be permitted in the following situations:

(A) In areas not authorized by management.

(B) In sprinklered buildings while such protection is impaired.

(C) In the presence of explosive atmospheres (mixtures of flammable gases, vapors, liquids, or dusts with air), or explosive atmospheres that may develop inside uncleaned or improperly prepared tanks or equipment which have previously contained such materials, or that may develop in areas with an accumulation of combustible dusts.

(D) In areas near the storage of large quantities of exposed, readily ignitable materials such as bulk sulfur, baled paper, or cotton.

(vii) **Relocation of combustibles.** Where practicable, all combustibles shall be relocated at least 35 feet (10.7 m) from the work site. Where relocation is impracticable, combustibles shall be protected with flameproofed covers or otherwise shielded with metal or asbestos guards or curtains.

(viii) **Ducts.** Ducts and conveyor systems that might carry sparks to distant combustibles shall be suitably protected or shut down.

(ix) **Combustible walls.** Where cutting or welding is done near walls, partitions, ceiling or roof of combustible construction, fire-resistant shields or guards shall be provided to prevent ignition.

(x) **Noncombustible walls.** If welding is to be done on a metal wall, partition, ceiling or roof, precautions shall be taken to prevent ignition of combustibles on the other side, due to conduction or radiation, preferably by relocating combustibles. Where combustibles are not relocated, a fire watch on the opposite side from the work shall be provided.

(xi) **Combustible cover.** Welding shall not be attempted on a metal partition, wall, ceiling or roof having a combustible covering nor on walls or partitions of combustible sandwich-type panel construction.

(xii) **Pipes.** Cutting or welding on pipes or other metal in contact with combustible walls, partitions, ceilings or roofs shall not be undertaken if the work is close enough to cause ignition by conduction.

(xiii) **Management. Management shall recognize its responsibility for the safe usage of cutting and welding equipment on its property and:**

(A) Based on fire potentials of plant facilities, establish areas for cutting and welding, and establish procedures for cutting and welding, in other areas.

(B) Designate an individual responsible for authorizing cutting and welding operations in areas not specifically designed for such processes.

(C) **Insist that cutters or welders and their supervisors are suitably trained in the safe operation of their equipment and the safe use of the process.**

(D) Advise all contractors about flammable materials or hazardous conditions of which they may not be aware.

(xiv) **Supervisor.** The Supervisor:

(A) Shall be responsible for the safe handling of the cutting or welding equipment and the safe use of the cutting or welding process.

(B) Shall determine the combustible materials and hazardous areas present or likely to be present in the work location.

(C) Shall protect combustibles from ignition by the following:

(1) Have the work moved to a location free from dangerous combustibles.

(2) If the work cannot be moved, have the combustibles moved to a safe distance from the work or have the combustibles properly shielded against ignition.

(3) See that cutting and welding are so scheduled that plant operations that might expose combustibles to ignition are not started during cutting or welding.

(D) Shall secure authorization for the cutting or welding operations from the designated management representative.

(E) Shall determine that the cutter or welder secures his approval that conditions are safe before going ahead.

(F) Shall determine that fire protection and extinguishing equipment are properly located at the site.

(G) Where fire watches are required, he shall see that they are available at the site.

(xv) **Fire prevention precautions.** Cutting or welding shall be permitted only in areas that are or have been made fire safe. When work cannot be moved practically, as in most construction work, the area shall be made safe by removing combustibles or protecting combustibles from ignition sources.

(b) Protection of personnel.

(1) General.

(i) Railing. A welder or helper working on platforms, scaffolds, or runways shall be protected against falling. This may be accomplished by the use of railings, safety belts, life lines, or some other equally effective safeguards.

(ii) Welding cable. Welders shall place welding cable and other equipment so that it is clear of passageways, ladders, and stairways.

(2) Eye protection.

(i) Selection.

(A) Helmets or hand shields shall be used during all arc welding or arc cutting operations, excluding submerged arc welding. Helpers or attendants shall be provided with proper eye Protection.

(B) Goggles or other suitable eye protection shall be used during all gas welding or oxygen cutting operations. Spectacles without side shields, with suitable filter lenses are permitted for use during gas welding operations on light work, for torch brazing or for inspection.

(C) All operators and attendants of resistance welding or resistance brazing equipment shall use transparent face shields or goggles, depending on the particular job, to protect their faces or eyes, as required.

(D) Eye protection in the form of suitable goggles shall be provided where needed for brazing operations not covered in paragraphs (b)(2)(i)(A) through (b)(2)(i)(C) of this section.

(ii) Specifications for protectors.

(A) Helmets and hand shields shall be made of a material which is an insulator for heat and electricity. Helmets, shields and goggles shall be not readily flammable and shall be capable of withstanding sterilization.

(B) Helmets and hand shields shall be arranged to protect the face, neck and ears from direct radiant energy from the arc.

(C) Helmets shall be provided with filter plates and cover plates designed for easy removal.

(D) All parts shall be constructed of a material which will not readily corrode or discolor the skin.

(E) Goggles shall be ventilated to prevent fogging of the lenses as much as practicable.

(F) All glass for lenses shall be tempered, substantially free from striae, air bubbles, waves and other flaws. Except when a lens is ground to provide proper optical correction for defective vision, the front and rear surfaces of lenses and windows shall be smooth and parallel.

(G) Lenses shall bear some permanent distinctive marking by which the source and shade may be readily identified.

(H) The following is a guide for the selection of the proper shade numbers. These recommendations may be varied to suit the individual's needs.

Welding operation	Shade No.
Shielded metal-arc welding – 1/16-, 3/32-, 1/8-, 5/32-inch electrodes	11
Gas-shielded arc welding (nonferrous) – 1/16-, 3/32-, 1/8-, 5/32-inch electrodes	11
Gas-shielded arc welding (ferrous) – 1/16-, 3/32-, 1/8-, 5/32-inch electrodes	12
Shielded metal-arc welding: 3/16-, 7/32-, 1/4-inch electrodes	14
5/16-, 3/8-inch electrodes	10-14
Atomic hydrogen welding	14
Carbon arc welding	2
Soldering	3 or 4
Torch brazing	3 or 4
Light cutting, up to 1 inch	4 or 5
Medium cutting, 1 inch to 6 inches	5 or 6
Heavy cutting, 6 inches and over	4 or 5
Gas welding (light) up to 1/8 inch	5 or 6
Gas welding (medium) 1/8 inch to 1/2 inch	6 or 8
Gas welding (heavy) 1/2 inch and over	

Note: In gas welding or oxygen cutting where the torch produces a high yellow light, it is desirable to use a filter or lens that absorbs the yellow or sodium line in the visible light of the operation.

(l) All filter lenses and plates shall meet the test for transmission of radiant energy prescribed in ANSI Z87.1-1968 – American National Standard Practice for Occupational and Educational Eye and Face Protection, which is incorporated by reference as specified in §1910.6.

(iii) **Protection from arc welding rays.** Where the work permits, the welder should be enclosed in an individual booth painted with a finish of low reflectivity, such as zinc oxide (an important factor for absorbing ultraviolet radiations) and lamp black, or shall be enclosed with noncombustible screens similarly painted. Booths and screens shall permit circulation of air at floor level. Workers or other persons adjacent to the welding areas shall be protected from the rays by noncombustible or flameproof screens or shields or shall be required to wear appropriate goggles.

(3) **Protective clothing – General requirements.** Employees exposed to the hazards created by welding, cutting, or brazing operations shall be protected by personal protective equipment in accordance with the requirements of §1910.132 of this part. Appropriate protective clothing required for any welding operation will vary with the size, nature and location of the work to be performed.

(4) **Work in confined spaces.**

(i) **General.** As used herein confined space is intended to mean a relatively small or restricted space such as a tank, boiler, pressure vessel, or small compartment of a ship.

(ii) **Ventilation.** Ventilation is a prerequisite to work in confined spaces. For ventilation requirements see paragraph (c) of this section.

(iii) **Securing cylinders and machinery.** When welding or cutting is being performed in any confined spaces the gas cylinders and welding machines shall be left on the outside. Before operations are started, heavy portable equipment mounted on wheels shall be securely blocked to prevent accidental movement.

(iv) **Lifelines.** Where a welder must enter a confined space through a manhole or other small opening, means shall be provided for quickly removing him in case of emergency. When safety belts and lifelines are used for this purpose they shall be so attached to the welder's body that his body cannot be jammed in a small exit opening. An attendant with a preplanned rescue procedure shall be stationed outside to observe the welder at all times and be capable of putting rescue operations into effect.

(v) **Electrode removal.** When arc welding is to be suspended for any substantial period of time, such as during lunch or overnight, all electrodes shall be removed from the holders and the holders carefully located so that accidental contact cannot occur and the machine disconnected from the power source.

(vi) **Gas cylinder shutoff.** In order to eliminate the possibility of gas escaping through leaks of improperly closed valves, when gas welding or cutting, the torch valves shall be closed and the fuel-gas and oxygen supply to the torch positively shut off at some point outside the confined area whenever the torch is not to be used for a substantial period of time, such as during lunch hour or overnight. Where practicable the torch and hose shall also be removed from the confined space.

(vii) **Warning sign.** After welding operations are completed, the welder shall mark the hot metal or provide some other means of warning other workers.

(c) **Health protection and ventilation.**

(1) **General.**

(i) **Contamination.** The requirements in this paragraph have been established on the basis of the following three factors in arc and gas welding which govern the amount of contamination to which welders may be exposed:

(A) Dimensions of space in which welding is to be done (with special regard to height of ceiling).

(B) Number of welders.

(C) **Possible evolution of hazardous fumes, gases, or dust according to the metals involved.**

(ii) **Screens.** When welding must be performed in a space entirely screened on all sides, the screens shall be so arranged that no serious restriction of ventilation exists. It is desirable to have the screens so mounted that they are about 2 feet (0.61 m) above the floor unless the work is performed at so low a level that the screen must be extended nearer to the floor to protect nearby workers from the glare of welding.

(iii) **Maximum allowable concentration.** Local exhaust or general ventilating systems shall be provided and arranged to keep the amount of toxic fumes, gases, or dusts below the maximum allowable concentration as specified in §1910.1000 of this part.

(iv) **Precautionary labels.** A number of potentially hazardous materials are employed in fluxes, coatings, coverings, and filler metals used in welding and cutting or are released to the atmosphere during welding and cutting. These include but are not limited to the materials itemized in paragraphs (c)(5) through (c)(12) of this section. The suppliers of welding materials shall determine the hazard, if any, associated with the use of their materials in welding, cutting, etc.

(A) All filler metals and fusible granular materials shall carry the following notice, as a minimum, on tags, boxes, or other containers:

CAUTION

Welding may produce fumes and gases hazardous to health.

Avoid breathing these fumes and gases. Use adequate ventilation.

See ANSI Z49.1-1967 Safety in Welding and Cutting published by the American Welding Society.

(B) Brazing (welding) filler metals containing cadmium in significant amounts shall carry the following notice on tags, boxes, or other containers:

WARNING

CONTAINS CADMIUM – POISONOUS FUMES MAY BE FORMED ON HEATING

Do not breathe fumes. Use only with adequate ventilation such as fume collectors, exhaust ventilators, or air-supplied respirators. See ANSI Z49.1-1967.

If chest pain, cough, or fever develops after use call physician immediately.

(C) Brazing and gas welding fluxes containing fluorine compounds shall have a cautionary wording to indicate that they contain fluorine compounds. One such cautionary wording recommended by the American Welding Society for brazing and gas welding fluxes reads as follows:

CAUTION: CONTAINS FLUORIDES

This flux when heated gives off fumes that may irritate eyes, nose and throat.

1. Avoid fumes – use only in well-ventilated spaces.
2. Avoid contact of flux with eyes or skin.
3. Do not take internally.

(2) Ventilation for general welding and cutting.

(i) **General.** Mechanical ventilation shall be provided when welding or cutting is done on metals not covered in paragraphs (c)(5) through (c)(12) of this section. (For specific materials, see the ventilation requirements of paragraphs (c)(5) through (c)(12) of this section.)

(A) In a space of less than 10,000 cubic feet (284 m³) per welder.

(B) In a room having a ceiling height of less than 16 feet (5 m).

(C) In confined spaces or where the welding space contains partitions, balconies, or other structural barriers to the extent that they significantly obstruct cross ventilation.

(ii) **Minimum rate.** Such ventilation shall be at the minimum rate of 2,000 cubic feet (57 m³) per minute per welder, except where local exhaust hoods and booths as per paragraph (c)(3) of this section, or airline respirators approved by the Mine Safety and Health Administration and the National Institute for Occupational Safety and Health, pursuant to the provisions of 30 CFR part 11, are provided. Natural ventilation is considered sufficient for welding or cutting operations where the restrictions in paragraph (c)(2)(i) of this section are not present.

(3) **Local exhaust hoods and booths.** Mechanical local exhaust ventilation may be by means of either of the following:

(i) **Hoods.** Freely movable hoods intended to be placed by the welder as near as practicable to the work being welded and provided with a rate of air-flow sufficient to maintain a velocity in the direction of the hood of 100 linear feet (30 m) per minute in the zone of welding when the hood is at its most remote distance from the point of welding.

The rates of ventilation required to accomplish this control velocity using a 3-inch wide flanged suction opening are shown in the table:

Welding zone	Minimum air flow ¹ cubic feet/minute	Duct diameter, inches ²
4 to 6 inches from arc or torch	150	3
6 to 8 inches from arc or torch	275	3-1/2
8 to 10 inches from arc or torch	425	4-1/2
10 to 12 inches from arc or torch	600	5-1/2

¹ When brazing with cadmium bearing materials or when cutting on such materials increased rates of ventilation may be required.

² Nearest half-inch duct diameter based on 4,000 feet per minute velocity in pipe.

(ii) **Fixed enclosure.** A fixed enclosure with a top and not less than two sides which surround the welding or cutting operations and with a rate of airflow sufficient to maintain a velocity away from the welder of not less than 100 linear feet (30 m) per minute.

