SAFETY HANDBOOK

ZERO INCIDENTS
A RESOURCE PRODUCTION SAFETY INITIATIVE
Receipt & Acknowledgment
Resource Production Company
Illness & Injury Prevention Handbook

Please read the following statements, sign below and return to your [manager / supervisor / team leader / designated company representative].

I Understand & Acknowledge Resource Production Company Safety Policies & Procedures

- I have received and read a copy of the Resource Production Company Injury & Illness Prevention Handbook.
- I understand that the information in this document supersedes previous documents and verbal instructions.
- I understand further that the policies and procedures described in this document are subject to change at the sole discretion of Resource Production Company at any time.

Safety Practices

I also acknowledge that I have read and understand all of the Safety Practices contained in this Injury & Illness Prevention Handbook and I agree to abide by these policies. If I have not complied with the procedures and policies as described, I agree to hold Resource Production Company harmless for injuries that I may sustain as a result of such actions.

I also agree to immediately report, in writing, any discrepancies in practices or conditions directly to my immediate [supervisor/manager] and/or the Resource Production Company Responsible Safety Officer.

Confidential Information

I am aware that during the course of my employment confidential information will be made available to me, for instance, product designs, marketing strategies, customer lists, pricing policies and other related information. I understand that this information is proprietary and critical to the success of Resource Production Company and must not be given out or used outside of Resource Production Company’s premises or with non-Resource Production Company employees. In the event of termination of employment, whether voluntary or involuntary, I hereby agree not to utilize or exploit this information with any other individual or company.

________________________________________  ________________________
Employee’s Printed Name                          Position

________________________________________  ________________________
Employee’s Signature                            Date
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Resource Production Company

Injury & Illness Prevention Program

Resource Production Company
P.O. Box 3076
Farmington, New Mexico 87499
(505) 325-7927
Injury & Illness Prevention Program

Written Plan
Every employer should have a written Injury & Illness Prevention plan. This is our plan. Please read it carefully. While no plan can guarantee an accident free work place, following the safety procedures set forth in this manual will significantly reduce the risk of danger to you and your co-workers. Thank you for all our safety.

Introduction to Our Program
State and federal law, as well as company policy, makes the safety and health of our employees the first consideration in operating our business. Safety and health in our business must be a part of every operation, and every employee's responsibility at all levels. It is the intent of Resource Production Company to comply with all laws concerning the operation of the business and the health and safety of our employees and the public. To do this, we must constantly be aware of conditions in all work areas that can produce or lead to injuries. No employee is required to work at a job known to be unsafe or dangerous to their health. Your cooperation in detecting hazards, reporting dangerous conditions and controlling workplace hazards is a condition of employment. Inform your supervisor immediately of any situation beyond your ability or authority to correct. Employees will not be disciplined or suffer any retaliation for reporting a safety violation in good faith.

Safety First Priority
The personal safety and health of each employee is of primary importance. Prevention of occupationally-induced injuries and illnesses is of such consequence that it will be given precedence over operating productivity. To the greatest degree possible, management will provide all mechanical and physical protection required for personal safety and health, but our employees must bear primary responsibility for working safely. A little common sense and caution can prevent most accidents from occurring.

Individual Cooperation Necessary
Resource Production Company maintains a safety and health program conforming to the best practices of our field. To be successful, such a program must embody proper attitudes towards injury and illness prevention on the part of supervisors and employees. It requires the cooperation in all safety and health matters, not only of the employer and employee, but between the employee and all co-workers. Only through such a cooperative effort can a safety program in the best interest of all be established and preserved. Safety is no accident; think safety and the job will be safer.

Safety Program Goals
The objective of Resource Production Company 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 similar operations by others. Our goal is zero accidents and injuries.

Safety Policy Statement
It is the policy of Resource Production Company that accident prevention shall be considered
of primary importance in all phases of operation and administration. It is the intention of Resource Production Company's management to provide safe and healthy working conditions and to establish and insist upon safe practices at all times by all employees. The prevention of accidents is an objective affecting all levels of our company and its operations. It is, therefore, a basic requirement that each supervisor make the safety of all employees an integral part of his or her regular management function.

It is equally the duty of each employee to accept and follow established safety regulations and procedures. Every effort will be made to provide adequate training to employees. However, if an employee is ever in doubt about how to do a job or task safely, it is his or her duty to ask a qualified person for assistance. Employees are expected to assist management in accident prevention activities. Unsafe conditions must be reported immediately. Fellow employees that need help should be assisted. Everyone is responsible for the housekeeping duties that pertain to their jobs. Every injury that occurs on the job, even a slight cut or strain, must be reported to management and/or the Responsible Safety Officer as soon as possible. Under no circumstances, except emergency trips to the hospital, should an employee leave the work site without reporting an injury. When you have an accident, everyone is hurt. Please work safely. Safety is everyone's business.

Stop Work Authority Program

Requirements and Guidance

Stop Work Authority Defined

Stop Work Authority establishes the ‘authority and obligation’ of any individual to suspend a single work task or group operation when the control of HSE risk is not clearly established or understood. In general terms, the SWA process involves a stop, notify, correct and resume approach for the resolution of a perceived unsafe condition, act, error, omission, or lack of understanding that could result in a undesirable event.

Program Requirements

Contractors performing work for all Resource production Company Customers must establish and implement a SWA program that contains at a minimum, each of the following elements: Policy and communication, roles and responsibilities, SWA intervention protocol, reporting process, follow-up, reward and recognition and training.

Policy and Communication
A SWA policy, endorsed by senior management, must be established and clearly communicated to the entire organization. The policy statement can either stand alone or be incorporated into the organization's HSE policy statement. This policy shall establish the authority and obligation of any individual to ‘stop work’ without the threat of reprisal.

This policy shall be prominently displayed and available to all employees and contractors in a language commonly understood. Policy content should be reviewed frequently, such as during new hire training, location-specific orientations, pre-job meetings, contractor engagements, and any other medium where HSE expectations are communicated and established.

Roles and Responsibilities

Role specific expectations and accountabilities must be established with regard to SWA processes.

- **Employees and Contractors** are responsible to initiate a ‘stop work’ intervention when warranted and support the intervention of others.
- **Line Supervisors** are responsible to create a culture where SWA is exercised freely, honor request for ‘stop work’, work to resolve issues before operations resume, and recognize proactive participation.
- **Senior Leaders** must establish and support clear expectations to exercise SWA, create a culture where SWA is exercised freely, resolve SWA conflicts when they arise, and hold those accountable that chose not to comply with established SWA policies.
- **HSE** in support of operations is responsible for monitoring compliance with the requirements of this program, maintenance of associated documents, processes and training materials, identification of trends, sharing of learnings, and publication of required scorecards.

As with any policy, clear accountabilities for non-compliance must be established and understood.

SWA Intervention Protocol

Guidelines for executing a ‘stop work’ intervention must be developed and communicated to facilitate a culture where SWA is freely exercised. Much like a behavior-based safety process; a workforce that clearly understands how to initiate, receive, and respond to a ‘stop work’ intervention is more likely to participate. Though obvious to some, a simple step-by-
step instruction creates an environment/culture were people know how to act and respond. Such step-by-step instructions shall include instruction on expected behavior as well as process.

An important consideration in development of this SWA process is the establishment of a “conflict resolution” process. When opinions differ regarding the validity of a ‘stop work’ intervention or the decision to resume work, a clear protocol must be established to properly resolve the conflict. Persons with proper authority and who are not party to the conflict shall be identified to resolve such issues.

**Policy and Program Overview**

This program formally establishes the Stop Work Authority (SWA) of all Company employees and contractors to suspend individual tasks or group operations when the control of HSE risk is not clearly established or understood.

It is the policy of this Company that:

- All employees and its contractors have the authority and obligation to stop any task or operation where concerns or questions regarding the control of HSE risk exist,
- No work will resume until all stop work issues and concerns have been adequately addressed, and
- Any form of retribution or intimidation directed at any individual or company for exercising their authority as outlined in this program will not be tolerated.

As with any policy, accountability for non-compliance will follow established Company procedures or contract requirements.

**Step**

**Protocol Instruction**

1. When a person identifies a perceived unsafe condition, act, error, omission, or lack of understanding that could result in an undesirable event, a “stop work intervention shall be immediately initiated with the person(s) potentially at risk.

2. If the supervisor is readily available and the affected person(s) are not in immediate risk, the “stop work action” should be coordinated through the supervisor. If the supervisor is not readily available or the affected person(s) are in immediate risk, the “stop work” intervention should be initiated directly with
those at risk.

3 “Stop work” interventions should be initiated in a positive manner by briefly introducing yourself and starting a conversation with the phrase “I am using my stop work authority because...”. Using this phrase will clarify the users intent and set expectations as detailed in this procedure.

4 Notify all affected personnel and supervision of the stop work issue. If necessary, stop associated work activities, remove person(s) from the area, stabilize the situation and make the area as safe as possible.