(4) Ventilation in confined spaces.

(i) **Air replacement.** All welding and cutting operations carried on in confined spaces shall be adequately ventilated to prevent the accumulation of toxic materials or possible oxygen deficiency. This applies not only to the welder but also to helpers and other personnel in the immediate vicinity. All air replacing that withdrawn shall be clean and respirable.

(ii) **Airline respirators.** In circumstances for which it is impossible to provide such ventilation, airline respirators or hose masks approved for this purpose by the National Institute for Occupational Safety and Health (NIOSH) under 42 CFR part 84 must be used.

(iii) **Self-contained units.** In areas immediately hazardous to life, a full-facepiece, pressure-demand, self-contained breathing apparatus or a combination full-facepiece, pressure-demand supplied-air respirator with an auxiliary, self-contained air supply approved by NIOSH under 42 CFR part 84 must be used.

(iv) **Outside helper.** Where welding operations are carried on in confined spaces and where welders and helpers are provided with hose masks, hose masks with blowers or self-contained breathing equipment approved by the Mine Safety and Health Administration and the National Institute for Occupational Safety and Health, a worker shall be stationed on the outside of such confined spaces to insure the safety of those working within.

(v) **Oxygen for ventilation.** Oxygen shall never be used for ventilation.

(5) Fluorine compounds.

(i) **General.** In confined spaces welding or cutting involving fluxes, covering, or other materials which contain fluorine compounds shall be done in accordance with paragraph (c)(4) of this section. A fluorine compound is one that contains fluorine, as an element in chemical combination, not as a free gas.

(ii) **Maximum allowable concentration.** The need for local exhaust ventilation or airline respirators for welding or cutting in other than confined spaces will depend upon the individual circumstances. However, experience has shown such protection to be desirable for fixed-location production welding and for all production welding on stainless steels. Where air samples taken at the welding location indicate that the fluorides liberated are below the maximum allowable concentration, such protection is not necessary.

(6) Zinc.

(i) **Confined spaces.** In confined spaces welding or cutting involving zinc bearing base or filler metals or metals coated with zinc-bearing materials shall be done in accordance with paragraph (c)(4) of this section.

(ii) **Indoors.** Indoors, welding or cutting involving zinc-bearing base or filler metals coated with zinc-bearing materials shall be done in accordance with paragraph (c)(3) of this section.

(7) Lead.

(i) **Confined spaces.** In confined spaces, welding involving lead-base metals (erroneously called lead-burning) shall be done in accordance with paragraph (c)(4) of this section.

(ii) **Indoors.** Indoors, welding involving lead-base metals shall be done in accordance with paragraph (c)(3) of this section.

(iii) **Local ventilation.** In confined spaces or indoors, welding or cutting operations involving metals containing lead, other than as an impurity, or metals coated with lead-bearing materials, including paint, must be done using local exhaust ventilation or airline respirators. Such operations, when done outdoors, must be done using respirators approved for this purpose by NIOSH under 42 CFR part 84. In all cases, workers in the immediate vicinity of the cutting operation must be protected by local exhaust ventilation or airline respirators.

(8) Beryllium. Welding or cutting indoors, outdoors, or in confined spaces involving beryllium-containing base or filler metals shall be done using local exhaust ventilation and airline respirators unless atmospheric tests under the most adverse conditions have established that the workers' exposure is within the acceptable concentrations defined by §1910.1000 of this part. In all cases, workers in the immediate vicinity of the welding or cutting operations shall be protected as necessary by local exhaust ventilation or airline respirators.

(9) Cadmium.

(i) General. In confined spaces or indoors, welding or cutting operations involving cadmium-bearing or cadmium-coated base metals must be done using local exhaust ventilation or airline respirators unless atmospheric tests under the most adverse conditions show that employee exposure is within the acceptable concentrations specified by 29 CFR 1910.1000. Such operations, when done outdoors, must be done using respirators, such as fume respirators, approved for this purpose by NIOSH under 42 CFR part 84.

(ii) Confined space. Welding (brazing involving cadmium-bearing filler metals shall be done using ventilation as prescribed in paragraph (c)(3) or (c)(4) of this section if the work is to be done in a confined space.

(10) Mercury. In confined spaces or indoors, welding or cutting operations involving metals coated with mercury-bearing materials, including paint, must be done using local exhaust ventilation or airline respirators unless atmospheric tests under the most adverse conditions show that employee exposure is within the acceptable concentrations specified by 29 CFR 1910.1000. Such operations, when done outdoors, must be done using respirators approved for this purpose by NIOSH under 42 CFR part 84.

(11) Cleaning compounds.

(i) Manufacturer's instructions. In the use of cleaning materials, because of their possible toxicity or flammability, appropriate precautions such as manufacturers instructions shall be followed.

(ii) Degreasing. Degreasing and other cleaning operations involving chlorinated hydrocarbons shall be so located that no vapors from these operations will reach or be drawn into the atmosphere surrounding any welding operation. In addition, trichloroethylene and perchlorethylene should be kept out of atmospheres penetrated by the ultraviolet radiation of gas-shielded welding operations.

(12) Cutting of stainless steels. Oxygen cutting, using either a chemical flux or iron powder or gas-shielded arc cutting of stainless steel, shall be done using mechanical ventilation adequate to remove the fumes generated.

(13) First-Aid equipment. First-aid equipment shall be available at all times. All injuries shall be reported as soon as possible for medical attention. First aid shall be rendered until medical attention can be provided.

§1910.253 — Oxygen-Fuel Gas Welding and Cutting

(a) General requirements.

(1) Flammable mixture. Mixtures of fuel gases and air or oxygen may be explosive and shall be guarded against. No device or attachment facilitating or permitting mixtures of air or oxygen with flammable gases prior to consumption, except at the burner or in a standard torch, shall be allowed unless approved for the purpose.

(2) Maximum pressure. Under no condition shall acetylene be generated, piped (except in approved cylinder manifolds) or utilized at a pressure in excess of 15 psig (103 kPa gauge pressure) or 30 psia (206 kPa absolute). (The 30 psia (206 kPa absolute) limit is intended to prevent unsafe use of acetylene in pressurized chambers such as caissons, underground excavations or tunnel construction.) This requirement is not intended to apply to storage of acetylene dissolved in a suitable solvent in cylinders manufactured and maintained according to U.S. Department of Transportation requirements, or to acetylene for chemical use. The use of liquid acetylene shall be prohibited.

(3) Apparatus. Only approved apparatus such as torches, regulators or pressure reducing valves, acetylene generators, and manifolds shall be used.

(4) Personnel. Workers in charge of the oxygen or fuel-gas supply equipment, including generators, and oxygen or fuel-gas distribution piping systems shall be instructed and judged competent by their employers for this important work before being left in charge. Rules and instructions covering the operation and maintenance of oxygen or fuel-gas supply equipment including generators, and oxygen or fuel-gas distribution piping systems shall be readily available.

(b) Cylinders and containers.

(1) Approval and marking.

(i) All portable cylinders used for the storage and shipment of compressed gases shall be constructed and maintained in accordance with the regulations of the U.S. Department of Transportation, 49 CFR parts 171-179.

(ii) Compressed gas cylinders shall be legibly marked, for the purpose of identifying the gas content, with either the chemical or the trade name of the gas. Such marking shall be by means of stenciling, stamping, or labeling, and shall not be readily removable. Whenever practical, the marking shall be located on the shoulder of the cylinder. This method conforms to the American

National Standard Method for Marking Portable Compressed Gas Containers to Identify the Material Contained, ANSI Z48.1-1954, which is incorporated by reference as specified in §1910.6.

(iii) Compressed gas cylinders shall be equipped with connections complying with the American National Standard Compressed Gas Cylinder Valve Outlet and Inlet Connections, ANSI B57.1-1965, which is incorporated by reference as specified in §1910.6.

(iv) All cylinders with a water weight capacity of over 30 pounds (13.6 kg) shall be equipped with means of connecting a valve protection cap or with a collar or recess to protect the valve.

(2) Storage of cylinders, General.

(i) **Cylinders shall be kept away from radiators and other sources of heat.**

(ii) Inside of buildings, cylinders shall be stored in a well-protected, well ventilated, dry location, at least 20 feet (6.1 m) from highly combustible materials such as oil or excelsior. Cylinders should be stored in definitely assigned places away from elevators, stairs, or gangways. Assigned storage spaces shall be located where cylinders will not be knocked over or damaged by passing or falling objects, or subject to tampering by unauthorized persons. Cylinders shall not be kept in unventilated enclosures such as lockers and cupboards.

(iii) Empty cylinders shall have their valves closed.

(iv) Valve protection caps, where cylinder is designed to accept a cap, shall always be in place, hand-tight, except when cylinders are in use or connected for use.

(3) Fuel-gas cylinder storage. Inside a building, cylinders, except those in actual use or attached ready for use, shall be limited to a total gas capacity of 2,000 cubic feet (56 m³) or 300 pounds (135.9 kg) of liquefied petroleum gas.

(i) For storage in excess of 2,000 cubic feet (56 m³) total gas capacity of cylinders or 300 (135.9 kg) pounds of liquefied petroleum gas, a separate room or compartment conforming to the requirements specified in paragraphs (f)(6)(i)(H) and (f)(6)(i)(I) of this section shall be provided, or cylinders shall be kept outside or in a special building. Special buildings, rooms or compartments shall have no open flame for heating or lighting and shall be well ventilated. They may also be used for storage of calcium carbide in quantities not to exceed 600 (271.8 kg) pounds – when contained in metal containers complying with paragraphs (g)(1)(i) and (g)(1)(ii) of this section.

(ii) Acetylene cylinders shall be stored valve end up.

(4) Oxygen storage.

(i) Oxygen cylinders shall not be stored near highly combustible material, especially oil and grease; or near reserve stocks of carbide and acetylene or other fuel-gas cylinders, or near any other substance likely to cause or accelerate fire; or in an acetylene generator compartment.

(ii) Oxygen cylinders stored in outside generator houses shall be separated from the generator or carbide storage rooms by a noncombustible partition having a fire-resistance rating of at least 1 hour. This partition shall be without openings and shall be gastight.

(iii) Oxygen cylinders in storage shall be separated from fuel-gas cylinders or combustible materials (especially oil or grease), a minimum distance of 20 feet (6.1 m) or by a noncombustible barrier at least 5 feet (1.5 m) high having a fire resistance rating of at least one-half hour.

(iv) Where a liquid oxygen system is to be used to supply gaseous oxygen for welding or cutting and the system has a storage capacity of more than 13,000 cubic feet (364 m³) of oxygen (measured at 14.7 psia (101 kPa) and 70° F (21.1° C)), connected in service or ready for service, or more than 25,000 cubic feet (700 m³) of oxygen measured at 14.7 psia (101 kPa) and 70° F (21.1° C)), including unconnected reserves on hand at the site, it shall comply with the provisions of the Standard for Bulk Oxygen Systems at Consumer Sites, NFPA No. 566-1965, which is incorporated by reference as specified in §1910.6.

§1910.254 — Arc Welding and Cutting

(a) General.

- (1) Equipment selection.** Welding equipment shall be chosen for safe application to the work to be done as specified in paragraph (b) of this section.
- (2) Installation.** Welding equipment shall be installed safely as specified by paragraph (c) of this section.
- (3) Instruction.** **Workers designated to operate arc welding equipment shall have been properly instructed and qualified to operate such equipment as specified in paragraph (d) of this section.**

(b) Application of arc welding equipment.

(1) General. Assurance of consideration of safety in design is obtainable by choosing apparatus complying with the Requirements for Electric Arc-Welding Apparatus, NEMA EW-1-1962, National Electrical Manufacturers Association or the Safety Standard for Transformer-Type Arc-Welding Machines, ANSI C33.2-1956, Underwriters' Laboratories, incorporated by reference as specified in §1910.6.

(2) Environmental conditions.

(i) Standard machines for arc welding service shall be designed and constructed to carry their rated load with rated temperature rises where the temperature of the cooling air does not exceed 40° C (104° F) and where the altitude does not exceed 3,300 feet (1,005.8 m), and shall be suitable for operation in atmospheres containing gases, dust, and light rays produced by the welding arc.

(ii) Unusual service conditions may exist, and in such circumstances machines shall be especially designed to safely meet the requirements of the service. Chief among these conditions are exposure to:

(A) Unusually corrosive fumes.	(E) Abnormal vibration or shock.
(B) Steam or excessive humidity.	(F) Excessive dust.
(C) Excessive oil vapor.	(G) Weather.
(D) Flammable gases.	(H) Unusual seacoast or shipboard conditions.

(3) Voltage. The following limits shall not be exceeded:

(i) Alternating-current machines.

- (A)** Manual arc welding and cutting – 80 volts.
- (B)** Automatic (machine or mechanized) arc welding and cutting – 100 volts.

(ii) Direct-current machines.

- (A)** Manual arc welding and cutting – 100 volts.
- (B)** Automatic (machine or mechanized) arc welding and cutting – 100 volts.

(iii) When special welding and cutting processes require values of open circuit voltages higher than the above, means shall be provided to prevent the operator from making accidental contact with the high voltage by adequate insulation or other means.

(iv) For a. c. welding under wet conditions or warm surroundings where perspiration is a factor, the use of reliable automatic controls for reducing no load voltage is recommended to reduce the shock hazard.

(4) Design.

(i) A controller integrally mounted in an electric motor driven welder shall have capacity for carrying rated motor current, shall be capable of making and interrupting stalled rotor current of the motor, and may serve as the running overcurrent device if provided with the number of overcurrent units as specified by Subpart S of this part.

(ii) On all types of arc welding machines, control apparatus shall be enclosed except for the operating wheels, levers, or handles.

(iii) Input power terminals, tap change devices and live metal parts connected to input circuits shall be completely enclosed and accessible only by means of tools.

(iv) Terminals for welding leads should be protected from accidental electrical contact by personnel or by metal objects, i.e., vehicles, crane hooks, etc. Protection may be obtained by use of: Dead-front receptacles for plug connections; recessed openings with non-removable hinged covers; heavy insulating sleeving or taping or other equivalent electrical and mechanical protection. If a welding lead terminal which is intended to be used exclusively for connection to the work is connected to the grounded enclosure, it must be done by a conductor at least two AWG sizes smaller than the grounding conductor and the terminal shall be marked to indicate that it is grounded.

(v) No connections for portable control devices such as push buttons to be carried by the operator shall be connected to an a.c. circuit of higher than 120 volts. Exposed metal parts of portable control devices operating on circuits above 50 volts shall be grounded by a grounding conductor in the control cable.

(vi) Auto transformers or a.c. reactors shall not be used to draw welding current directly from any a.c. power source having a voltage exceeding 80 volts.

(c) Installation of arc welding equipment.

(1) General. Installation including power supply shall be in accordance with the requirements of Subpart S of this part.

(2) Grounding.

(i) The frame or case of the welding machine (except engine-driven machines) shall be grounded under the conditions and according to the methods prescribed in Subpart S of this part.

(ii) Conduits containing electrical conductors shall not be used for completing a work-lead circuit. Pipelines shall not be used as a permanent part of a worklead circuit, but may be used during construction, extension or repair providing current is not carried through threaded joints, flanged bolted joints, or caulked joints and that special precautions are used to avoid sparking at connection of the work-lead cable.

(iii) Chains, wire ropes, cranes, hoists, and elevators shall not be used to carry welding current.

(iv) Where a structure, conveyor or fixture is regularly employed as a welding current return circuit, joints shall be bonded or provided with adequate current collecting devices.

(v) All ground connections shall be checked to determine that they are mechanically strong and electrically adequate for the required current.

(3) Supply connections and conductors.

(i) A disconnecting switch or controller shall be provided at or near each welding machine which is not equipped with such a switch or controller mounted as an integral part of the machine. The switch shall be in accordance with Subpart S of this part. Overcurrent protection shall be provided as specified in Subpart S of this part. A disconnect switch with overload protection or equivalent disconnect and protection means, permitted by Subpart S of this part, shall be provided for each outlet intended for connection to a portable welding machine.

(ii) For individual welding machines, the rated current-carrying capacity of the supply conductors shall be not less than the rated primary current of the welding machines.

(iii) For groups of welding machines, the rated current-carrying capacity of conductors may be less than the sum of the rated primary currents of the welding machines supplied. The conductor rating shall be determined in each case according to the machine loading based on the use to be made of each welding machine and the allowance permissible in the event that all the welding machines supplied by the conductors will not be in use at the same time.

(iv) In operations involving several welders on one structure, d.c. welding process requirements may require the use of both polarities; or supply circuit limitations for a.c. welding may require distribution of machines among the phases of the supply circuit. In such cases no load voltages between electrode holders will be 2 times normal in d.c. or 1, 1.41, 1.73, or 2 times normal on a.c. machines. Similar voltage differences will exist if both a.c. and d.c. welding are done on the same structure.

(A) All d.c. machines shall be connected with the same polarity.

(B) All a.c. machines shall be connected to the same phase of the supply circuit and with the same instantaneous polarity.

(d) Operation and maintenance.

(1) General. Workers assigned to operate or maintain arc welding equipment shall be acquainted with the requirements of this section and with §1910.252(a), (b) and (c) of this part; if doing gas-shielded arc welding, also Recommended Safe Practices for Gas-Shielded Arc Welding, A6.1-1966, American Welding Society, which is incorporated by reference as specified in §1910.6.

(2) Machine hook up. Before starting operations all connections to the machine shall be checked to make certain they are properly made. The work lead shall be firmly attached to the work; magnetic work clamps shall be freed from adherent metal particles of spatter on contact surfaces. Coiled welding cable shall be spread out before use to avoid serious overheating and damage to insulation.

(3) Grounding. Grounding of the welding machine frame shall be checked. Special attention shall be given to safety ground connections of portable machines.

(4) Leaks. There shall be no leaks of cooling water, shielding gas or engine fuel.

(5) Switches. It shall be determined that proper switching equipment for shutting down the machines is required.

(6) Manufacturers' instructions. Printed rules and instructions covering operation of equipment supplied by the manufacturers shall be strictly followed.

(7) Electrode holders. Electrode holders when not in use shall be so placed that they cannot make electrical contact with persons, conducting objects, fuel or compressed gas tanks.

(8) Electric shock. Cables with splices within 10 feet (3 m) of the holder shall not be used. The welder should not coil or loop welding electrode cable around parts of his body.

(9) Maintenance.

- (i) The operator should report any equipment defect or safety hazard to his supervisor and the use of the equipment shall be discontinued until its safety has been assured. Repairs shall be made only by qualified personnel.**
- (ii) Machines which have become wet shall be thoroughly dried and tested before being used.**
- (iii) Cables with damaged insulation or exposed bare conductors shall be replaced. Joining lengths of work and electrode cables shall be done by the use of connecting means specifically intended for the purpose. The connecting means shall have insulation adequate for the service conditions.**

"HOT WORK" SAFETY CHECKLIST/PERMIT

Hazard Assessment must be completed and resolved before commencing welding, cutting, or heating operations. The Authorized Supervisor must sign off on this permit.

Hot Work Location: _____

Y	N	
☐	☐	Is appropriate fire-extinguishing equipment ready for use?
☐	☐	Is all flammable material moved away from workzone or properly shielded?
☐	☐	Are drums, barrels, tanks, or other containers cleansed of flammable, explosive, or toxic residue that could react to heat?
☐	☐	Are containers tested prior to and frequently during welding, torching, abrasive cutting, or other hot works to ensure that the containers are free of flammable or toxic vapors?
☐	☐	Are shaded goggles or other suitable eye protection used when gas welding or oxygen cutting?
☐	☐	Are transparent face shields or goggles used when resistance welding or resistance brazing?
☐	☐	Do all welding helpers and equipment attendants use face or eye protection?
☐	☐	Are helmets and hand shields worn to protect the face, neck, and ears when arc welding?
☐	☐	Do lenses have permanent markings to show the source and shade?
☐	☐	Do all employees wear PPE when exposed to the hazards created by welding, cutting, or brazing?
☐	☐	Is clothing that is easily ignited or highly flammable, such as that made from synthetic materials, prohibited while welding, cutting, or brazing?
☐	☐	Are all electrodes removed from the holders and the machine turned off when arc welding is stopped for lunch or overnight?
☐	☐	Are the torch valves closed when gas welding or cutting is stopped for lunch or overnight?
☐	☐	Are only approved apparatus such as torches, regulators, or pressure-reducing valves used?
☐	☐	Are all compressed-gas cylinders legibly marked to identify the gas content?
☐	☐	Are all compressed-gas cylinders stored away from radiators and other sources of heat?
☐	☐	Do all compressed-gas cylinders have valve protection caps in place, hand-tight when not in use?
☐	☐	Are all compressed-gas cylinders securely lashed in place to prevent them from falling?
☐	☐	Are oxygen and fuel-gas cylinders stored separately by at least 20 feet or by a noncombustible barrier at least five feet high with a fire-resistance rating of at least one-half hour?
☐	☐	Are there signs in fuel-gas storage areas that read "DANGER – NO SMOKING, MATCHES OR OPEN LIGHTS" or equivalent wording?
☐	☐	Are regulators with cracked, broken, or defective parts removed from service?
☐	☐	Are approved back-flow valves or flash-back valves installed between the blowpipe or torch and the hoses?
☐	☐	Are arc welder lead cables or electrode lead cables with damaged insulation or exposed conductors removed from service?

Assessor Name

Signature

Date

Supervisor Name

Signature

Date

"HOT WORK" Permit Observations:

Notes:

Lined area for notes, consisting of 20 horizontal lines.

Chapter 35

Cain's Pipeline & Industrial Services, LLC.

OSHA Inspections, Log 300, & Posting Requirements

This information is provided so that ALL employees of ***Cain's Pipeline & Industrial Services, LLC.*** will know and understand their rights, responsibilities, and roles in maintaining safe and healthful working conditions.

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Introduction — Who is OSHA?

More than three decades ago, the Occupational Safety and Health Act of 1970 created the Occupational Safety and Health Administration to help employers and employees reduce injuries, illnesses, and deaths on the job in America. Since then, workplace fatalities have been cut by 62 percent and occupational injury and illness rates have declined 40 percent. At the same time, U.S. employment has doubled and now includes nearly 115 million workers at 7 million sites. OSHA provides national leadership in occupational safety and health. The agency seeks to find and share the most effective ways to get results—to save lives and prevent injuries and illnesses. The message is simple—Safety and health add value: To your business. To your workplace. To your life.

For business, protecting workers' safety and health is the right thing to do. It saves money and adds value to the organization. When workers stay whole and healthy, businesses experience lower Workers' Compensation insurance costs, reduced medical expenditures, decreased payout for return-to-work programs, fewer faulty products, and lower costs for job accommodations for injured workers. There are also indirect benefits such as increased productivity, lower costs for training replacement workers, and decreased costs for overtime.

Every workplace is a community. Safety and health add value to workplaces by increasing morale, improving productivity, and reducing turnover. The best companies

build a reputation that is synonymous not only with an excellent product, but also an outstanding work environment where safety and health is a core value.

Every employee benefits when safety and health is a priority at the workplace. Every worker wants to make a contribution through his or her job, yet the primary purpose of work is to make a living. Safety and health add value to the lives of workers by enabling them to maintain their incomes and provide for their families. Getting hurt or sick is not just physically painful. On-the-job injuries and illnesses can significantly reduce income, increase stress, and hinder a full family life.

Establishing a safe and healthful working environment requires every employer and every worker to make safety and health a top priority. The entire workforce – from the CEO to recent hires – must recognize the value of safety and health and acknowledge that this is central to the mission and key to the corporate vision and identity.

OSHA provides leadership and encouragement to employers and workers to help them recognize and realize the value of safety and health on the job. The agency's ultimate goal will always be to reduce injuries, illnesses, and deaths to zero.

OSHA's Establishment – Purpose & History

OSHA stands for the Occupational Safety and Health Administration, an agency of the U.S. Department of Labor. The U.S. Congress, led by U.S. Senator Harrison A. Williams Jr. and U.S. Representative William A. Steiger, passed the Occupational Safety and Health Act of 1970 (the OSH Act) "...to assure so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources."

The legislation, signed into law by President Richard M. Nixon on Dec. 29, 1970, established OSHA and its sole responsibility to provide worker safety and health protection.

Who OSHA Affects

Nearly everyone in America works or has someone in the immediate family who does. Whether you are an employer, employee, or have a family member who works, you need to know about OSHA. The more you know about OSHA, the better you can protect yourself, your coworkers, or your employees and contribute to safe and healthful working conditions for all Americans.

Why OSHA is Necessary

Until 1970, no uniform or comprehensive provisions existed to protect against workplace safety and health hazards. At that time:

- Job-related accidents accounted for more than 14,000 worker deaths,
- Nearly 2.5 million workers were disabled by workplace accidents and injuries,
- Ten times as many workdays were lost from job-related disabilities as from labor strikes
- The estimated new cases of occupational diseases totaled 300,000.

In terms of lost productivity and wages, medical expenses, and disability compensation, the burden on the nation's commerce was staggering. The human cost was beyond calculation. Today, OSHA helps to safeguard the right to a safe and healthful work environment for nearly 115 million workers—America's most valuable national resource.

OSHA's Impact

Since OSHA's creation in 1970, the nation has made substantial progress in occupational safety and health. OSHA and its many partners in the public and private sectors have:

- Cut the work-related fatality rate by 62 percent.
- Reduced overall injury and illness rates by 42 percent.
- Virtually eliminated brown lung disease in the textile industry.
- Reduced trenching and excavation fatalities by 35 percent.

OSHA's Role

Despite these important successes, significant hazards and unsafe conditions still exist in U.S. workplaces. Each year:

- Almost 6,000 Americans die from workplace injuries.
- Perhaps as many as 50,000 workers die from illnesses in which workplace exposures were a contributing factor.
- Nearly 6 million people suffer non-fatal workplace injuries.
- The cost of occupational injuries and illnesses totals more than \$170 billion.

What OSHA Does

OSHA uses three basic strategies, authorized by the *Occupational Safety and Health Act*, to help employers and employees reduce injuries, illnesses, and deaths on the job:

- Strong, fair, and effective enforcement.
- Outreach, education, and compliance assistance.
- Partnerships and other cooperative programs.

Based on these strategies, OSHA conducts a wide range of programs and activities to promote workplace safety and health. The agency:

- Encourages employers and employees to reduce workplace hazards and to implement new safety and health management systems or improve existing programs.
- Develops mandatory job safety and health standards and enforces them through worksite inspections, employer assistance, and, sometimes, by imposing citations, penalties, or both.
- Promotes safe and healthful work environments through cooperative programs, partnerships, and alliances.
- Establishes responsibilities and rights for employers and employees to achieve better safety and health conditions.
- Supports the development of innovative ways of dealing with workplace hazards.
- Maintains a reporting and recordkeeping system to monitor job-related injuries and illnesses.
- Establishes training programs to increase the competence of occupational safety and health personnel.
- Provides technical and compliance assistance and training and education to help employers reduce worker accidents and injuries.
- Works in partnership with states that operate their own occupational safety and health programs.
- Supports the Consultation Service.

The "OSH Act" — OSHA Coverage

Who the OSH Act Covers

The *OSH Act* covers all private-sector employers and their employees in the 50 states and all territories and jurisdictions under federal authority. Those jurisdictions include the District of Columbia, Puerto Rico, the Virgin Islands, American Samoa, Johnston Island, and the Outer Continental Shelf Lands as defined in the *Outer Continental Shelf Lands Act*.