5 All parties shall discuss and gain agreement on the stop work issue.

6 If determined and agreed that the task or operation is OK to proceed as is (i.e., the stop work initiator was unaware of certain facts or procedures) the affected persons should thank the initiator for their concern and proceed with the work.

7 If determined and agreed that the stop work issue is valid, then every attempt should be made to resolve the issue to all affected person’s satisfaction prior to the commencement of work.

8 If the stop work issue cannot be resolved immediately, work shall be suspended until proper resolution is achieved. When opinions differ regarding the validity of the stop work issue or adequacy of the resolution actions, the location’s “person in charge” shall make the final determination. Details regarding differences of opinion and resolution actions should be included in the documented report.

9 Positive feedback should be given to all affected employees regarding resolution of the stop work issue. Under no circumstances should retribution be directed at any person(s) who exercise in good faith their stop work authority as detailed in this program.

10 All stop work interventions and associated detail shall be documented and reported as detailed in this program.
Reporting

All “stop work” interventions exercised under the authority of this program shall be documented as a near miss utilizing existing reporting protocols. The near miss report shall contain the words “STOP WORK” at the beginning of the incident description in order to differentiate it from traditional near miss reports.

“STOP WORK” reports shall be reviewed by line supervision in order to:

- Measure participation
- Determine quality of interventions and follow-up
- Trend common issues and identify opportunities for improvement
- Facilitate sharing of learnings
- Feed recognition programs.

The HSE department will regularly publish incident details regarding the number of “stop work” actions reported by location as well as details regarding common trends and learnings.

Follow-up

It is the desired outcome of any ‘stop work’ intervention that the identified safety concerns be addressed to the satisfaction of all involved persons prior to the resumption of work. Although most issues can be adequately resolved in a timely fashion at the job site, occasionally additional investigation and corrective actions may be required to identify and address root causes.

Stop Work” interventions that required additional investigation or follow-up will be handled utilizing existing protocols and procedures for incident investigation and follow-up.

Waste Management

All Crews Leaders must estimate the waste that will be generated during the job being performed so that the need for containers and waste removal if necessary can be determined. Each job will be evaluated to determine what waste will be generated to make sure that proper waste containers and waste removal is performed.
Waste materials should be properly stored and handled to minimize the potential for a spill or impact to the environment. During outdoor activities, receptacles must be covered to prevent dispersion of waste materials and to control the potential for run-off.

All RPC Crew Leads and crew are trained to recognize hazardous, non-hazardous wastes, trash, or scrap materials and dispose of them in a proper manner by caring it to an approved disposal site.

Resource Production Co. always strives to recycle all waste material when possible. Reuse, reclaim or recycle as much of the waste generated as possible.

**Safety Rules for All Employees**

It is the policy of Resource Production Company that everything possible will be done to protect you from accidents, injuries and/or occupational disease while on the job. Safety is a cooperative undertaking requiring an ever-present safety consciousness on the part of every employee. If an employee is injured, positive action must be taken promptly to see that the employee receives adequate treatment. No one likes to see a fellow employee injured by an accident. Therefore, all operations must be planned to prevent accidents.

To carry out this policy, the following rules will apply:

All employees shall follow the safe practices and rules contained in this manual and such other rules and practices communicated on the job.

All employees shall report all unsafe conditions or practices to the proper authority, including the supervision on the project, and, if corrective action is not taken immediately, a governmental authority with proper jurisdiction over such practices.

The RSO shall be responsible for implementing these policies by insisting that employees observe and obey all rules and regulations necessary to maintain a safe work place and safe work habits and practices.

Good housekeeping must be practiced at all times in the work area. Clean up all waste and eliminate any dangers in the work area.

Suitable clothing and footwear must be worn at all times. Personal protection equipment (hardhats, respirators, eye protection) will be worn whenever needed.

All employees will participate in a safety meeting conducted by their supervisor once every ten working days.

Anyone under the influence of intoxicating liquor or drugs, including prescription drugs which might impair motor skills and judgment, shall not be allowed on the job.

Horseplay, scuffling, and other acts which tend to have an adverse influence on safety or well-being of other employees are prohibited.

Work shall be well planned and supervised to avoid injuries in the handling of heavy materials and while using equipment.
No one shall be permitted to work while the employee’s ability or alertness is so impaired by fatigue, illness, or other causes that it might expose the employee or others to injury. There will be no consumption of liquor or beer on the job. Employees should be alert to see that all guards and other protective devices are in proper places and adjusted, and shall report deficiencies promptly to the RSO. Employees 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 specific instructions. All injuries should be reported to the RSO so that arrangements can be made for medical or first aid treatment. When lifting heavy objects, use the large muscles of the leg instead of the smaller muscles of the back. Do not throw things, especially material and equipment. Dispose of all waste properly and carefully. Bend all exposed nails so they do not hurt anyone removing the waste. Do not wear shoes with thin or torn soles.

**Lone Worker Procedure**

**Scope**
This Resource Production Company procedure establishes the required steps for a worker to perform duties in the absence of co-workers, contractors or supervision both during and after normal work hours.

**RESPONSIBILITIES**
The responsibilities for line management, HSE and Contractors defined in the HSE Compliance Procedure apply to the Operating Procedures.

**DEFINITIONS**
- **After hours**- following normal work hours during the week (example: from 4:30 p.m. to 6:30 a.m.) and include overtime work hours, call out hours, weekends and scheduled holidays.
- **Lone worker**- a RPC employee, contract designee or a contractor required to perform duties in the absence of other workers or supervision. Working by one’s self.
- **Normal work hours**- regular scheduled work hours (example: for the majority of the workers this is a 10 hour work day from 6:30 a.m. until 4:30 p.m.) Monday through Friday excluding weekends and scheduled holidays.

**PROCEDURE**

**General Requirements**
Develop a tracking process for monitoring the lone worker’s safety during normal and after hour’s work. (A GPS Tracking Device is installed in each Resource vehicle).

**Note**: This process may name a supervisor, designee and/or a Lead as being the responsible party.
Document the tracking process. Ensure that if an answering service is used in the tracking process, that they have been trained on the requirements of this procedure, any other responsibilities they may have, and they have access to the current assets call out list with the appropriate information to perform their task. Issue lone workers a radio or telephone access and make them aware of the areas that have dead zones that prevent constant communications.

**Note:** Areas where communications are intermittent due to terrain or other reasons should be notified in the assets. GPS Tracking System installed in each Resource vehicle.

Ensure lone workers have the training, skills and are qualified to perform assigned job task without supervision.

Consider the risk involved with the job, especially pressure related releases, prior to assigning job to a lone worker.

**Note:** Special consideration should be given to critical activities, e.g., H2S operations, high pressure, driving conditions, and other high risk task.

The lone worker will consult with his or her supervisor on any questions relating to an assigned task prior to leaving for the work location.

The process shall take action whenever a required notification from a lone worker does not take place as scheduled or agreed upon.

**Normal 10-Hour Daylight Shift**

The lone worker will call the Supervisor, Lead or Coworker if the work plan prevents him or her from going to the field or if work or personal activities require leaving the work area.

Notify the supervisor’s designee, a Lead or Coworker if the scope of work changes during the day or if an unplanned event takes place (example: weather becomes bad or sudden illness).

Communicate with the supervisor’s designee, co-worker at least two times a day (once in the morning and once in the afternoon).

Notify RPC Office or Supervisor when work assignment is completed for the day or if he or she is no longer working under this procedure.

Notify RPC Office or Supervisor if work assignment will require overtime work.

Notify RPC Office or Supervisor when overtime work has been completed.

Notify the Supervisor or Lead when he or she will not be going to the field as normally scheduled (example: calls in sick, takes a personal day, or takes vacation).

**Calls Outs and Weekend Duty**

Notify your supervisor or designee when you are called out after normal work hours or you are on weekend duty.

In your notification provide a brief description of the work activity, location and estimated time to complete the job and return home.

Provide a Supervisor with updates on activities at a minimum of two times a day (once in the morning and once in the afternoon), just prior to leaving location and again when you arrive home safely from a call out.
RECORDKEEPING
There is no record keeping requirements for this procedure.

TRAINING
Responsible Action
Supervisor Verify that direct report RPC employees, contract designees and contractors are trained in this procedure prior to assigning them lone worker duties.

{Supervisor} When appropriate, request the contractor provide documentation of company’s lone worker procedure and that the individual has completed training on that procedure.

Responsible Safety Officer / Health Safety Environment Leader (H.S.E)
The identity of the person who is responsible for the Resource Production Company safety program is [Safety Officer]. This person must be someone of sufficient authority to implement the program. In addition to other titles, this person is called the Responsible Safety Officer.