OSHA coverage includes:

- Employers and employees in varied fields that include but are not limited to manufacturing, construction, long-shoring, shipbuilding, ship breaking, ship repair, agriculture, law, medicine, charity and disaster relief, organized labor, and private education.
- Religious groups to the extent that they employ workers for secular purposes. The *OSH Act* covers employers and employees either directly through federal OSHA or through an OSHA-approved state program.

Who is Not Covered

The *OSH Act* does not cover:

- The self-employed.
- Immediate members of farming families on farms that do not employ outside workers.
- Employees whose working conditions are regulated by other federal agencies under other federal statutes. These include mine workers, certain truckers and transportation workers, and atomic energy workers.
- Public employees in state and local governments; some states have their own occupational safety and health plans that cover these workers.

Rights and Responsibilities under the "OSH Act"

Employer Responsibilities

If you are an employer, you **must**:

- Meet your general duty/responsibility to provide a workplace free from recognized hazards.
- Keep workers informed about OSHA and safety and health matters with which they are involved.
- Comply, in a responsible manner, with standards, rules, and regulations issued under the *OSH Act*.
- Be familiar with mandatory OSHA standards.
- Make copies of standards available to employees for review upon request.
- Evaluate workplace conditions.
- Minimize or eliminate potential hazards.
- Provide employees safe, properly maintained tools and equipment, including appropriate personal protective equipment, and ensure that they use it.
- Warn employees of potential hazards.
- Establish or update operating procedures and communicate them to employees.
- Provide medical examinations when required.
- Provide training required by OSHA standards.

- Report within eight hours any accident that results in a fatality or the hospitalization of three or more employees.
- Keep OSHA-required records of work-related injuries and illnesses.
- Post a copy of OSHA 300A, Summary of Work-Related Injuries and Illnesses, for the previous year from February 1 to April 30.
- Post, at a prominent location within the workplace, the OSHA "It's The Law" poster (OSHA 3165) informing employees of their rights and responsibilities.
- Provide employees, former employees, and their representatives' access to the Log of Work-Related Occupational Injuries and Illnesses (OSHA 300) at a reasonable time and in a reasonable manner.
- Provide access to employee medical records and exposure records to the employee and others as required by law.
- Cooperate with OSHA compliance officers.
- Not discriminate against employees who properly exercise their rights under the *OSH Act*.
- Post OSHA citations and abatement verification notices at or near the worksite involved.
- Abate cited violations within the prescribed period.

Employer Rights

If you are an employer, you have the right to:

- Seek free advice and on-site consultation from OSHA.
- Be involved in job safety and health through your industry association.
- Request and receive proper identification of OSHA compliance officers.
- Be advised by the compliance officer of the reason for an inspection.
- Have an opening and closing conference with the compliance officer.
- Accompany the compliance officer on the inspection.
- File a notice of contest to dispute inspection results.
- Request an informal settlement agreement process after an inspection.
- Apply for a variance from a standard's requirements when technical expertise and materials are unavailable and other means have been provided to protect employees.
- Take an active role in developing safety and health programs.
- Be assured of the confidentiality of any trade secrets.
- Submit a written request to the National Institute for Occupational Safety and Health (NIOSH) for information on whether any substance in your workplace has potentially toxic effects in the concentrations being used.
- Submit information or comments to OSHA on the issuance, modification, or revocation of OSHA standards and request a public hearing.

Employee Responsibilities

Employees are expected to comply with all applicable standards, rules, regulations, and orders issued under the *OSH Act*.

If you are an employee, you **should**:

- Read the OSHA "It's The Law" poster (OSHA 3165) at the jobsite.
- Comply with all applicable OSHA standards.
- Follow all employer safety and health rules and regulations, and wear or use prescribed protective equipment while engaged in work.
- Report hazardous conditions to the supervisor.
- Report any job-related injury or illness to *Cain's Pipeline & Industrial Services, LLC.*, and promptly seek medical treatment.
- Cooperate with the OSHA compliance officer conducting an inspection.
- Exercise your rights under the *OSH Act* in a responsible manner.

Employee Rights

If you are an employee, you have the right to:

- Review copies of appropriate OSHA standards, rules, regulations, and requirements that *Cain's Pipeline & Industrial Services, LLC.* should have available at the workplace.
- Request information from your employer on safety and health hazards, precautions, and emergency procedures.
- Receive adequate training and information.
- Request that OSHA investigate if you believe hazardous conditions or violations of standards exist in your workplace.
- Have your name withheld from your employer if you file a complaint.
- Be advised of OSHA actions regarding your complaint and have an informal review of any decision not to inspect or to issue a citation.
- Have your authorized employee representative accompany the OSHA compliance officer during an inspection.
- Respond to questions from the OSHA compliance officer.
- Observe any monitoring or measuring of hazardous materials and see any related monitoring or medical records.
- Review the Log and Summary of Work-Related Injuries and Illnesses (OSHA 300 and 300A) at a reasonable time and in a reasonable manner.
- Request a closing discussion following an inspection.
- Submit a written request to the National Institute for Occupational Safety and Health for information on whether any substance in your workplace has potentially toxic effects in the concentrations being used and have your name withheld from your employer.
- Object to the abatement period set in a citation issued to your employer.
- Participate in hearings conducted by the Occupational Safety and Health Review Commission.
- Be notified by your employer if he or she applies for a variance, and testify at a variance hearing and appeal the final decision.
- Submit information or comments to OSHA on the issuance, modification, or revocation of OSHA standards and request a public hearing.

If Employees feel their Workplace is Unsafe or Unhealthful... To File a Complaint...

If employees feel their workplace has unsafe or unhealthful working conditions, often the best and fastest way to get it corrected is to notify a supervisor or employer. Employees also may file a complaint by phone, mail, e-mail, or fax with the nearest OSHA office and request an inspection. Employees may request that OSHA not reveal their name. To file a complaint, call (800) 321-OSHA (6742) or contact the nearest OSHA regional, area, state plan, or consultation office listed at www.osha.gov. The teletypewriter (TTY) number is (877) 889-5627. Employees can also file a complaint online. Most online complaints are addressed by OSHA's phone/fax system. That means they may be resolved informally over the phone with the employer. Written, signed complaints submitted to OSHA area or state-plan offices are more likely to result in on-site OSHA inspections. Complaints from workers in OSHA-approved state-plan states will be forwarded to the appropriate state plan for response. If employees are concerned about confidentiality, they may prefer to file a complaint from their home computer or a computer in the local library. Download the OSHA complaint form, complete it and then fax or mail it to the local OSHA office or they may simply contact the local OSHA office to receive a copy of the complaint form. Be sure to include name, address, and telephone number so that OSHA is able to get in touch.

To Refuse Unsafe Work...

Refusing to do a job because of potentially unsafe workplace conditions is not ordinarily an employee right under the law and may result in disciplinary action by an employer. However, if employees have reasonable grounds to believe that they are exposed to an imminent danger on the job, they do have the right to refuse to do a job. Employees should remain at the jobsite until the problem can be resolved because OSHA will not be able to protect them if they walk off the job.

Legal Protections

Additional Employee Protections

A number of different laws provide employees legal protections for getting involved in safety and health matters. The *OSH Act*, for example, provides employees the right to seek safe and healthful conditions on the job without fear of punishment. Under Section 11(c) of the act, employees may exercise such rights as:

- Voicing concerns to an employer, union, OSHA, any other government agency, or others about job safety or health hazards.
- Filing safety or health grievances
- Participating in a workplace safety and health committee or in union activities concerning job safety and health.
- Participating in OSHA inspections, conferences, or hearings.
- Refusing to work when a dangerous situation threatens death or serious injury where there is insufficient time to contact OSHA and where the employee has sought from his or her employer and been unable to obtain a correction of the dangerous conditions.

Protections against Employer Retaliation

An employer may not retaliate if an employee exercises these or any other rights under the *OSH Act*. This means that an employer make not take these actions against any worker who expresses concern or files a complaint about safety and health conditions or participates in job safety-related activities:

- Termination of employment
- Demotion
- Threaten or harass the worker
- Transfer to an undesirable job or shift
- Take away seniority or other earned benefits

Whistleblower Protections

Since passage of the *OSH Act* in 1970, Congress has expanded OSHA's whistleblower protection authority to protect workers from discrimination under 14 federal statutes.

These statutes, and the number of days employees have to file a complaint, are:

- ***Occupational Safety and Health Act of 1970 (30 days)***

Provides discrimination protection for employees who exercise rights guaranteed under the act, such as filing a safety and health complaint with OSHA and participating in an inspection.

- ***Surface Transportation Assistance Act (180 days)***

Provides discrimination protections for truck drivers and other employees relating to the safety of commercial motor vehicles. Coverage includes all buses for hire and freight trucks with a gross vehicle weight greater than 10,001 pounds.

- ***Asbestos Hazard Emergency Response Act (90 days)***

Provides discrimination protection for individuals who report violations of environmental laws relating to asbestos in elementary and secondary school systems.

- ***International Safety Container Act (60 days)***

Provides discrimination protection for employees who report violations of the act, which regulates shipping containers.

- ***Energy Reorganization Act (180 days)***

Provides discrimination protection for employees of operators and subcontractors of nuclear power plants licensed by the Nuclear Regulatory Commission and for employees of contractors working under contract with the Department of Energy.

- ***Clean Air Act (30 days)***

Provides discrimination protection for employees who report violations of the act, which provides for the development and enforcement of standards regarding air quality and air pollution.

- ***Safe Drinking Water Act (30 days)***

Provides discrimination protection for employees who report violations of the act, which requires that all drinking water systems in public buildings and in new construction be lead free.

- ***Federal Water Pollution Control Act (30 days)***

Provides discrimination protection for employees who report hazardous pollution of waters that provide a natural habitat for living things. Also called the Clean Water Act.

- ***Toxic Substances Control Act (30 days)***

Provides discrimination protection for employees who report violations of regulations involving the manufacture, distribution, and use of certain toxic substances

- ***Solid Waste Disposal Act (30 days)***

Provides discrimination protection for employees who exercise certain rights under the act, which provides assistance for the development of facilities for the recovery of energy and other resources from discarded materials and regulates hazardous waste management. Also called the Resource Conservation and Recovery Act.

- ***Comprehensive Environmental Response, Compensation, and Liability Act (30 days)***

Provides discrimination protection for employees who exercise rights under the act, which provides liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and for the cleanup of inactive hazardous waste disposal sites.

- ***Wendell H. Ford Aviation Investment and Reform Act for the 21st Century (90 days)***

Provides discrimination protection for employees of air carriers, contractors, or subcontractors of air carriers who raise safety concerns.

- ***Corporate and Criminal Fraud Accountability Act of 2002 (90 days)***

Provides discrimination protection for employees or contractors of publicly traded companies or brokerage firms who report mail, wire, bank, or securities fraud or violations of laws related to stockholder fraud. Also called the Sarbanes-Oxley Act.

- ***Pipeline Safety Improvement Act of 2002 (180 days)***

Provides discrimination protection for employees who report violations of the federal law regarding pipeline safety and security or who refuse to violate such provisions.

Public-Sector Employees

Federal Worker Coverage

Section 19 of the *OSH Act* makes federal agency heads responsible for providing safe and healthful working conditions for their employees. OSHA conducts federal workplace inspections in response to employee reports of hazards. The *OSH Act* also requires agencies to comply with standards consistent with those for private-sector employers. Under a 1998 amendment to the act, it covers the U.S. Postal Service the same as any private-sector employer.

OSHA's Federal Sector Authority

In its federal sector authority, OSHA:

- Can not propose monetary penalties against another federal agency for failure to comply with OSHA standards.
- Does not have authority to protect federal employee "whistleblowers." The *Whistleblower Protection Act of 1989* allows present and former federal employees (except for corporations and certain intelligence agencies) to file their reports of reprisal with the Office of Special Counsel – U.S. Merit Systems Protection Board.

State and Local Government Worker Coverage

OSHA provisions cover the private sector only. However, some states have their own OSHA-approved occupational safety and health programs. These state programs must cover state and local workers and must be at least as effective as federal OSHA requirements.

Advisory Groups

OSHA has several standing or ad hoc advisory committees that advise the agency on safety and health issues. These committees include representatives of management, labor, and state agencies as well as one or more designees of the Secretary of Health and Human Services (HHS). Members also may include representatives of occupational safety and health professions and the general public.

The two standing (or statutory) advisory committees are:

- The National Advisory Committee on Occupational Safety and Health (NACOSH), which advises, consults with, and makes recommendations to the Secretaries of Labor and HHS on matters regarding administration of the *OSH Act*.
- The Advisory Committee on Construction Safety and Health (ACCSH), which advises the Secretary of Labor on construction safety and health standards and other regulations.

Other continuing advisory committees include:

- The Federal Safety and Health Advisory Committee (FACOSH), which advises the Secretary of Labor on all aspects of federal agency safety and health.
- The Maritime Advisory Committee for Occupational Safety and Health (MACOSH), which advises the Secretary of Labor on workplace safety and health programs, policies, and standards in the maritime industry.
- The National Advisory Committee on Ergonomics, which advises OSHA on initiatives to reduce ergonomic-related injuries and illnesses in the workplace. OSHA may occasionally form short-term advisory committees to advise the agency on specific issues.

State Plans — State Safety & Health Programs

State plans are OSHA-approved job safety and health programs operated by individual states instead of federal OSHA. The *OSH Act* encourages states to develop and operate their own job safety and health plans and precludes state enforcement of OSHA standards unless the state has an approved plan. OSHA approves and monitors all state plans.

Once a state plan is approved under Section 18(b) of the *OSH Act*, OSHA funds up to 50 percent of the program's operating costs. State plans must provide standards and enforcement programs as well as voluntary compliance activities that are at least as effective as the federal program.

State plans covering the private sector also must cover state and local government employees. OSHA rules also permit states to develop plans that cover only public sector (state and local government) employees. In these cases, private sector employment remains under federal OSHA jurisdiction.

Twenty-three states operate complete plans and three cover only the public sector. These states are listed on the OSHA website at www.osha.gov.

State Program Coverage

States with approved plans cover most private sector employees as well as state and local government workers in the state. Federal OSHA continues to cover federal employees and certain other employees specifically excluded by a state plan—for example, those who work in maritime industries and on military bases.

State Workplace Inspections

States with approved state plans respond to accidents and workplace complaints and conduct random unannounced inspections, just like federal OSHA. The states issue citations and proposed penalties under state law and adjudicate disputes through a state review board or other procedure.

Federal Monitoring of State Plans

Federal OSHA closely monitors state programs. Anyone finding inadequacies or other problems in the administration of a state program may file a Complaint About State Program Administration (CASPA) with the appropriate OSHA regional administrator. OSHA investigates all these complaints and, where they are found to be valid, requires appropriate corrective action.

Employer Rights and Responsibilities

State plans must guarantee the same employer and employee rights as OSHA. Employer and employee responsibilities in states with their own occupational safety and health programs are generally the same as in states under federal OSHA.

State Safety and Health Standards

State safety and health standards under approved plans must be identical to or at least as effective as federal OSHA standards and must keep pace with federal standards. State plans must adopt standards comparable to federal standards within six months after a federal standard takes effect. Most state plan standards are very similar to federal standards, but states with approved plans may have different and independent standards.

Standards and Guidance

Requirements

In general, standards require that employers:

- Maintain conditions or adopt practices reasonably necessary and appropriate to protect workers on the job.
- Be familiar with and comply with standards applicable to their establishments.
- Ensure that employees have and use personal protective equipment when required for safety and health.

Hazards Addressed

OSHA issues standards for a wide variety of workplace hazards, including:

- Toxic substances
- Harmful physical agents
- Electrical hazards
- Fall hazards
- Trenching hazards
- Hazardous waste
- Infectious diseases
- Fire and explosion hazards
- Dangerous atmospheres
- Machine hazards

In addition, where there are no specific OSHA standards, employers must comply with the *OSH Act's* "General Duty Clause". The general duty clause, Section 5(a)(1) requires that each employer "furnish ... a place of employment which is free from recognized hazards that are causing or are likely to cause death or serious physical harm to employees."

The Standards-Setting Process

Deciding to Develop a Standard

OSHA can begin standards-setting procedures on its own initiative or in response to petitions from other parties, including:

- The Secretary of Health and Human Services (HHS).
- The National Institute for Occupational Safety and Health (NIOSH).
- State and local governments.

- Nationally recognized standards producing organizations and employer or labor representatives.
- Any other interested parties.

How OSHA Develops Standards

OSHA publishes its intention to propose, amend, or revoke a standard in the *Federal Register*, either as:

- A Request for Information or an Advance Notice of Proposed Rulemaking or announcement of a meeting to solicit information to be used in drafting a proposal.
- A Notice of Proposed Rulemaking, which sets out the proposed new rule's requirements and provides a specific time for the public to respond.

Interested parties may submit written information and evidence. OSHA also may schedule a public hearing to consider various points of view. After reviewing public comments, evidence, and testimony, OSHA publishes:

- The full text of any standard amended or adopted and the date it becomes effective, along with an explanation of the standard and the reasons for implementing it.
- A determination that no standard or amendment is necessary.

Input from Other Government Agencies

Other government agencies, such as NIOSH, can recommend standards to OSHA. The *OSH Act* established the National Institute for Occupational Safety and Health under the Department of HHS as the research agency for occupational safety and health. NIOSH conducts research on various safety and health problems, provides technical assistance to OSHA, and recommends standards for OSHA's adoption. (For more information, call (800) 35-NIOSH or visit the agency's website at www.cdc.gov/niosh.)

Emergency Temporary Standards

Under certain limited conditions, OSHA can set emergency temporary standards that take effect immediately and remain in effect until superseded by a permanent standard.

To take such an action, OSHA must determine that:

- Workers are in grave danger due to exposure to substances or agents determined to be toxic or physically harmful or to new hazards.
- An emergency standard is necessary to protect them.

OSHA then publishes the emergency temporary standard in the *Federal Register*, where it also serves as a proposed permanent standard. The usual procedures for adopting a permanent standard apply, except that a final ruling should be made within six months.

Congressional Jurisdiction over OSHA Standards

OSHA submits all final rules to Congress and the General Accounting Office for review. Congress has the authority to repeal a standard by passing a joint resolution under an expedited procedure established by the *Small Business Regulatory Enforcement and Fairness Act*, or *SBREFA*, but has done so only once. For the repeal to take effect, the joint resolution must be signed by the President.

Employer Recourse

An employer who is unable to comply with new requirements or anyone who disagrees with a new standard can:

- Petition a court for judicial review.

- Request a permanent, temporary, or experimental variance from a standard or regulation.
- Apply for an interim order to continue working under existing conditions while OSHA considers a variance request.

Petitions to Modify or Withdraw Standards or Requirements

Employers or employees may petition OSHA to modify or revoke standards just as they may petition the agency to develop standards. OSHA continually reviews its standards to keep pace with developing and changing industrial technology.

Filing a Petition for Judicial Review

Anyone who may be adversely affected by a final or emergency standard may file a petition for judicial review. The objecting party must file the petition within 60 days of the rule's publication with the U.S. Court of Appeals for the circuit in which the petitioner lives or has his or her primary place of business. Filing an appeals petition will not delay enforcement of a standard, unless the Court of Appeals specifically orders it.

OSHA issues permanent standards only after careful consideration of the arguments and data received from the public in written submissions and at hearings.

Guidelines versus Standards

A guideline is a tool to assist employers in recognizing and controlling hazards. It is voluntary and not enforceable under the *OSH Act*. Failure to implement a guideline is not itself a violation of the *OSH Act's* general duty clause. Guidelines are more flexible than standards. They can be developed quickly and can be changed easily as new information becomes available with scientific advances. Guidelines make it easier for employers to adopt innovative programs to suit their workplaces, rather than inflexible, one-size-fits-all solutions to issues that may be unique to an industry or facility.

Variances

A variance grants an employer formal permission to deviate from a standard's requirements or time frame.

Employer Requests for Variances

Employers may ask OSHA for a variance from:

- A newly promulgated standard or regulation if they cannot fully comply by the effective date due to shortage of materials, equipment, or professional or technical personnel.
- Requirements of a standard or regulation if they can demonstrate that their alternative or alternatives provide employees with protection as effective as that provided by the standard or regulation.

Types of Variances

An employer applies for a ***temporary variance*** if he or she cannot comply with a standard or regulation by its effective date because professional or technical personnel, material, or equipment are not available, or because the necessary construction or alteration of facilities cannot be completed in time. While operating under a temporary variance, an employer generally must meet specific conditions specified by OSHA.

An employer who can prove that working conditions, practices, means, methods, operations, or processes at his or her worksite are as safe and healthful as they would be if the employer complied with the standard may apply for a ***permanent variance***. Pending OSHA approval to grant a permanent variance, an employer must comply with the OSHA standard.

An employer may apply for an **experimental variance** if he or she is participating in an effort to demonstrate or validate new job safety and health techniques, and either the Secretary of Labor or the Secretary of HHS has approved that experiment.

Impact of Variance Applications on Citations

Variances are not retroactive. An employer who has been cited for violating a standard may not seek relief from that citation by applying for a variance. The fact that a citation is outstanding does not prevent an employer from filing a variance application.

However, if the citation is being contested by *Cain's Pipeline & Industrial Services, LLC.*, the OSHA Administrator has the option to decline to accept the variance application for the provision(s) under contest.

For more Information about Variances

For further information and help in applying for a variance, contact the nearest OSHA office listed on the agency website at www.osha.gov or by calling (800) 321-OSHA.

OSHA's Reporting & Recordkeeping Requirements

All employers must report to OSHA within eight hours of learning about:

- The death of any employee from a work-related incident, and
- The in-patient hospitalization of three or more employees as a result of a work-related incident.

In addition, employers must report all fatal heart attacks. Deaths from motor vehicle accidents on public streets (except those in a construction work zone) and in accidents on commercial airplanes, trains, subways or buses do not need to be reported. These reports may be made by telephone or in person to the nearest OSHA area office listed at www.osha.gov or by calling OSHA's toll-free number, (800) 321-OSHA (6742).

Employers may be subject to other requirements in other OSHA standards as well.

Recordkeeping Benefits

OSHA's recordkeeping requirements, as set out in the *OSH Act*, established an effective, centralized, nationwide system for monitoring occupational safety and health problems—a vital requirement for gauging problems and solving them. Keeping records allows OSHA to compile survey material, helps identify high-hazard industries, and informs employees about their employers' workplace safety record. These records also help employers identify potential sources of injuries and illnesses at their worksites.

Employer Requirements

OSHA's reporting and recordkeeping regulations require employers to:

- Maintain records in each establishment of occupational injuries and illnesses as they occur and make those records accessible to employees.
- Keep injury and illness records and post from February 1 through April 30 an annual summary of occupational injuries and illnesses for each establishment. A company executive must certify the accuracy of the summary.
- Record any fatality regardless of length of time between the injury and death.
- Provide, upon request, pertinent injury and illness records for inspection and copying by any representative of the Secretaries of Labor or HHS, or the state during any investigation, research, or statistical compilation.
- Comply with any additional recordkeeping and reporting requirements in specific OSHA standards.

Exempt Employers

Employers with 10 or fewer employees are exempt from maintaining the OSHA log of injuries and illnesses unless the Bureau of Labor Statistics (BLS) or OSHA notifies them that they have been selected to participate in a mandatory data collection.

OSHA also exempts employers in certain low-hazard industries such as real estate agencies and clothing stores, as defined in the recordkeeping standard. Exempt employers must still comply with requirements to display an OSHA "It's The Law" poster (OSHA 3165) and report to OSHA within eight hours any accident that results in one or more fatalities or the hospitalization of three or more employees. A few exempt employers will have to maintain records if OSHA or BLS selects them to participate in a mandatory data collection. The agency will notify those employers in advance and supply them the necessary forms and instructions.

Exceptions to the Recording Requirements

To be considered work-related, there must be a significant degree of aggravation to a preexisting injury or illness. In addition, cases arising from eating food and drinking beverages, blood donations, and exercise programs do not need to be recorded. Common cold and flu cases also do not need to be recorded. There are specific criteria for determining when mental illnesses are considered work-related and when cases should be recorded if employees are traveling or working at home.

Maintaining Recordkeeping Forms

Employers must log injuries and illnesses on recordkeeping forms, keep the logs current and retain them for five years at each establishment. Logs must be available for inspection by representatives of OSHA, HHS, BLS, or the designated state agency within four hours of the request. Employers are required to update logs to reflect any changes that occur.

DO NOT send any recordkeeping forms to OSHA or any other agency. *Cain's Pipeline & Industrial Services, LLC.* maintains forms and posts the annual summary in the workplace. If OSHA inspects the workplace, *Cain's Pipeline & Industrial Services, LLC.* will be required to produce the forms.

Summary for Reporting and Recordkeeping Requirements

OSHA recordkeeping regulations require most employers to maintain records of workplace injuries, illness, and deaths. Employers must:

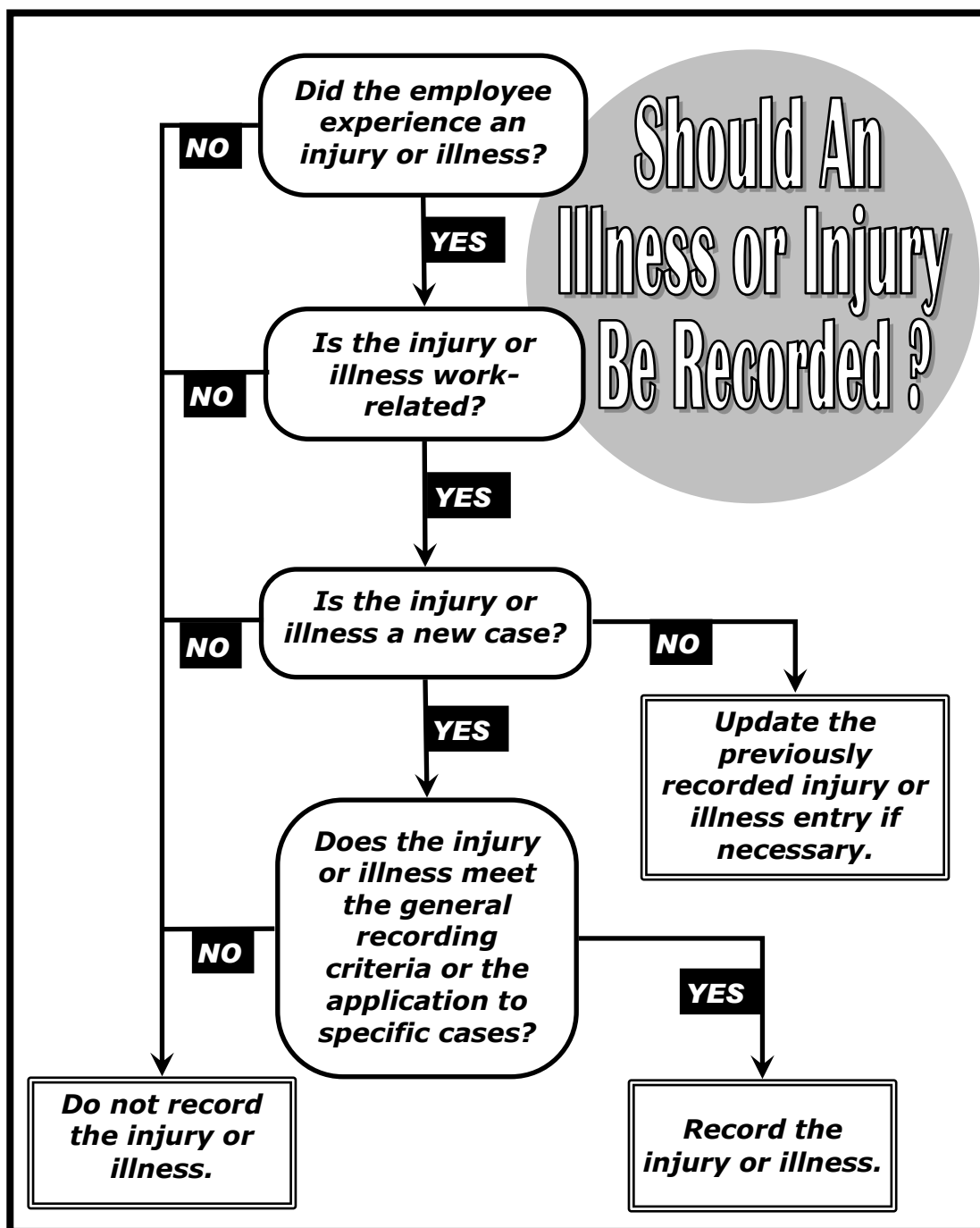
- ★ *Maintain injury and illness records.*
- ★ *Report all fatalities.*
- ★ *Report each accident that hospitalizes three or more employees.*
- ★ *Make records accessible to employees.*
- ★ *Allow OSHA access to records.*
- ★ *Post an annual summary of injuries and illnesses.*

Determining if an Injury or Illness is Work-Related

An employer must consider an injury or illness to be work-related if an event or exposure in the work environment either caused or contributed to the resulting condition or significantly aggravated a preexisting injury or illness. Most injuries and illnesses resulting from events or exposures in the work environment are presumed to be work-related.