Designated
In accordance with Resource Production Company's safety and injury prevention program, [Safety Officer] has been designated as the Responsible Safety Officer, and has responsibility and authority to do the following in the name of Resource Production Company:
1. Develop and implement rules of safe practices for each function within the company.
2. Develop and implement safe operating rules for use of electrical and mechanical equipment consistent with manufacturer's recommendations and specifications.
Develop and implement a system to encourage employees to report unsafe conditions immediately.
Conduct a thorough investigation of each accident, whether or not it results in an injury, to determine the cause of the accident and to prevent recurrence. In cases of a known injury accident, the investigation shall proceed only after consultation with Resource Production Company attorneys, who shall direct the investigation (the product of which investigation shall be considered the work product of the attorney).
Instruct supervisors in safety responsibilities.
Develop and implement a program of employee safety education.
Conduct scheduled and unscheduled inspections to identify and correct unsafe working conditions. Special attention shall be given to notice of serious concealed dangers.
Maintain records of training, periodic inspections, corrective actions and investigations as required by law. The Responsible Safety Officer for Resource Production Company is [Safety Officer]. Resource Production Company will inform every person of the name of the Responsible

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Safety Officer and post his or her name and telephone/office number on the bulletin board where all other safety information is routinely maintained.

**Duties**
Overall responsibility and authority for implementing the injury and illness prevention program is vested in [Safety Officer], the Responsible Safety Officer. Management fully supports the Responsible Safety Officer. As part of the job, the Responsible Safety Officer will supplement this written injury and illness prevention program by: establishing workplace objectives and safety recognition programs; working with all government officials in both accident investigation and safety inspection procedures; maintaining safety and individual training records; encouraging reporting of unsafe conditions and promoting a safe workplace. Some of these responsibilities will be delegated to your immediate supervisor for implementation.

**Employee Compliance**
This written plan contains incentives designed to promote employee participation in the safety program. These incentives are not part of your regular compensation and are not intended to discourage you from reporting accidents.

**Agreement to Participate**
Every employer is required to provide a safe and healthful workplace. Resource Production Company is committed to fulfilling this requirement. A safe and healthful workplace is one of the highest priorities of Resource Production Company. The information in this manual constitutes a written injury and illness prevention program. While Resource Production Company cannot anticipate every workplace hazard, the following general principals should guide your conduct. To be safe, you must never stop being safety conscious. Study the guidelines contained in this manual. Discuss the workplace situation with the RSO. Attend all company sponsored training and safety meetings. Read all posters and warnings. Listen to instructions carefully. Follow the Code of Safe Work Place Practices contained herein. Participate in accident investigations as requested. Accept responsibility for the safety of others. Maintain all required documentation. By signing the acknowledgement at the end of this handbook, each employee promises to read and implement this injury and illness prevention program. If you don’t understand any policy, please ask your supervisor.

**Accident Free Workplace**
To help us all meet our goal of an accident free workplace, we have instituted a contest: we will offer a prize for each month in which there is not a single time-loss accident at work. The prize will be awarded at random. Each month, the prize will be announced in advance. All employees who worked more than 1 hour in the month are eligible. Failure to report an industrial injury will suspend the prize for two months.

**Employee Safety Suggestion Box**
From time to time, Resource Production Company will award a prize for the best safety suggestion. To be eligible, please give your written safety suggestions to your supervisor during the safety meetings. All these safety suggestions will be discussed at the meeting. The supervisor whose employee wins the best safety suggestion will also be given a prize. The
group that consistently has the best safety suggestions will also be recognized. Management is the sole judge of the value of safety suggestions, and will implement as many of the good suggestions as possible.

**Training**

Employee safety training is another requirement of an effective injury and illness prevention program. While Resource Production Company believes in skills training, we also want to emphasize safety training. All employees should start the safety training by reading this manual and discussing any problems or safety concerns with your direct supervisor. You may wish to make notes in the margins of this manual where it applies to your work.

**Safety & Health Training**

Training is one of the most important elements of any injury and illness prevention program. Such training is designed to enable employees to learn their jobs properly, bring new ideas to the workplace, reinforce existing safety policies and put the injury and illness prevention program into action. Training is required for both supervision and employees alike. The content of each training session will vary, but each session will attempt to teach the following:

a) The success of Resource Production Company’s injury and illness prevention program depends on the actions of individual employees as well as a commitment by the Company.

b) Each employee’s immediate supervisor will review the safe work procedures unique to that employee’s job, and how these safe work procedures protect against risk and danger.

c) Each employee will learn when personal protective equipment is required or necessary, and how to use and maintain the equipment in good condition.

d) Each employee will learn what to do in case of emergencies occurring in the workplace. Supervisors are also vested with special duties concerning the safety of employees.

The supervisors are key figures in the establishment and success of Resource Production Company’s injury and illness prevention program. They have primary responsibility for actually implementing the injury and illness prevention program, especially as it relates directly to the workplace. Supervisors are responsible for being familiar with safety and health hazards to which employees are exposed, how to recognize them, the potential effects of these hazards, and rules and procedures for maintaining a safe workplace. Supervisors shall convey this information to the employees at the workplace, and shall investigate accidents according to the accident investigation policies contained in this manual.

**Periodic Safety Training Meetings**

Resource Production Company has safety meetings every 3 months. The purpose of the meeting is to convey safety information and answer employee questions. The format of most meetings will be to review, in language understandable to every employee, the content of the injury prevention program, special work site hazards, serious concealed dangers, and material safety data sheets. Each week, the RSO will review a portion of the company’s safe work practices contained in this booklet, or other safety related information. Whenever a new practice or procedure is introduced into the workplace, it will be thoroughly reviewed for safety. A sign-up sheet will be passed round each meeting, and notes of the meeting will be distributed afterwards. A copy of the notes will also be placed in the file of each employee who attends the meeting. Employee attendance is mandatory and is compensable unless part
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of an official state approved training program or pre-employment requirement.

Employee Responsibility for Training
Teaching safety is a two-way street. Resource Production Company can preach safety, but only employees can practice safety. Safety education requires employee participation. Every month, a meeting of all employees will be conducted for the purpose of safety instruction. The employees will discuss the application of the Company's injury and illness prevention program to actual job assignments. They will also read and discuss a section of the manual and review application of general safety rules to specific situations. Remember, the following general rules apply in all situations:

a) No employee should undertake a job that appears to be unsafe.
b) No employee is expected to undertake a job until he/she has received adequate safety instructions, and is authorized to perform the task.
c) No employee should use chemicals without fully understanding their toxic properties and without the knowledge required to work with these chemicals safely.
d) Mechanical safeguards must be kept in place.
e) Employees must report any unsafe conditions to the job site supervisor and the Responsible Safety Officer.
f) Any work-related injury or illness must be reported to management at once.
g) Personal protective equipment must be used when and where required. All such equipment must be properly maintained.

Communication
Employers should communicate to employees their commitment to safety and to make sure that employees are familiar with the elements of the safety program. Resource Production Company communicates with its employees orally, in the form of directions and statements from your supervisor, written, in the form of directives and this manual, and by example. If you see a supervisor or management do something unsafe, please tell that person. We sometimes forget actions speak louder than words.

Disciplinary Program
Persons directly responsible for Disciplinary Measures are the safety department, project manager, project superintendent and/or foreman.
Not following verbal or written safety procedures, guidelines, rules, horse play, failure to wear selected PPE, abuse of selected PPE, etc can be grounds for disciplinary action.
To correct violation requires meeting with employee(s) to discuss the infraction & inform individual(s) of the rule or procedure that was violated and the corrective action to be taken.
Physical inspections by company officials that indicate violations showing overall lack of commitment to company safety goals shall be under the same level of disciplinary actions.

Accident Prevention Policy Posting
Each employee has a personal responsibility to prevent accidents. You have a responsibility to your family, to your fellow workers and to the Company. You will be expected to observe safe practice rules and instructions relating to the efficient handling of your work. Your responsibilities include the following:
• Incorporate safety into every job procedure. No job is done efficiently unless it has been done safely.
• Know and obey safe practice rules.
• Know that disciplinary action may result from a violation of the safety rules.
• Report all injuries immediately, no matter how slight the injury may be.
• Caution fellow workers when they perform unsafe acts.
• Don't take chances.
• Ask questions when there is any doubt concerning safety.
• Don't tamper with anything you do not understand.
• Report all unsafe conditions or equipment to your supervisor immediately.

A copy of this manual will be posted in the work area. It is the policy of Resource Production Company to provide a safe and clean workplace and to maintain sound operating practices. Concentrated efforts shall produce safe working conditions and result in efficient, productive operations. Safeguarding the health and welfare of our employees cannot be stressed too strongly. Accident prevention is the responsibility of all of us. Department heads and supervisors at all levels shall be responsible for continuous efforts directed toward the prevention of accidents. Employees are responsible for performing their jobs in a safe manner. The observance of safe and clean work practices, coupled with ongoing compliance of all established safety standards and codes, will reduce accidents and make our Company a better place to work.

Safety Meetings
Resource Production Company has safety meetings weekly and every month. The purpose of the meeting is to convey safety information and answer employee questions. The format of most meetings will be to review, in language understandable to every employee, the content of the injury prevention program, special work site hazards, serious concealed dangers, and material safety data sheets. Each week, the RSO will review a portion of the company's safe work practices contained in this booklet, or other safety related information essential to accomplish the goals of the program. Resource Production Company requires all its employees to accept responsibility for their own safety, as well as that of others in the workplace. It is your responsibility to read this manual and to become familiar with the Code of Safe Work Practices and Specific Safety Rules contained in this manual, as well as any posted government Safety Orders.

Hazard Identification & Abatement
This written safety and health plan sets out a system for identifying workplace hazards and correcting them in a timely fashion. Please review it carefully with your supervisor. Remember, safety is everyone's responsibility.

Safety Audits
The best method to establish a safer workplace is to study past accidents and worker compensation complaints. By focusing on past injuries, Resource Production Company hopes to avoid similar problems in the future. Therefore, whenever there is an accident, and in many cases upon review of past accidents, you may be requested to participate in a safety
audit interview. During the interview, there will be questions about the nature of the investigation and the workplace safety related to the incident. Please answer these questions honestly and completely. Also, please volunteer any personal observations and/or suggestions for improved workplace safety. Based upon the study of past accidents and industry recommendations, a safety training program has been implemented. In addition to other preventative practices, there will be a group discussion of the cause of the accident and methods to avoid the type of accidents and injury situations experienced in the past. Work rules will be reviewed and modified based upon the study of these accidents. In addition to historical information, workplace safety depends on workplace observation.

Your supervisor is responsible for inspecting your working area daily before and while you are working, but this does not mean you are no longer responsible for inspecting the workplace also. Each day, before you begin work, you must inspect the area for any dangerous conditions. Inform your supervisor of anything significant, so other employees and guests are advised. You may also be given written communications regarding unsafe conditions or serious concealed dangers. Review this communication carefully and adjust your workplace behavior to avoid any danger or hazards. If you are unclear or unsure of the significance of this written communication, contact your supervisor and review your planned actions before starting to work. It is better to wait and check, then to go ahead and possibly cause an injury to yourself and others. Managers must provide written notice to employees of any serious concealed dangers of which they have actual knowledge. In addition to providing written notice of all serious concealed dangers to employees, managers are required to report serious concealed dangers to either OSHA or an appropriate administrative agency within fifteen days, or immediately if such danger would cause imminent harm, unless the danger is abated. Merely identifying the problem is not sufficient. The danger must be reported to the appropriate supervisor and the Responsible Safety Officer, who then will correct the problem. If the danger cannot be corrected, then all employees will be warned to take protective action so that the danger will not result in any injuries.

**Workplace Inspections**

In addition to the examination of records, workplace safety inspections will occur periodically every month, when conditions change, or when a new process or procedure is implemented. During these inspections, there will be a review of the injury and illness prevention policy and Resource Production Company code of safe work practices.

**Introduction Incident Investigation and Reporting**

Accidents occur when hazards escape detection during preventive measures, such as a job or process safety analysis, 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.
Most accidents in the workplace result from unsafe work behaviors. According to the latest research, they represent the direct cause for about 95% of all workplace accidents. Hazardous conditions represent the direct cause for only about 3% of workplace accidents. "Acts of God" account for the remaining 2%. All these statistics imply that management system weaknesses account for fully 98% of all workplace accidents. Effective accident investigation identifies these root causes and recommends strategies to eliminate management system weaknesses.

Reporting of the incident must occur in a specified manner and the reporting sequence must be posted. In the event of an incident, the following are contacted in order: 911, department supervisor, section manager, company physician, security, human resources, safety department, and other organizations as required. The Resource Production must also verbally report required incidents to OSHA within 8 hours of their discovery. Incidents must also be reported to the Owner Client as soon as possible or in a timely manner (within 24 hours of incident).

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.

Individual responsibilities for reporting and investigation must be pre-determined and assigned prior to incidents

Personnel will be trained in their roles and responsibilities for incident response and incident investigation techniques. Training requirements are but not limited to Awareness, First Responder, Investigation, and training frequency.

Equipment may include some or all of the following items; writing equipment such as pens/paper, measurement equipment such as tape measures and rulers, cameras, small tools, audio recorder, PPE, marking devices such as flags, equipment manuals, etc.

Employees who could be first responders will be trained and qualified in first aid techniques to control the degree of loss during the immediate post-incident phase.

After immediate rescue, actions to prevent further loss should occur. Maintenance personnel will be summoned to assess integrity of buildings 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.

Initial identification of evidence immediately following the incident might include a listing of people, equipment, and materials involved and a recording of environmental factors such as weather, illumination, temperature, noise, ventilation.

Evidence such as people, positions of equipment, parts, and papers must be preserved, secured, and collected through notes, photographs, witness statements, flagging, and impoundment of documents and equipment.

Witness interviews and statements must be collected. Locating witnesses, ensuring unbiased testimony, obtaining appropriate interview locations, and use of trained interviewers should be detailed. The need for follow-up interviews should also be addressed.
Incident investigations should result in corrective actions, individuals should be assigned responsibilities relative to the corrective actions, and these actions should be tracked to closure. Written incident reports should be prepared by supervisors and include an incident report form and a detailed narrative statement concerning the events. The format of the narrative report may include an introduction, methodology, summary of the incident, investigation board member names, narrative of the event, findings and recommendations. Photographs, witness statements, drawings, etc. should be included. Lessons learned should be reviewed and communicated. Changes to processes must be placed into effect to prevent reoccurrence or similar events.

**Accident Investigation**

A primary tool used by Resource Production Company to identify the areas responsible for accidents is a thorough and properly completed accident investigation. The results of each investigation will be reduced to writing and submitted for review by management and Resource Production Company's insurance risk management advisors, and, if the accident resulted in serious injury, to Company attorneys. If the accident resulted in serious injury, the procedure will be directed by the attorneys to provide the most reliable evidence or description legally permissible. All investigations pursuant to the directions of legal counsel will be protected by all applicable privileges, if any. The attorney will provide more detail on this topic during the investigation.

Every job location will have on site at least one camera, preferably either a video or a sixty second type, with enough film to take pictures immediately after any occurrence. Some workplaces will have a video camera. A written report should be prepared from notes and diagrams made at the scene, or a portable [tape/voice] recorder will be used to record direct eyewitness statements as near to the actual time of observation as possible. All statements should include the time and date given, and the town or county where the statement was made. If the statement is intended to be used in court proceedings, a suitable jury is required, otherwise, a simple statement that the description is sworn to be true under penalty of perjury with the date, place and time should be included. All pictures should be similarly identified. Let people know on tape that they are being recorded. Also, make sure that the names and addresses and day and evening phone numbers of all eye witnesses are noted or recorded. If a formal police report or other official investigation is conducted by any government agency, get the name and badge number of the official, or a business card, and find out when a copy of the official report will be available to the public. If you are requested to make a statement, you have the right to have the Company lawyer attend your statement at no cost to you.

A satisfactory accident report will answer the following questions:

a. What happened? The investigation report should begin by describing the accident, the injury sustained, the eyewitnesses, the date, time and location of the incident and the date and time of the report. Remember: who, what, when, where and how are the questions that the report must answer.
b. Why did the accident occur? The ultimate cause of the accident may not be known for several
days after all the data are analyzed. However, if an obvious cause suggests itself, include your
conclusions as a hypothesis at the time you give your information to the person in charge of the
investigation.
c. What should be done? Once a report determines the cause of the accident, it should suggest a
method for avoiding future accidents of a similar character. This is a decision by the Responsible
Safety Officer and the supervisor on the project, as well as top management. Once a solution
has been adopted, it is everyone’s responsibility to implement it.
d. What has been done? A follow up report will be issued after a reasonable amount of time to
determine if the suggested solution was implemented, and if so, whether the likelihood of
accident has been reduced.

Records
Resource Production Company maintains records of employee training, hazard identification
and abatement, and accident investigation.

OSHA Records Required
Copies of required accident investigations and certification of employee safety training shall be
maintained by the Responsible Safety Officer. A written report will be maintained on each
accident, injury or on-the-job illness requiring medical treatment. A record of each such injury
or illness is recorded on OSHA Log and Summary of Occupational Injuries Form 300 according to
its instructions within seven (7) calendar days of receiving information that a recordable injury or
illness has occurred. Supplemental records of each injury are maintained on OSHA Form 101, or
Employers Report of Injury or Illness Form 5020. Every year, a summary of all reported injuries
or illnesses is posted in a conspicuous place or places where notices to employees are
customarily posted no later than February 1, for one month, until March 1, on OSHA Form 300.
The annual summary must post no later than February 1 of the year following the year covered
by the records and keep the posting in place until 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. These records are maintained for five years from the date of
preparation.