What Cases to Record

To determine which work-related injuries and illnesses must be recorded, consult the following chart.



Employers with Multiple Worksites

Employers must keep injury and illness records for each establishment. OSHA defines an establishment as a "single physical location where business is conducted or where services are performed." An employer whose employees work in dispersed locations must keep records at the place where the employees report for work. In some situations, employees do not report to work at the same place each day. In that case, records must be kept at the place from which they are paid or at the base from which they operate.

Recordkeeping Forms

Three forms are needed for recordkeeping:

- **OSHA 300 — Log of Work-Related Injuries and Illnesses.**

Employers must log each recordable occupational injury and illness on this form within six working days from the time *Cain's Pipeline & Industrial Services, LLC.* learns of it. A complete copy current to within 45 calendar days must be present at all times in the establishment if *Cain's Pipeline & Industrial Services, LLC.* prepares the log at a central location using automatic data processing equipment. A substitute for the OSHA 300 is acceptable if it is as detailed, readable, and understandable as the OSHA 300.

- **OSHA 301 — Injury and Illness Incident Report.**

Each employer must complete the OSHA 301 form within seven calendar days from the time *Cain's Pipeline & Industrial Services, LLC.* learns of the work-related injury or illness. This form includes more data about how the injury or illness occurred. Employees and former employees are guaranteed access to their individual OSHA 301 forms. Employee representatives will be provided access to the "information about the case" section of the OSHA 301 form in establishments where they represent employees.

- **OSHA Form 300A — Summary of Work-Related Injuries and Illnesses.**

This form was created to make it easier to post and calculate incident rates. Employers must post copies of the previous year's records no later than February 1 and keep them in place through April 30. A company executive must certify that he or she has examined the OSHA 300 Log and that he or she reasonably believes, based on his or her knowledge of the process by which the information was recorded, that the annual summary is correct and complete.

NOTE: It is required to save the OSHA 300 Log, the privacy list (if one Exists), the annual summary, and the OSHA 301 Incident report forms for five (5) years following the end of the calendar year that these records cover.

Recording Zero Injuries or Illnesses

If there were no injuries or illnesses during the year, employers must enter "zero" on the totals line of the form and post it. The form must be signed and certified by a company executive.

Employee Privacy

Employers must withhold the names of individuals with sensitive injuries such as sexual assaults, HIV infections, and mental illness.

OSHA's Annual Survey

Each year, OSHA collects injury and illness information from employers through the OSHA Data Initiative to better direct agency resources and improve worker protections. All employers in construction and manufacturing with 40 or more employees are eligible to be included in the initiative. In addition, employers from 67 other industries in other industrial sectors are selected, generally if they are in industries rated as "high hazard" or with high injury and illness rates. Establishments are selected for inclusion in the annual survey based on previous reported injury and illness rates, an OSHA intervention, or the periodic revisiting of former participants in the annual survey.

OSHA asks employers selected for participation to send information already collected on the 300A summary form, required by the OSHA occupational injury and illness recordkeeping regulation.

Summary of Information Employers must Post

Employers must display at each establishment, wherever they normally post notices to employees, the following:

- *A copy of the totals from the previous year's summary of occupational injuries and illnesses, OSHA 300A (February through April).*
- *OSHA "It's The Law" poster (OSHA 3156), or the state equivalent, informing employees of their rights and responsibilities under the OSH Act.*
- *Summaries of petitions for variances from standards of recordkeeping procedures.*
- *Copies of all OSHA citations for violations of standards. These must remain posted at or near the location of alleged violations for three days, or until the violations are corrected, whichever is longer.*

OSHA Enforcement

Compliance Officer Authority

The *OSH Act* authorizes OSHA compliance officers – at reasonable times, in a reasonable manner, and within reasonable time limits – to:

- Enter any factory, plant, establishment, construction site, or other areas of the workplace or environment where work is being performed.
- Inspect and investigate during regular working hours any such place of employment and all pertinent conditions, structures, machines, apparatus, devices, equipment, and materials.
- Inspect and investigate at other times any such place of employment and all pertinent conditions, structures, machines, apparatus, devices, equipment, and materials.
- Question privately any employer, owner, operator, agent or employee during an inspection or investigation.

Compliance Officer Qualifications

OSHA compliance officers have specialized knowledge and experience in the occupational safety and health field, including industrial hygiene, safety engineering, toxicology, and occupational medicine. They receive vigorous training on OSHA standards and how to recognize safety and health hazards. Many OSHA staff members have specialized credentials such as certified industrial hygienist (CIH) or certified safety professional (CSP) certifications.

Advance Notice of Inspections

OSHA generally conducts inspections without advance notice. In fact, anyone who alerts an employer in advance of an OSHA inspection can receive a criminal fine of up to \$1,000 or a six-month jail term or both.

However, under special circumstances, OSHA may give the employer advance notice of an inspection – but no more than 24 hours. These special circumstances include:

- Imminent danger situations, which require correction immediately.
- Inspections that must take place after regular business hours or require special preparation.
- Cases where OSHA must provide advance notice to assure that the employer and employee representative or other personnel will be present.
- Situations in which OSHA determines that advance notice would produce a more thorough or effective inspection.

Employers receiving advance notice of an inspection must inform their employees' representative or arrange for OSHA to do so.

Search Warrants

An employer has the right to require the compliance officer to obtain an inspection warrant before entering the worksite. OSHA may inspect after acquiring a judicially authorized search warrant based on administrative probable cause or evidence of a violation.

OSHA may take appropriate steps, including legal action, if an employer still refuses to admit a compliance officer, or if an employer attempts to interfere with an inspection.

Inspection Priorities

OSHA cannot inspect all 7 million workplaces covered by the *OSH Act* each year. The most hazardous workplaces need primary attention. OSHA, therefore, has established a system of inspection priorities in order to make the most positive impact on occupational safety and health. The agency inspects under the following conditions:

- ***Imminent danger*** – or any condition where there is reasonable certainty that a danger exists that can be expected to cause death or serious physical harm immediately or before the danger can be eliminated through normal enforcement procedures. OSHA gives top priority to imminent danger.
- ***Catastrophes and fatal accidents*** – resulting in the death of any employee or the hospitalization of three or more employees.
- ***Employee complaints*** – involving imminent danger or an employer violation that threatens death or serious physical harm.
- ***Referrals*** – from other individuals, agencies, organizations, or the media.
- ***Planned or programmed*** – inspections in industries with a high number of hazards and associated injuries.
- ***Follow-ups*** – to previous inspections.

The Inspection Process – Off-site Investigations

"Phone/FAX" Investigations

There are two ways that OSHA can respond to a complaint. OSHA can either perform an on-site inspection or an off-site investigation, also known as a "phone/fax investigation."

Although every worker has a right to receive an on-site inspection if certain conditions are met, there are times when a phone/fax (or letter) investigation may be a better alternative. OSHA responds more quickly to lower-priority hazards using a phone/fax approach. This enables the agency to concentrate resources on the most serious workplace hazards.

The *OSH Act* authorizes OSHA to conduct workplace inspections to enforce its standards. Every establishment covered by the *OSH Act* is subject to inspection by OSHA compliance safety and health officers.

Employees who request a phone/fax investigation do not give up the right to request an on-site inspection of potential violations and hazards if they are not satisfied with the investigation. Workers should call their nearest OSHA area office to discuss their options.

If an off-site investigation is appropriate, the agency telephones the employer, describes the alleged hazards, and then follows up with a fax or letter. The employer must respond in writing within five days, identifying any problems found and noting corrective actions taken or planned. If the response is adequate, OSHA generally will not conduct an inspection. The employee or employee representative who filed the original complaint will receive a copy of the employer's response and, if still not satisfied, may then request an on-site inspection.

If the employee or employee representative files a written complaint that meets certain conditions, then OSHA may conduct an on-site inspection. Those conditions include claims of serious physical harm that have already resulted in disabling injuries or illnesses or claims of imminent danger situations; written, signed complaints requesting inspections; and situations where the employer provided an inadequate response to a phone/fax investigation.

The Inspection Process – On-site Inspections

What to Expect

A typical OSHA inspection includes four stages:

- 1.** Presentation of inspector credentials
- 2.** Opening conference
- 3.** Inspection walkaround
- 4.** Closing conference

How an Inspection Begins

When arriving at a worksite, the OSHA compliance officer displays official credentials and asks to meet an appropriate employer representative. Employers should always insist on seeing the compliance officer's credentials.

An OSHA compliance officer carries U.S. Department of Labor credentials bearing his or her photograph and a serial number that an employer can verify by phoning the nearest OSHA office. Posing as a compliance officer is a violation of law; suspected imposters should be promptly reported to local law enforcement agencies.

Opening Conference

In the opening conference, the compliance officer:

- Explains why OSHA selected the establishment for inspection.
- Obtains information about the establishment.

- Explains the purpose of the visit, the scope of the inspection, walk-around procedures, employee representation, employee interviews, and the closing conference.
- Determines whether an OSHA funded consultation is in progress or whether the facility has received an inspection exemption.

If so, the compliance officer usually terminates the inspection. The compliance officer asks the employer to select an employer representative to accompany him or her during the inspection. OSHA welcomes, but does not require, an employee representative to accompany the inspector.

Under no circumstances may the employer select the employee representative for the walkaround. OSHA encourages employers and employees to meet together.

Selecting Employee Representatives

If ... ☐ The employees are represented by a recognized bargaining representative, ☐ There is a plant safety committee and no recognized bargaining representative, ☐ There is neither a recognized bargaining representative nor a plant safety committee, ☐ There is no authorized employee representative.	Then ... ★ The union usually will designate the employee rep to accompany the compliance officer. ★ The employee members of that committee or the employees at large will designate the employee rep. ★ The employees themselves may select the employee rep, or the compliance officer will determine if any other employees would suitably represent the interests of employees. ★ The compliance officer must consult with a reasonable number of employees concerning safety and health matters in the workplace. Such consultations may be held privately.

Inspection Walkaround

After the opening conference, the compliance officer and accompanying representatives proceed through the establishment, inspecting work areas for potentially hazardous working conditions. The compliance officer will discuss possible corrective actions with the employer. OSHA may consult, at times privately, with employees during the inspection walkaround. An inspection walkaround may cover only part of an establishment, particularly if the inspection resulted from a specific complaint, fatality, or catastrophe or is part of a local or national emphasis program. Other inspections may cover the entire facility, "wall to wall."

Trade secrets observed by the compliance officers are kept confidential. Federal employees who release confidential information without authorization are subject to a \$1,000 fine, one year in jail, or both, and removal from office or employment.

Records Reviews

The compliance officer checks posting and recordkeeping practices, including whether the employer has:

- Maintained records of deaths, injuries, and illnesses.
- Posted OSHA's Summary of Work-Related Injuries and Illnesses (OSHA 300A) from February 1 to April 30.
- Prominently displayed the OSHA "It's The Law" poster (OSHA 3165).

The compliance officer also examines records, where required, of employee exposure to toxic substances and harmful physical agents.

On-the-Spot Corrections

Some apparent violations detected by the compliance officer can be corrected immediately. The compliance officer records such corrections to help evaluate the employer's good faith for compliance. Apparent violations that have been corrected may still serve as the basis for a citation or notice of proposed penalty or both.

After the Walkaround

After the inspection walkaround, the compliance officer holds a closing conference with the employer and the employee representatives, either jointly or separately.

During the closing conference, the compliance officer:

- Discusses with the employer all unsafe or unhealthful conditions observed on the inspection and indicates all apparent violations for which a citation may be recommended.
- Tells the employer of his or her appeal rights, anti-discrimination rights under 11(c) of the *OSH Act*, and procedures for contesting citations within 15 working days after receiving the citation.
- Informs the employer of his or her obligations regarding any citations that may be issued.

The compliance officer will hold a separate closing conference with the employees or their representative, if requested, to discuss matters of direct interest to employees and to inform them of their rights after an inspection.

Information in an OSHA Citation

Citations inform the employer and employees of:

- Regulations and standards the employer allegedly violated.
- Any hazardous working conditions covered by the *OSH Act's* general duty clause.
- The proposed length of time set for abatement of hazards.
- Any proposed penalties.

Additional Information Provided

The compliance officer:

- Informs employers of their rights under the *Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA)*. *SBREFA* requires that all federal agencies have in place a policy to reduce or, under appropriate circumstances, waive penalties for violations of standards by small businesses.
- Informs employers that Regional Small Business Regulatory Fairness Boards created under *SBREFA* exist to hear cases if employers are not satisfied with agency resolutions of enforcement matters.
- Explains that OSHA area offices offer assistance and can answer questions about programs and activities.

Disclosures of Penalties

Only the OSHA area director has the authority to tell the employer what penalties the agency will propose.

OSHA has up to six months following an inspection to issue a final report. After reviewing the full inspection report, the OSHA area director will:

- Issue citations without penalties.
- Issue citations with proposed penalties.
- Determine that neither is warranted.

Violations and Penalties

Types of Penalties

Under the *OSH Act*, OSHA may cite the following violations and propose the following penalties:

Other-than-Serious: A violation that has a direct relationship to job safety and health, but probably would not cause death or serious physical harm. OSHA may propose a penalty of up to \$7,000 for each other-than-serious violation.

Serious: A violation where there is substantial probability that death or serious physical harm could result and that the employer knew, or should have known, of the hazard. OSHA may propose a mandatory penalty of up to \$7,000 for each serious violation.

Willful: A violation that the employer intentionally and knowingly commits or a violation that the employer commits with plain indifference to the law. The employer either knows that what he or she is doing constitutes a violation, or is aware that a hazardous condition existed and made no reasonable effort to eliminate it. OSHA may propose penalties of up to \$70,000 for each willful violation, with a minimum penalty of \$5,000 for each willful violation.

In addition to OSHA citations and penalties, the U.S. Department of Justice may bring a criminal action against an employer whose willful violation of a standard results in the death of an employee.

If a court convicts such an employer, the offense is punishable by a court-imposed fine or by imprisonment for up to six months, or both. The court may impose a fine for a criminal conviction of up to \$250,000 for an individual or \$500,000 for a corporation.

Repeated: A violation of any standard, regulation, rule, or order where OSHA finds a substantially similar violation during a re-inspection. OSHA may propose penalties of up to \$70,000 for each repeated violation. To be the basis of a repeat citation, the original citation must be final. A citation under contest may not serve as the basis for a subsequent repeat citation.

Violation Categories & Possible Penalties

Type of Violation	Minimum Penalty Per Violation	Maximum Penalty Per Violation
Other-than-serious		\$7,000
Serious	\$100*	\$7,000
Posting		\$7,000
Willful	\$5,000	\$70,000
Willful, with fatality, first conviction		\$250,000/\$500,000 or six months in prison or both **
Willful, with fatality, second conviction		\$250,000/\$500,000 or one year in prison or both **
Repeated	\$5,000	\$70,000
Failure to abate		\$7,000 per day
<i>* Set as OSHA policy in the Field Inspection Reference Manual (FIRM).</i> <i>** The monetary criminal fine is set by Title 18 of the U.S. Code (Crimes and Criminal Procedure), Section 3571, which states that individuals found guilty of an offense may not be fined more than \$250,000, and organizations not more than \$500,000.</i>		

Failure to Abate: OSHA may propose an additional penalty of up to \$7,000 for each day an employer fails to correct a previously cited violation beyond the prescribed abatement date.

Penalties for Other Violations

Employers may be assessed penalties for:

- Violating posting requirements can bring a civil penalty of up to \$7,000. (OSHA does not fine for failing to post the "It's The Law" poster (OSHA 3165).)
- Falsifying records, reports, or applications, upon conviction in a court, can bring a criminal fine of \$10,000 or up to six months in jail, or both.
- Assaulting a compliance officer or otherwise resisting, opposing, intimidating or interfering with a compliance officer in the performance of his or her duties is a criminal offense. Anyone convicted of such an action is subject to a criminal fine of not more than \$5,000 and imprisonment for not more than three years.

Adjustments to Proposed Penalty Amounts

The agency may adjust a penalty downward depending on the employer's good faith (demonstrated efforts to comply with the *OSH Act*), history of previous violations, and size of business. When the adjusted penalty amounts to less than \$100, OSHA does not propose any penalty. For serious violations, OSHA may also reduce the proposed penalty based on the gravity of the alleged violation. No good faith adjustment will be made for alleged willful violations.

Criminal Penalties

An employer who is convicted in a criminal proceeding of a willful violation of a standard that has resulted in the death of an employee may be fined up to \$250,000 (or \$500,000 if the employer is a corporation) or imprisoned up to six months, or both. A second conviction doubles the possible term of imprisonment.

Contesting Inspection Results

Employee Questions Regarding Inspection Results

Employees may request an informal conference with OSHA to discuss any issues raised by an inspection, citation, notice of proposed penalty, or employer's notice of intent to contest.

OSHA must conduct an informal conference within the 15 working day contest period. In addition, if OSHA initiated an inspection due to an employee complaint, the employee or authorized employee representative may request an informal review of any decision not to issue a citation.

Employees may contest:

- The time specified in the citation for abatement of a hazardous condition.
- An employer's petition for modification of abatement (PMA) requesting an extension of the abatement period. Employees must contest the PMA within 10 working days of its posting or within 10 working days after an authorized employee representative has received a copy.

Employees, however, may not contest citations, penalties, or lack of penalties.

Employer Appeals of Inspection Results

When issued a citation or notice of a proposed penalty, an employer may request an informal conference with OSHA's area director to discuss the case. OSHA authorizes its area directors to reach settlement agreements with employers that adjust citations and penalties to avoid prolonged legal disputes. As with informal conferences requested by employees, OSHA must conduct an informal conference requested by an employer within the 15-working-day contest period.

Petitions for Modification of Abatement

If an employer who has been cited for violations cannot meet the abatement dates as issued or amended at the informal conference, the employer must submit a request for an extension of time. This is called a "Petition for Modification of Abatement", or PMA. A PMA must be filed in writing with the area director who issued the citation no later than the close of the next working day following the date the director originally set for abatement.

Notices of Contest

If an employer decides to contest the citation, the time set for abatement, and/or the proposed penalty, he or she has 15 working days after receiving the citation and notice of proposed penalty to notify the OSHA area director in writing. An oral disagreement is not sufficient. This written notification is called a notice of contest.

Any employer, employee, or employee representative also may request an informal conference within the 15 working day contest period to discuss inspection results. Based on information and evidence presented at the informal conference, OSHA may enter into an informal settlement agreement with the employer, which could involve changes to citations, penalties, or abatement dates.

There is no specific format for the notice of contest. It must, however, clearly identify the employer's basis for filing a contest of the citation, notice of proposed penalty, abatement period, or notification of failure to correct the violation.

Reviews of Notices of Contest

If the written notice of contest has been filed within the required 15 working days, the OSHA area director forwards it to the Occupational Safety and Health Review Commission (OSHRC).

The commission is an independent federal agency created by the *OSH Act* to decide contested OSHA citations and penalties. It is not associated with OSHA or the Department of Labor.

The commission will assign an administrative law judge to hear the case. The administrative law judge may:

- Find the contest legally invalid and disallow it.
- Set a hearing for a public place near the employer's workplace.

The employer and the employees have the right to participate in the hearing.

Employer Appeals of Administrative Judge Rulings

Once the administrative law judge has ruled, any party to the case may request a further review by the commission.

Any of the three OSHRC commissioners also may, at his or her own motion, bring a case before the commission for review. Employers and OSHA may appeal commission rulings to the appropriate U.S. Court of Appeals.

Recordkeeping Forms

Following are the three forms needed for recordkeeping:

- ***OSHA Form 300 – Log of Work-Related Injuries and Illnesses.***
- ***OSHA Form 301 – Injury and Illness Incident Report.***
- ***OSHA Form 300A – Summary of Work-Related Injuries & Illnesses.***

These are official Federal OSHA forms with accompanying instructions and worksheets. Make copies of the blank forms for future use.

Posting Requirements (Federal)

Federal law requires that employers conspicuously display the following posters where they can be read by their employees:

- 1. Federal Minimum Wage** — This posting explains the Federal Minimum Wage; Overtime Pay; Child Labor; and Enforcement.
- 2. Equal Employment Opportunity is the Law** — Reasons for Taking Leave; Advance Notice & Medical Certification; Jobs Benefit & Protection.
- 3. Notice Employee Polygraph Protection Act** — Prohibitions; Exemptions; Examinee Rights; Enforcement; Additional Information.
- 4. You Have A Right to a Safe & Healthful Workplace — "IT'S THE LAW"**— Employers Holding Federal Contracts or Subcontracts; Private Employment State & Local Government Educational Institutions; Programs or Activities Receiving Federal Financial Assistance.
- 5. Your Rights Family & Medical Leave ACT** — Reasons for Taking Leave; Advance Notice & Medical Leave; Jobs Benefit & Protection.
- 6. Your rights under USERRA** — THE UNIFORMED SERVICES EMPLOYMENT AND REEMPLOYMENT RIGHTS ACT. **USERRA** protects the job rights of individuals who voluntarily or involuntarily leave employment positions to undertake military service. **USERRA** also prohibits employers from discriminating against past and present members of the uniformed services, and applicants to the uniformed services.

NOTE: Some states require the use of their own posters. Check with your State Labor Department for poster requirements.

§1903.2

Posting of notice; availability of the Act, regulations and applicable standards

(a) (1) Each employer shall post and keep posted a notice or notices, to be furnished by the Occupational Safety and Health Administration, U.S. Department of Labor, informing employees of the protections and obligations provided for in the Act, and that for assistance and information, including copies of the Act and of specific safety and health standards, employees should contact the employer or the nearest office of the Department of Labor. Such notice or notices shall be posted by the employer in each establishment in a conspicuous place or places where notices to employees are customarily posted. Each employer shall take steps to insure that such notices are not altered, defaced, or covered by other material.

(2) Where a State has an approved poster informing employees of their protections and obligations as defined in 1952.10 of this chapter, such poster, when posted by employers covered by the State plan, shall constitute compliance with the posting requirements of section 8(c)(1) of the Act. Employers whose operations are not within the issues covered by the State plan must comply with paragraph (a)(1) of this section.

(3) Reproductions or facsimiles of such Federal or State posters shall constitute compliance with the posting requirements of section 8(c)(1) of the Act where such reproductions or facsimiles are at least 8 ½ inches by 14 inches, and the printing size is at least 10 pt. Whenever the size of the poster increases, the size of the print shall also increase accordingly. The caption or heading on the poster shall be in large type, generally not less than 36 pt.

(b) Establishment means a single physical location where business is conducted or where services or industrial operations are performed. (For example: A factory, mill, store, hotel, restaurant, movie theatre, farm, ranch, bank, sales office, warehouse, or central administrative office.) Where distinctly separate activities are performed at a single physical location (such as contract construction activities from the same physical location as a lumber yard), each activity shall be treated as a separate physical establishment, and a separate notice or notices shall be posted in each such establishment, to the extent that such notices have been furnished by the Occupational Safety and Health Administration, U.S. Department of Labor. Where employers are engaged in activities which are physically dispersed, such as agriculture, construction, transportation, communications, and electric, gas and sanitary services, the notice or notices required by this section shall be posted at the location to which employees report each day. Where employees do not usually work at, or report to, a single establishment, such as longshoremens, traveling salesmen, technicians, engineers, etc., such notice or notices shall be posted at the location from which the employees operate to carry out their activities. In all cases, such notice or notices shall be posted in accordance with the requirements of paragraph (a) of this section.

(c) Copies of the Act, all regulations published in this chapter and all applicable standards will be available at all Area Offices of the Occupational Safety and Health Administration, U.S. Department of Labor. If an employer has obtained copies of these materials, he shall make them available upon request to any employee or his authorized representative for review in the establishment where the employee is employed on the same day the request is made or at the earliest time mutually convenient to the employee or his authorized representative and the employer.

(d) Any employer failing to comply with the provisions of this section shall be subject to citation and penalty in accordance with the provisions of section 17 of the act.

Chapter 36
Cain's Pipeline & Industrial Services, LLC.
Safety Training Minutes
and Other Safety Training Documents

This section is designated to hold all Company Safety Training Documents. Any paperwork related to Company Safety Training should be 3-ring hole-punched and stored in this section.

DAILY JOB LOG

Today's Date		Day of Week ☐ S ☐ M ☐ T ☐ W ☐ T ☐ F ☐ S		Job Name:	
Job Location:			Job #:		
Weather Conditions		Approx Temp AM ____ °F PM ____ °F		Site Conditions	
Crew Forman/Supervisor:					
Company Competent Person(s):					
Crew Members:		Start	Finish	Total	Special Materials Needed:
					Expected Problems/Delays Today?
Special Safety Training/Equipment Required:					
Special Work Requests/Assignments (Describe)					
Work Performed Today:					
Change Orders Issued? (Describe)				Authorized By:	
Special Tools/Equipment Rented Today		Rented From		Rate/hr	Total Cost
Material Purchases		Cost	Special Planning Required for Tomorrow		
Accidents/Incidents/Near Misses? (Describe)					
Other:					
Supervisor's Signature:					

Chapter 37

Cain's Pipeline & Industrial Services, LLC.

Behavior-Based Safety Program (BBS)

Cain's Pipeline & Industrial Services, LLC. has adopted this Behavior-based Safety program for the safety of our employees and help prevent occupational injuries and illness.

The elements of our program consist of:

- **Common Goals**-Employee and Managerial commitment to the process.
- **Creating** a systematic, ongoing process that defines a set of behaviors that reduce the risk of work-related injury, derived from safety assessments.
- **Training** personnel in the Observation Process.
- **Observation and data collection** on the frequency of critical safety practices.
- **Feedback** and reinforcement to encourage and support positive safety practices.
- **Action Plan**-Team meetings to decide on how to proceed, based on the data.
- **Review**-monitoring the progress of the Action Plan on a regular basis.