General Statement on Safety
Resource Production Company strives to maintain a safe place to work and to employ safe
workers. It is your responsibility to conduct your work in a safe, responsible manner.
Immediately report all accidents occurring on Company premises to your supervisor.
Supervisors will report incident and or accident to the Health, Safety, and Environment
(H.S.E.) representative.
Each employee has an individual responsibility to prevent accidents. It is to the benefit of all
employees and Resource Production Company that you report any situation or condition you
believe may present a safety hazard, including any known or concealed dangers in your work area. Resource Production Company encourages you to report your concern either to your immediate supervisor or to a member of the Safety Committee. The supervisor or Safety Committee will take immediate action to investigate the matter.

**Safety Equipment**

Proper safety equipment is necessary for your protection. The Company provides the best protective equipment it is possible to obtain. Use all safeguards, safety appliances, or devices furnished for your protection and comply with all regulations that may concern or affect your safety. Wear your gear properly – all snaps and straps fastened, cuffs not cut or rolled. Your supervisor will advise you as to what protective equipment is required for your job. Certain jobs require standard safety apparel and appliances for the protection of the employee. Your supervisor is aware of the requirements and will furnish you with the necessary approved protective appliances. These items shall be worn and effectively maintained as a condition of your continued employment and part of our mutual obligation to comply with the Occupational Safety and Health Act. Safety goggles, glasses and face shields shall correspond to the degree of hazard, i.e., chemical splashes, welding flashes, impact hazard, dust, etc. Do not alter or replace an approved appliance without permission from your supervisor. Rubber gloves and rubber aprons shall be worn when working with acids, caustics or other corrosive materials. Specified footwear must be worn. No jewelry shall be worn around power equipment. Hearing protection appliances (approved muffs or plugs) shall be worn by all employees working within any area identified as having excess noise levels. Your supervisor will instruct you in the proper use of the appliance.

**Protective Clothing**

Proper safety equipment is necessary for your protection. The Company provides industry acceptable OSHA approved protective equipment it is possible to obtain. Use all safeguards, safety appliances, or devices furnished for your protection and carry out all regulations that may concern or affect your safety. Wear your gear properly - all snaps and traps fastened, cuffs not cut or rolled. Your supervisor will advise you as to what PPE is required for your job.

**Smoking & Fire Safety**

Fire is one of the worst enemies of any facility. Learn the location of the fire extinguishers. Learn how to use them. You can help prevent fires by observing the smoking rules:
- Smoking is not allowed on the site, except in designated areas.
- Smoking is not permitted in rest rooms.
- If you are not sure about where you may smoke, ask the supervisor.

**Reporting**

All serious accidents must be reported to OSHA. In cases of hospitalization or death, a full investigation with copies to governmental authorities will be required. In less serious cases, the investigation report must be presented to the company for disclosure to its insurance carrier and for remedial action at the work site.

**Electrical Safety: Qualified/Non Qualified**

Employees who face a risk of electric shock but who are not qualified persons shall be trained
& familiar with electrically related safety practices. 2. Employees shall be trained in safety related work practices that pertain to their respective job assignments. 3. Clearance distances. Safe work practices shall be employed to prevent electric shock or other injuries resulting from either direct or indirect electrical contacts when work is performed near or on equipment or circuits which are or may be energized. Applies to work on exposed deenergized parts or near enough to them to expose the employee to any electrical hazard they present. 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. Applies to work performed on exposed live parts (involving either direct contact or by means of tools or materials) or near enough to them for employees to be exposed to any hazard they present Only qualified persons may work on electric circuit parts or equipment that have not been deenergized. Such persons shall be made familiar with the use of special precautionary techniques, PPE, insulating & shielding materials and insulated tools. The lines shall be deenergized and grounded or other protective measures shall be provided before work is started. Minimum approach distances for both should be listed along with safety measures utilized. Clearance distances should be listed along with other protective measures utilized. Employees may not enter spaces containing exposed energized parts unless illumination is provided that enables the employees to work safely. Protective shields, protective barriers or insulating materials as necessary shall be provided. If employees are subject to handle long dimensional conductor objects (ducts or pipes), steps for safe work practices shall be listed. Portable ladders shall have non-conductive side rails. Conductive items of jewelry or clothing shall not be worn unless they are rendered non-conductive by covering, wrapping or other insulating means. 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:

**TABLE S-5 - APPROACH DISTANCES FOR QUALIFIED EMPLOYEES - ALTERNATING CURRENT**

<table>
<thead>
<tr>
<th>Voltage range (phase to phase)</th>
<th>Minimum approach distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>300V and less ..................</td>
<td>Avoid Contact</td>
</tr>
<tr>
<td>Over 300V, not over 750V ......</td>
<td>1 ft. 0 in. (30.5 cm).</td>
</tr>
<tr>
<td>Over 750V, not over 2kV ........</td>
<td>1 ft. 6 in. (46 cm).</td>
</tr>
</tbody>
</table>

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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:

For voltages to ground 50kV or below - 10 feet (305 cm);

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over 2kV, not over 15kV</td>
<td>2 ft. 0 in. (61 cm).</td>
</tr>
<tr>
<td>Over 15kV, not over 37kV</td>
<td>3 ft. 0 in. (91 cm).</td>
</tr>
<tr>
<td>Over 37kV, not over 87.5kV</td>
<td>3 ft. 6 in. (107 cm).</td>
</tr>
<tr>
<td>Over 87.5kV, not over 121kV</td>
<td>4 ft. 0 in. (122 cm).</td>
</tr>
<tr>
<td>Over 121kV, not over 140kV</td>
<td>4 ft. 6 in. (137 cm).</td>
</tr>
</tbody>
</table>

**General Code of Safe Work Practices**

**General Fire Safety**

Our local fire department is well acquainted with our facility, its location and specific hazards. All fire doors and shutters must be maintained in good operating condition. Fire doors and shutters should be unobstructed and protected against obstructions, including their counterweights. Fire door and shutter fusible links must be in place. All automatic sprinkler water control valves, if any, air and water pressures should be checked routinely. The maintenance of automatic sprinkler systems is assigned to the Responsible Safety Officer. Sprinkler heads should be protected by metal guards if they could possibly be exposed to damage. Proper clearance must be maintained below sprinkler heads. Portable fire extinguishers are provided in adequate number and type and are located throughout the facility. Fire extinguishers are mounted in readily accessible locations. Fire extinguishers are recharged regularly and the date of last inspection noted on their tags. All employees are periodically instructed in the use of extinguishers and fire protection procedures. Notify the Responsible Safety Officer of any damage to fire protection equipment.

**Cold**

Prolonged exposure to freezing or cold temperatures can result in serious health problems such as trench foot, frostbite and hypothermia. In extreme cases, including cold water immersion, exposure can result in death. Danger signs include uncontrolled shivering, slurred speech, clumsy movements, fatigue and confused behavior. If these signs are observed, call for emergency help.

Some tips:
- Recognize environmental and workplace conditions that can be dangerous.
- Learn the signs and symptoms of cold-induced illnesses/injuries and what to do to for yourself and others.
- Wear proper clothing for cold, wet and windy conditions including layers so you can adjust to changing conditions.
- Be sure to take frequent short breaks in warm dry shelters to allow the body to warm up.
Try to schedule work for the warmest part of the day.
Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
Use the buddy system—work in pairs so that one worker can recognize danger signs.
Drink warm, sweet beverages (sugar water, sports-type drinks) and avoid drinks with caffeine (coffee, tea, sodas or hot chocolate) or alcohol.
Eat warm, high-calorie foods such as hot pasta dishes.
Remember, you face increased risks when you take certain medications, are in poor physical condition or suffer from illnesses such as diabetes, hypertension or cardiovascular disease.

**Powder Actuated Tools**
The employees using powder-actuated tools must be properly trained and will be issued a card as proof of that training. Some of the powder-actuated tools being used have written approval of the Division of Occupational Safety and Health. Check to see which tools require a certification and which certificates have been issued. Each powder-actuated tool should be stored in its own locked container when not being used. Signs measuring at least 7” x 10” and in bold face typed reading “POWDER-ACTUATED TOOL IN USE” must be placed conspicuously when the tool is being used. All powder-actuated tools must be left unloaded until they are actually ready to be used. Each day before using, each powder-actuated tool must be inspected for obstructions or defects. The powder-actuated tool operators must have and must use appropriate personal protective equipment such as hard hats, safety goggles, safety shoes and ear protectors whenever they are using these machines.

**Machine Guarding**
Before operating any machine, every employee must have completed a training program on safe methods of machine operations. It is the primary purpose of supervision to ensure that employees are following safe machine operating procedures. There will be a regular program of safety inspection of machinery and equipment. All machinery and equipment must be kept clean and properly maintained. There must be sufficient clearance provided around and between machines to allow for safe operations, set up, servicing, material handling and waste removal.
All equipment and machinery should be securely placed and anchored when necessary, to prevent tipping or other movement that could result in personal injury. Most of the time, machinery should be bolted to the floor to prevent falling during an earthquake, and the electrical cord to the machinery fixed with a breaker or other shut-off device to stop power in case of machine movement. There must be a power shut-off switch within reach of the operator’s position at each machine. Electrical power to each machine shall be capable of being locked out for maintenance, repair or security. The non-current carrying metal parts of electrically operated machines must be bonded and grounded. The foot-operated switches are guarded and/or arranged to prevent accidental actuation by personnel or falling objects. All manually operated valves and switches controlling the operation of equipment and machines must be clearly identified and readily accessible.
All EMERGENCY stop buttons are colored RED. All the pulleys and belts which are within 7 feet of the floor or working level are properly guarded. All moving chains and gears must be properly guarded. All splash guards mounted on machines that use coolant must be positioned to prevent coolant from splashing the employees. The supervisor will instruct
every employee in the work area on the methods provided to protect the operator and other employees in the machine area from hazards created by the operation of a machine, such as nip points, rotating parts, flying chips and sparks. The machinery guards must be secure and arranged so they do not present a hazard. All special hand tools used for placing and removing material must protect the operator's hands. All revolving drums, barrels and containers should be guarded by an enclosure that is interlocked with the drive mechanisms, so that revolution cannot occur unless the guard enclosure is in place. All arbors and mandrels must have firm and secure bearings and be free of play. A protective mechanism has been installed to prevent machines from automatically starting when power is restored after a power failure or shutdown. Machines should be constructed so as to be free from excessive vibration when the size tool is mounted and run at full speed. If the machinery is cleaned with compressed air, the air must be pressure controlled and personal protective equipment or other safeguards used to protect operators and other workers from eye and bodily injury. All fan blades should be protected by a guard having openings no larger than 1/2 inch when operating within 7 feet of the floor. Saws used for ripping equipment must be installed with anti-kickback devices and spreaders. All radial arm saws must be arranged so that the cutting head will gently return to the back of the table when released.

**Lock-out / Block-out Procedures**

All machinery or equipment capable of movement must be de-energized or disengaged and blocked or locked out during cleaning, servicing, adjusting or setting up operations, whenever required. The locking out of the control circuits in lieu of locking out main power disconnects is prohibited. All equipment control valve handles must be provided with a means for locking out. The lock-out procedure requires that stored energy (i.e. mechanical, hydraulic, air) be released or blocked before equipment is locked out for repairs. Appropriate employees are provided with individually keyed personal safety locks. Employees are required to keep personal control of their key(s) while they have safety locks in use. Employees must check the safety of the lockout by attempting a start up after making sure no one is exposed. Where the power disconnector does not also disconnect the electrical control circuit, the appropriate electrical enclosures must be identified. The control circuit can also be disconnected and locked out.

**Welding, Cutting & Brazing**

Only authorized and trained personnel are permitted to use welding, cutting or brazing equipment. All operators must have a copy of the appropriate operating instructions and are directed to follow them. Compressed gas cylinders should be regularly examined for obvious signs of defects, deep rusting, or leakage. Use care in handling and storing cylinders, safety valves, relief valves and the like, to prevent damage. Precaution must be taken to prevent mixture of air or oxygen with flammable gases, except at a burner or in a standard torch. Only approved apparatus (torches, regulators, pressure-reducing valves, acetylene generators, manifolds) may be used. Cylinders must be kept away from sources of heat. It is prohibited to use cylinders as rollers or supports. Empty cylinders must be appropriately marked, their valves closed and valve-protection caps on.

Signs reading: “DANGER-NO SMOKING, MATCHES, OR OPEN LIGHTS,” or equivalent must be
posted. Cylinders, cylinder valves, couplings, regulators, hoses and apparatus must be kept free of oily or greasy substances. Care must be taken not to drop or strike cylinders. Unless secured on special trucks, all regulators must be removed and valve-protection caps put in place before moving cylinders. All cylinders without fixed hand wheels must have keys, handles, or non-adjustable wrenches on stem valves when in service. Liquefied gases must be stored and shipped valve-end up with valve covers in place. Before a regulator is removed, the valve must be closed and gas released from the regulator. All employees are instructed never to crack a fuel-gas cylinder valve near sources of ignition. Red is used to identify the acetylene (and other fuel-gas) hose, green for oxygen hose, and black for inert gas and air hose. All pressure-reducing regulators must be used only for the gas and pressures for which they are intended.

**Arc Welders**

The open circuit (No Load) voltage of arc welding and cutting machines must be as low as possible and not in excess of the recommended limits. Under wet conditions, automatic controls for reducing no-load voltage must be used. Grounding of the machine frame and safety ground connections of portable machines must be checked periodically. Electrodes must be removed from the holders when not in use. All electric power to the welder must be shut off when no one is in attendance. Suitable fire extinguishing equipment must be available for immediate use before starting to ignite the welding torch. The welder is strictly forbidden to coil or loop welding electrode cable around his/her body. All wet welding machines must be thoroughly dried and tested before being used. All work and electrode lead cables must be frequently inspected for wear and damage, and replaced when needed. All connecting cable lengths must have adequate insulation. When the object to be welded cannot be moved and fire hazards cannot be removed, shields must be used to confine heat, sparks and slag. Fire watchers will be assigned when welding or cutting is performed in locations where a serious fire might develop. Assigned fire watchers must be trained in the use of fire extinguishing equipment and familiar with the facilities for sounding an alarm in the event of a fire. All combustible floors must be kept wet, covered by damp sand, or protected by fire-resistant shields. When floors are wet down, personnel should be protected from possible electrical shock. 1) Locations where other than a minor fire might develop. 2) Combustible materials closer than 35 ft. (10.7M) to point of operation... 3) Combustibles that are 35 ft. (10.7M) or more away but are easily ignited. 4) Wall or floor openings within 35 feet (10.7M) radius expose combustible materials. 5) Combustible materials are adjacent to the opposite side of metal partitions, ceilings or roofs. When welding is done on metal walls, precautions must be taken to protect combustibles on the other side. Before hot work is begun, used drums, barrels, tanks and other containers must be so thoroughly cleaned that no substances remain that could explode, ignite or produce toxic vapors. It is required that eye protection helmets, hand shields and goggles meet appropriate standards. Employees exposed to the hazards created by welding, cutting or brazing operations must be protected with personal protective equipment and clothing. Check for adequate ventilation where welding or cutting is performed. When working in confined spaces, environmental monitoring tests should be taken and means provided for quick removal of welders in case of emergency.
Compressors & Compressed Air
All compressors must be equipped with pressure relief valves and pressure gauges. All compressor air intakes must be installed and equipped to ensure that only clean, uncontaminated air enters the compressor. Every air receiver must be provided with a drain pipe and valve at the lowest point for the removal of accumulated oil and water. Compressed air receivers must be periodically drained of moisture and oil. All safety valves shall be tested frequently and at regular intervals to determine whether they are in good operating condition. A current operating permit issued by the Division of Occupational Safety and Health shall be maintained. The inlet of air receivers and piping systems must be kept free of accumulated oil and carbonaceous materials.

Compressed Gas & Cylinders
Cylinders with a water weight capacity over 30 pounds must be equipped with means for connecting a valve protector device, or with a collar or recess to protect the valve. Cylinders must be legibly marked to identify clearly the gas contained. Compressed gas cylinders should be stored only in areas which are protected from external heat sources such as flame impingement, intense radiant heat, electric arcs or high temperature lines. Cylinders must not be located or stored in areas where they will be damaged by passing or falling objects or subject to tampering by unauthorized persons. Cylinders must be stored or transported in a manner to prevent them from creating a hazard by tipping, falling or rolling. All cylinders containing liquefied fuel gas must be stored or transported in a position so that the safety relief device is always in direct contact with the vapor space in the cylinder. Oxygen cylinders shall be stored in an upright secured position 20 feet from any flammable gases or petroleum products. Valve protectors must always be placed on cylinders when the cylinders are not in use or connected for use. All valves must be closed off before a cylinder is moved, when the cylinder is empty, and at the completion of each job. Low pressure fuel-gas cylinders must be checked periodically for corrosion, general distortion, cracks, or any other defect that might indicate a weakness or render them unfit for service. The periodic check of low pressure fuel-gas cylinders includes a close inspection of the cylinder's bottom.