Observation

A critical element in our Behavior-based Safety (BBS) program depends on site observation. Site observation includes direct and open communication with the employees involved. The observer will:

- Meet with the worker at the site and introduce himself and the job being done.
- Observe and monitor the worker, noting his safe behaviors.
- Monitor the At-risk behaviors the worker is putting himself in.

Observation Process Training

Training in the Observation Process will be established and implemented to the proper personnel. These individuals will be experienced employees of the Company. Training will consist of either classroom or on the job training.

Elements of the Training Program include:

- Who is to be trained.
- Ensuring employees know the basic elements of the Behavior-based Program.
- Ensuring that all employees involved in the process are trained in the classroom or on the job.

The types of training that will be provided are:

- **Management training**- to ensure the common goals and process of the program are being met.
- **New employee training**- effectively communicating the program to all employees.
- **Refresher training**- to be done as needed or when changes are made to the policy or procedure of the program.

This training will include:

- Program objectives and incident report reviews
- How to conduct the site observations
- The observer's knowledge of the job procedures they observe.
- Knowledge of the correct work and safety procedures involved.
- How to complete the observation form
- How to determine and analyze At-risk behaviors
- Feedback training and role play (mentoring and coaching)- Employees should be aware they may be observed at any time

This training process will be documented in order to keep on record those qualified to observe on site behaviors and effectively implement the program's elements.

Feedback

Communication is a crucial element in a successful Behavior-based Safety Program. To effectively accomplish this, feedback is of key importance.

The observer will start by commending the safe behavior the worker was doing during his work. You then want to explain, one by one, the At-risk behaviors the worker was doing. Then the observer asks the worker why he was putting himself at risk. For example, if the worker is welding a piece of metal and the sparks are flying in the workers direction. The observer would then ask the worker why he was not wearing protective clothing, like flame-retardant apron.

At this time the observer and worker will discuss the at-risk behaviors until the worker agrees to try the suggested recommendation made by the observer. The worker might be aware of his at-risk behavior or maybe not. The worker may be doing the at-risk behavior for long time without hurting himself.

The Observer's job here is to highlight this behavior, then explain the associated negative consequences with this behavior. The above discussion and agreement is the individual feedback which helps the worker to change his behavior. This feedback is considered as a form of reward since:

- The worker got commendable comments on his safe behavior.
- The worker understood his at-risk behavior without being reprimanded at site or reported to his superiors for further penalties.

Key elements for the observer to remember during the feedback process are:

- Reviewing the observation with the employee
- Start with positive comments on behavior and procedure
- Reinforce these behaviors
- Describe and discuss the unsafe portions observed
- Determine the reasons for the unsafe actions with open-ended questions to the worker.
- Re-emphasize that there are no negative consequences at this stage, so long as the observer and worker agree on the change of behavior.

Data Collection

At the end of the observation, the Observer will:

- Fill out an Observation Form with the safe and at-risk behaviors he noticed.
- Record the date, time and location of the observations.
- Note the workers comments and reasons for the at-risk behavior.
- Record recommended safe behavior

NOTE: The worker's name or identification number are not noted in the Observation Form.

- These Company forms will be used by *Cain's Pipeline & Industrial Services, LLC.* to summarize the observation process. Recording this interaction is important for later detailed analysis by the committee in charge of the program.
- Data gathering and the Observation Form will be gathered and entered into an electronic database. Reports will be generated for the committee to analyze and recommend practical solutions. These reports highlight trends of at-risk behaviors and in which location they are taking place.
- Data collection and trend analysis allow our company to compile the information taken from the observation and feedback phase of the program and transfer it to useful data, which will be implemented in the Action Plan.

Elements of the Action Plan

In order to address unsafe behaviors *Cain's Pipeline & Industrial Services, LLC.* will construct its Action Plan based on Observation Reports, trend analysis and recommendations from the Observers and employees. Brent Messina is responsible for the procedures of the Action Plan.

Action planning will include:

- Holding regularly scheduled meetings to discuss and analyze Behavior-based report findings.
- Evaluating unsafe behaviors
- Designating responsible parties and time frames to complete the Action Plan
- Ensuring support of management

The committee will:

- Produce a set of recommendations to correct workers' behavior.

Recommendations may be as simple as providing Personal Protective Equipment (PPE) to workers in certain location, or increase work force in another location.

- Some of the recommendations require site modification or costly machinery. Such recommendations are sent to top management for necessary approvals.

The committee's responsibility is to ensure that:

- The recommendations will change the at-risk behaviors at the targeted location.
- The recommendations will eliminate hazards and risks caused by hardware or wrong design.

Follow-Up

Any Action Plans set out by *Cain's Pipeline & Industrial Services, LLC.* at the direction of Brent Messina will be completed in a time frame agreed upon by the entire committee.

Regularly scheduled meetings will be held to:

- Assign responsibility for the completion of the Action Plan
- Ensure that the guidelines of the Action Plan are being carried out
- To document the Action Plan and its progress

Summary

Cain's Pipeline & Industrial Services, LLC. is committed to the safety of its employees. Behavior-based safety is an approach that instills not only correct job safety procedures but a safety conscious attitude and behaviors that positively impact the entire Company and those we work with.

Training Form

Company Name: <i>Cain's Pipeline & Industrial Services, LLC.</i>		
Date of Training:		
Trainer's Name:		
Trainee:	☐ Initial Training	☐ Refresher Training
The trainee (observer) named above has been trained to observe the following jobs:		
Work Type/Job	Trained	Not Trained
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐

I, _____, understand that my training in the above listed jobs qualifies me to observe employees while doing their job(s), conduct feedback with employee(s) and implement the established goals of the Behavior-based Safety Program. I have also displayed the required knowledge in the following areas:

- Knowing the BBS Program objectives
- How to conduct observations
- Knowledge of the jobs being observed
- The correct safety procedures of these jobs
- Filling out the Observation Form
- How to identify At-risk behaviors

Signature: _____ Date: _____

Observation Form

Observer Name:		Date:
Job being observed:		
Job Step	Procedure Comments	
	Positive Behaviors:	At-risk Behaviors
1		
Recommendations:		
	Positive Behaviors:	At-risk Behaviors
2		
Recommendations:		
	Positive Behaviors:	At-risk Behaviors
3		
Recommendations:		
	Positive Behaviors:	At-risk Behaviors
4		
Recommendations:		
Employee Comments:		

Observer's Signature _____ Date: _____

Employee Training Form

I, _____, have read or been informed of the Behavior-based Safety Program and its elements.

- ☐ I am aware of the companies Safe Work procedures including the Company Code of Safe Practices.
- ☐ I understand I may be observed in my job performance or assigned task by a designated Observer and this person will inform me that I am being observed.
- ☐ I understand that the Observer will communicate to me the positive and At-risk behaviors I may display on completion of his/her observation.
- ☐ I agree to do my utmost to implement any of the Observers' recommendations they make in order to improve my performance and safety.
- ☐ I understand my cooperation and communication is key to the success of the Behavior-based program.
- ☐ I understand that the Observations of my job performance will not include my name or identifying mark and is used only for statistical information in the program.
- ☐ I agree to follow the procedures of any Action Plan as set out by the Company.

Employee Signature: _____

Date: _____

Notes:

Handwriting practice lines consisting of 20 sets of three horizontal lines (top, middle, and bottom) for letter formation.

Chapter 38

Cain's Pipeline & Industrial Services, LLC.

Short Service Employee (SSE) Policy

Cain's Pipeline & Industrial Services, LLC. has adopted the following program to ensure that short service employees are identified, appropriately supervised, trained, mentored, and managed. This program is adopted in order to prevent accidents such as personal injury, injury to others, environmental damage, and/or property damage by the short service employee.

Definition

Cain's Pipeline & Industrial Services, LLC. defines a short service employee (SSE) as any person or personnel with less than six (6) months experience in his/her current position or with one's current employer. A person or persons can also be classified as an SSE if they change jobs within the company they are working for or as a new hire for the same type of position for another company.

Work crew assignments and restrictions

- A single employee as his own crew is not considered a SSE.
- When crew/group sizes of less than five (5) are assembled, no more than one (1) SSE per group/crew is allowed.
- When working with crew/group sizes larger than five (5) members, the SSE's will not exceed 20% of the crew/group make up. When the crew/groups exceed the twenty percent (20%) make up of SSE's, this will only be permitted with a written variance form, which will serve as the mitigation plan; approved by the Supervisor and/or Manager in charge of the project.

Communication and Notification

The processes for the proposed crew/group, when using an SSE, are outlined in the Short Service Employee Form. Prior to beginning the job assignment the Supervisor/Manager in charge will submit to the projects coordinator, on-site supervisor, or contractor; the completed SSE form for all the jobs that will contain SSE personnel. The work owner or supervisor/person in charge will decide SSE approval status and will keep the original completed form in the project files.

Identification

All SSE personnel will be visibly identified. This will be done by employing one of the following methods:

- Wearing a high-visibility Hard Hat or,
- Wearing a high-visibility Vest.
- Any method which clearly identifies the employee as an SSE to anyone onsite.

Monitoring SSE's

The supervisor will monitor their employees, which includes the SSE personnel for Health, Environment and Safety (HES) awareness.

The identifier marking the SSE may be removed from the SSE Program at the discretion of the supervisor at the end of the required six-month period if he/she has:

- Worked safely.
- Adhered to all HES policies and,
- Had no recordable incidents attributed to him/her.

The supervisor shall require the employee that fails to complete the six-month period free of recordable incidents, to get the operator to approve in writing prior to allowing the person to return to the operator's property.

Mentoring Process

This will be done by assigning all SSE's a mentor for the first six (6) months of employment. A mentor's responsibility is to provide guidance and develop the SSE personnel. A mentor may only be assigned one (1) SSE per crew/group. The mentor must be onsite with the SSE to monitor the SSE at all times.

The mentor must meet the following requirements:

- Be familiar with the SSE's job, have the oversight responsibilities required, and all hazards accompanied with the job.
- Have up to date orientation training.
- Be familiar with all site policies, procedures, and any required specialized actions with the work to be done.
- Show the ability to recognize any hazards and/or unsafe acts.
- Are able and willing to challenge their personnel on the job if they do not meet site procedures, policies, or other requirements and will see that the stop work authority is enforced.
- Participate actively in the behavior-based safety process.

Note: A mentor must keep a helpful eye on new hire's in your crew. Take time to describe the layout of the project, the best method to access the work, or how to work a tool they have never used before.

Sub-Contractor Management

Sub-Contractors working on site will have assigned mentors that monitor their employees only. Mentoring of outside employees will be done on an individual basis, and as required. They will also be managed following this policy.

High Hazard Areas

SSE's may in certain situations be prohibited from entering into and working in high hazard areas, these may include:

- Naturally occurring radioactive material (NORM).
- H₂S areas
- Confined spaces
- High Voltage environments, etc.

Procedures

Cain's Pipeline & Industrial Services, LLC. has set forth these procedures to verify all work is being carried out under the guidelines of this chapter by having:

- The supervisors communicate the SSE policy and procedure at all pre-job meetings.
- The supervisor submits the crew/group makeup and all SSE form(s) to the on-site representative of the work owner for approval.
- The supervisor will have the on-site representative validate the crew/group makeup and experience level.
- The supervisor will see that the on-site representative approves the SSE variance form.
- The supervisor will make sure the on-site representative posts the forms to the appropriate database, if required.

Program Review

Cain's Pipeline & Industrial Services, LLC.'s Short Service Employee Program will ensure the following practices are kept up to date on a regular basis when using and working with SSE's:

- Continuous monitoring of the SSE.
- Ensuring all changes/updates to the forms are submitted prior to beginning work and whenever a change may occur thereafter.

Contractor Short-Service Employee Form & Variance

Supervisor must complete and submit this form to work owner supervision for approval prior to arrival on location. The work owner supervision must approve the individual SSE before he/she arrives on location.

SSE Information				
Contractor Company name:				
Request Date:				
SSE Name:				
Date of Employment:		Current Job Title:		
Years Related Experience:	Experience in Current Position:	Yrs	Months	
Is this employee in compliance with your Substance Abuse Policy?		☐ Yes	☐ No	
Have site owner, contractor and HES policies (including Stop Work Authority) been reviewed with SSE?		☐ Yes	☐ No	
Who has been assigned as the SSE's mentor?				
	Mentor's Experience:	Yrs	Months	
List all training provided to the SSE:		List any previous special training:		
SSE(s) identified by: ☐ Hard Hat -High Visibility ☐ Vest -High Visibility				
☐ Other: _____ Color: _____				

II. SSE Crew Composition Requirements	
Choose one of the crew types below. If any of the stated limitations are exceeded, proceed to the variance form on next page.	
☐ Single person crew-cannot be an SSE (Variance Required)	
☐ 2-4 person crew-no more than one SSE	
☐ 5 or more person crew-no more than 20% SSE(s) per crew	
☐ Exceeding 20% SSE per crew (Variance Required)	
III. SSE Review and Approval	
☐ Contractor Supervising Manager:	Date:
☐ CPL Work Location Supervisor:	Date:
☐ Work Owner:	Date:
IV. Contractor SSE Form Repository	
☐ CSM Data Base:	Date:
☐ CPL Work location	Date:
☐ Work Owner file:	Date:

This form is to be filled out whenever the conditions on this form or any other element of the Short Service Employee Policy cannot be met.

IV. Variance Information	
Variance Justification (What are the current circumstances and what will be done to ensure an acceptable level of risk?)	
Alternatives to Variance (If the variance is denied, what are the alternatives to completing the scope of the work? Briefly detail the cost and operational impact of the alternatives.)	

List the steps to be taken to manage/mitigate the SSE risk to an acceptable level:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

V. Variance Review and Approvals

Variance Expiration Date: _____

Contractor Manager/Supervisor

☐ Approves ☐ Denies

Signed: _____ Date: _____

Work Owner's on-site representative ☐ Approves ☐ Denies

Signed _____ Date: _____

Note: For large jobs, please use a separate sheet to list all SSEs on the crew by name and job title.