Overview of Welding & Cutting
Assigned fire watchers must be trained in the use of fire extinguishing equipment and familiar with the facilities for sounding an alarm in the event of a fire. Cutters, welders and their supervisors must be suitably trained in the safe operations of their equipment and the safe use of the process.
If the object to be welded or cut cannot readily be moved, all moveable fire hazards should be removed.
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.
If the requirements stated in paragraphs (a) (1) (i) and (a) (1) (ii) of this section cannot be followed the welding and cutting shall not be performed.
1) Locations where other than a minor fire might develop. 2) Combustible materials closer than 35 ft. (10.7M) to point of operation... 3) Combustibles that are 35 ft. (10.7M) or more away but are easily ignited. 4) Wall or floor openings within 35 feet (10.7M) radius expose combustible materials. 5) Combustible materials are adjacent to the opposite side of metal
partitions, ceilings or roofs.
Fire watchers shall have fire extinguishers readily available.
Before cutting or welding is permitted the area shall be inspected by position responsible for inspection and granting authorized welding and cutting operations. Precautions that are to be taken shall be in the form of a written permit.
Ventilation, securing cylinders, lifelines, electrode removal, gas cylinders shut off and warning signs must be addressed.
Any welding, cutting or burning of lead base metals, zinc, cadmium, mercury, beryllium or exotic metals or paints not listed here shall have proper ventilation or respiratory protection.
First aid equipment shall be available at all times.
Workers in charge of oxygen or fuel-gas supply equipment (including distribution piping systems and generators) must be instructed and judged competent for such work.
Oxygen cylinders shall be stored in an upright secured position 20 feet from any flammable gases or petroleum products.
Workman assigned to operate arc welding equipment must be properly instructed and qualified to operate such equipment.
Workman assigned must be familiar with this section (1910.254) and with 1910.252(a) (b) & (c).
Operators of equipment should report any equipment defect or safety hazards and discontinue use of equipment until its safety has been assured. Repairs shall be made only by qualified personnel.

**Hoists & Auxiliary Equipment**

Every overhead electrical hoist shall be equipped with a limit device to stop the hook travel at its highest and lowest points of safe travel. Check these limits without a load to ensure the device is working correctly. Each hoist should automatically stop and hold any load up to 125 percent of its rated load if its actuating force is removed. Check this periodically under controlled conditions. Make sure that the rated load of each hoist is legibly marked and visible to the operator. Stops should be provided at the safe limits of travel for trolley hoists. The controls of hoists should be plainly marked to indicate direction of travel or motion. Every cage-controlled hoist must be equipped with an effective warning device. Close-fitting guards or other suitable devices should be installed on hoists to assure hoist ropes will be maintained in the sheave grooves. All hoist chains or ropes must be of sufficient length to handle the full range of movement for the application, while maintaining two full wraps on the drum at all times. All nip points or contact points between hoist ropes and sheaves which are permanently located within 7 feet of the floor; ground or working platform must be guarded. It is prohibited to use chains or rope slings that are kinked or twisted. The operator should avoid carrying loads over people. Only employees who have been trained in the proper use of hoists are allowed to operate them.

**Industrial Trucks / Forklifts**

Only trained personnel should be allowed to operate industrial trucks. Lift Truck Operating rules must be posted and will be strictly enforced. When operating any industrial truck, substantial overhead protective equipment will be provided on high lift rider equipment. Directional lighting is also provided on each industrial truck that operates in an area with less
than 2 foot candles per square foot of general lighting. Each industrial truck must have a
warning horn, whistle, gong or other device which can be clearly heard above the normal
noise in the area where operated. Before using a forklift, check that the brakes on each
industrial truck are capable of bringing the vehicle to a complete and safe stop when fully
loaded. The parking brake must effectively prevent the vehicle from moving when
unattended. When motorized hand and hand/rider truck are operated, and when the
operator releases the steering mechanism, make sure that both the brakes are applied and
power to the motor shut off. Maintenance records are available so that a driver can check on
the servicing of the truck in case of questions. When an industrial truck operates in areas
where flammable gases, vapors, combustible dust, or ignitable fibers may be present in the
atmosphere, the vehicle must be approved for such locations with a tag showing such
approval posted on the vehicle itself. Industrial trucks with internal combustion engines,
operated in buildings or enclosed areas, should be carefully checked to ensure that the
operation of the vehicle does not cause harmful concentration of dangerous gases or fumes.

**Spraying Operations**

In any spraying operation there should be adequate ventilation before starting any spraying
job. As to the conditions of the area where the spray job is to be done, consideration should
be taken before beginning work. If the area is enclosed, does it require mechanical
ventilation? Before working, make sure that the area is free of combustible materials, and
that there is "No Smoking" signs adequately posted and easily seen. If mechanical ventilation
is provided when spraying in enclosed areas, air should not be recirculated so as to avoid
contamination. There should be adequate space and ventilation for all drying areas. Also in an
enclosed area, spray operations must be at least 20 feet from flames, sparks, operating
electrical motors and other ignition sources. The spray area should be free of any hot
surfaces.

Any solvent used in the cleaning process should not have a flash point of 100 degrees or less.
If portable lamps are used to illuminate the spray areas they must be approved for the
location and must be suitable for use in a hazardous area. Approved respiratory equipment
will be provided and must be used when appropriate during spraying operations. If a sprinkler
system is within the confines of the spraying area operation, it should be in working order and
will be inspected semi-annually to make sure that it is in operating condition.

If a spraying booth is used for the spraying operation, it must be made of metal, masonry or
other noncombustible material. Make sure that "NO SMOKING" signs are posted in spray
areas, paint rooms, paint booths and paint storage areas. The spray booth must be
completely ventilated. Booth floors and baffles must be easily cleaned and noncombustible.
Ducts and access doors must be easily cleaned. Lighting fixtures for both outside and inside
the spray booth must be enclosed in clear see-through sealed panels. Electric motors for
exhaust fans must be placed outside the booth. Belts and pulleys must be completely
enclosed. Drying apparatus should be located in a well ventilated area in the booth and
properly grounded. Infrared drying apparatus must be kept out of the spray area during a
spraying operation.

**Confined Spaces**

Before entry into a confined space, all impellers, agitators, or other moving equipment
contained in the confined space must be locked-out. Ventilation must be either natural or mechanically provided into the confined space. All hazardous or corrosive substances that contain inert, toxic, flammable or corrosive materials must be valved off, blanked, disconnected and separated. Atmospheric tests should be performed to check for oxygen content, toxicity and explosive concentration. Atmospheric tests must be performed on a regular basis in a confined area where entry is required. The area must also be checked for decaying vegetation or animal matter that could produce methane. Adequate lighting must be provided within the space. If the confined area is located below the ground or near where motor vehicles are operating, care must be taken that vehicle exhaust or carbon monoxide does not enter the space.

When personnel enter a confined area, assigned safety standby employees who are alert to the work being done, are able to sound an alarm if necessary and to render assistance, must be in the area. These standby employees must be trained to assist in handling lifelines, respiratory equipment, CPR, first aid, and be able to employ rescue equipment that will remove the individual from the confined area. Standby personnel should be in teams of two during such an operation or else within the vicinity if working separately. There must also be an effective communication system utilized while the operation is occurring. When equipment which utilizes oxygen, such as salamanders, torches or furnaces, is used in a confined space, adequate ventilation must be provided to guarantee oxygen content and combustion for the equipment. When this equipment is used, adequate measures must be taken to assure that exhaust gases are vented outside the enclosure. When gas welding or burning is used, hoses must be checked for leaks. Compressed bottled gas must be outside the area and torches must be lit outside the area also. The atmosphere must be tested each time before lighting a torch.

**Environmental Controls**

All employees must be aware of the hazards involved when working with chemicals and the remedies that need to be used when an accident does occur. A training program will give instructions on how to handle the chemical being used and first aid to be applied to victims of chemical exposure. First aid and caution signs will be conspicuously posted so as to alert individuals on a constant basis. Charts identifying the chemicals utilized in the workplace, their symptoms and effects must also be posted. The workers must know what the acceptable level of exposure to a chemical is and what safety systems must be in place when working with a chemical. Staff should also be aware of new chemical products which may be available that are less harmful, and they must ensure that facilities are adequately ventilated when using chemicals on the premises. Spray painting operations done in spray rooms or booths must be equipped with an appropriate exhaust system. Periodic inspections must be made of the booth and noted on an inspection tag posted on the booth.

If welding is done, the welder should be certified. In the area of operation where the welding is taking place, the welder must be aware of ventilation available, the type of respirator that can be used in the area, and if exposure time or other means will suffice as a safe and adequate measure when welding as to the fumes that will be emitted. Welders should also be supplied with protective clothing and a flash shield during welding operations. When forklifts and other vehicles are used in buildings or other enclosed areas, carbon monoxide levels must be kept below maximum acceptable concentration. Noise levels also present a potential
hazard. Noise levels within a facility must be at acceptable levels and if not, steps must be taken to reduce the level using recommended engineering controls.

When fibrous materials such as asbestos are being handled, the necessary precautions must be taken to protect the employee from the material. The material must be labeled, along with signs conspicuously posted that these materials are being used in the area. Employees should be aware of effective methods used to prevent emission of airborne asbestos fibers, silica dust and other similar hazardous materials. Some of the recommended methods of controlling the emission of these materials are by using water and vacuuming, rather than blowing and sweeping, the materials. Machinery such as grinders, saws and other tools that produce a fine airborne dust must be vented to an industrial collector or central exhaust system. In any ventilation system the system should be designed and operated at an airflow and volume necessary for proper application and effectiveness. In the design of the ventilation system the ducts and belts must be free of obstructions and slippage.

As with all operations, there must be written standards on the procedures for the equipment, description of the job task, usage of the protective equipment provided, such as the selection and use of respirators, and when they are needed. Any water that is provided to an employee throughout the facility should be clearly identified as to whether it is for drinking, washing or cooking. All restrooms must be kept clean and sanitary. Employees should be screened before taking positions that may expose them to hazards they are not physically capable of handling. An employee who takes an assignment which requires physical labor must be trained to lift heavy loads properly so as not to damage themselves physically. If the work assignment involves dealing with equipment that produces ultra-violet radiation, the employee must be properly protected or given the correct protective clothing. An employee posted to an assignment on a roadway where there is heavy traffic must be given the designated protective clothing (bright colored traffic orange warning vest) and safety training regarding the hazards of this job.

Heat Illness Prevention

Purpose

This program is designed to reduce the risk of work-related heat illnesses.

Scope

This procedure applies to all work being performed in hot environments.

Definitions

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

"Heat Illness" means a serious medical condition resulting from the body's inability to cope with a particular heat load, and includes heat cramps, heat exhaustion, heat syncope and heat stroke.
"Preventative recovery period" means a period of time to recover from the heat in order to prevent heat illness.

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

**Requirements**

All managers and supervisors are responsible for implementing and maintaining the Heat Illness Program in their work areas.

**Provision of Water**

Employees shall have access to potable drinking water. Where it is not plumbed or otherwise continuously supplied, it shall be provided in sufficient quantity at the beginning of the work shift.

**Access to Shade**

Employees will be provided with access to shade. Employees suffering from heat illness or believing a preventative recovery period is needed shall be provided access to an area with shade that is either open to the air or provided with ventilation or cooling. Such access to shade shall be permitted at all times. See definition of “Shade”.

**Control Measures**

Each work location involved in working in hot environments shall implement measures that must be in place to control the effects of environmental factors that can contribute to heat related illnesses. The most common environmental factors are air temperature, humidity, radiant heat sources and air circulation.

Physical factors that can contribute to heat related illness shall be taken into consideration before performing a task. The most common physical factors that can contribute to heat related illness are type of work, level of physical activity and duration, and clothing color, weight and breathability.

Supervisors must ensure personal factors that contribute to heat related illness are taken into consideration before assigning a task where there is the possibility of a heat-related illness occurring. The most common personal factors that can contribute to heat related illness are age, weight/fitness, drug/alcohol use, prior heat-related illness, etc.
Each work site shall develop site specific procedures but shall include the minimum:

- Bring at least 2 quarts per employee at the start of the shift and the supervisors/designated persons will monitor water containers every 30 minutes, and employees are encouraged to report to supervisor/designated person low levels or dirty water.
- Supervisors will provide frequent reminders to employees to drink frequently.
- Every morning there will be short tailgate meetings to remind workers about the importance of frequent consumption of water throughout the shift during hot weather.
- Place water containers as close as possible to the workers.
- When drinking water levels within a container drop below 50%, the water shall be replenished immediately or water levels should not fall below the point that will allow for adequate water during the time necessary to effect replenishment.
- Disposable/single use drinking cups will be provided to employees or provisions will be made to issue employees their own cups each day.
- Supervisors will set-up an adequate number of umbrellas, canopies or other portable devices at the start of the shift and will relocate them to be closer to the crew, as needed.
- Non-agricultural employers can use other cooling measures if they demonstrate that these methods are as effective as shade.
- Working hours will be modified to work during the cooler hours of the day, when possible.
- When a modified or shorter work-shift is not possible, more water and rest breaks will be provided.
- Supervisors will continuously check all employees and stay alert to the presence of heat related symptoms.
- Supervisors will carry cell phones or other means of communication, to ensure that emergency services can be called and check that these are functional at the worksite prior to each shift.
- Every morning, workers will be reminded about address and directions to the worksite to inform medical responders and emergency procedures.
- All newly hired workers will be assigned a buddy or experienced coworker to ensure that they understood the training and follow the company procedures.

Training
Training in the following topics shall be provided to all supervisory and non-supervisory employees:

- The environmental and personal risk factors for heat illness;
- The importance of frequent consumption of small quantities of water, up to 4 cups per hour, when the work environment is hot and employees are likely to be sweating more than usual in the performance of their duties;
- The importance of acclimatization;
- The different types of heat illness and the common signs and symptoms of heat illness;
- The importance to employees of immediately reporting to the employer, directly or through the employee's supervisor, symptoms or signs of heat illness in themselves, or in co-workers;
• Resource Production procedures for responding to symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary;

• Resource Production procedures for contacting emergency medical services, and if necessary, for transporting employees to a point where they can be reached by an emergency medical service provider;

• Resource Production procedures for ensuring that, in the event of an emergency, clear and precise directions to the work site can and will be provided as needed to emergency responders.

Supervisors must receive training in the prevention of heat related illnesses prior to supervising employees working in heat. Supervisors will be trained in the Resource Production heat illness emergency response procedures to prevent heat illness and procedures to follow when an employee exhibits symptoms consistent with possible heat illness, including emergency response procedures.

Communication for employees shall be in a form readily understandable by all affected employees.

Resource Production shall ensure all contractors, subcontractors, staffing companies, etc. employees (including temporary) working outdoors have been trained in heat illness prevention.

**Hazardous Chemical Exposures**

In any company which utilizes chemical substances, a training program on the handling, hazards, storage, exposure risks, symptoms of chemical exposure, and first aid needs to be part of any new employees training. There must also be follow-up training sessions as to any new chemical or processes that may be initiated by the company. Follow-up training sessions act as a reinforcement of safety standards that need to be followed on a daily basis. In a training program, employees will learn acceptable levels of chemical exposure, proper storage and labeling of chemicals, and usage of protective clothing and equipment for handling chemicals. They will also learn about potential fire and toxicity hazards, when not to have a chemical in a confined area, or to store in closed containers, usage of eye wash fountains and safety showers, and the necessary posting of open, and dangerous areas.

**Lead**

1. Employee shall be informed of Appendices A & B of the regulation. All affected employees are required to attend training programs. The training shall be provided prior to the time of initial job assignment. Training should be provided at least annually. The employees should be informed of the specific nature of the operations which could result in exposure to lead above the action level. Employees shall be informed of the purpose, proper selection, fitting, use, and limitation of respirators. Employees shall be informed of the engineering controls. The employees shall be informed of the purpose & a description of the medical surveillance program & the medical removal program. There could be adverse effects on reproductive systems.

2. The employer shall assure that no employee is exposed to lead at concentrations greater than fifty micrograms per cubic meter of air (50 ug/m(3)) averaged over an 8-hour period.

3. If an employee is exposed to lead for more than 8 hours in any work day, the permissible
exposure limit, as a time weighted average (TWA) for that day, shall be reduced according to the following formula: Maximum permissible limit (in \( \text{ug/m}^3 \))=400 divided by hours worked in the day.

4. Employee that are exposed to lead at concentrations greater than fifty micrograms per cubic meter of air averaged over an 8-hour period must be tested by having a program that examines employee's airborne exposure to lead at work.

5. Personal Monitors should be provided to assure Industrial hygiene and measurements necessary to determine employee exposures.

6. Monitoring should determine exposure levels and assure that employees are not to exceed excitable levels and address engineering controls and PPE to reduce exposures.

7. Action shall be taken to reduce exposure to or below the permissible exposure. If engineering & work practice controls do not reduce exposure to acceptable limits, the employer may supplement with respirators. If such controls are not feasible, the employer

8. The program should address means of engineering & work practice controls. The specific means that will be employed to achieve compliance must be outlined. Documentation of air monitoring, including the source of lead, is required. A description of each operation in which lead is emitted should be outlined (i.e. machinery used, material used, material processed, controls in place, crew size & employee job responsibilities). The written program must be revised & updated every 6 months.

9. An employee may choose this type of respirator at no extra cost to the employee. The respirator shall be used during the time period necessary to install or implement engineering or work practice controls.

10. Gloves, hats, vented goggles, shoes or disposable shoe covers shall be provided. Protective clothing shall be in clean & dry condition at least weekly. Protective clothing shall be cleaned, laundered, properly disposed and repair or replaced as necessary.

11. Medical examinations & procedures shall be performed by or under the supervision of a licensed physician. The medical surveillance is provided without cost to the employees.

12. Medical surveillance -

a. 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.

b. The employer shall assure that all medical examinations and procedures are performed by or under the supervision of a licensed physician.

c. 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.

13. The blood sampling & monitoring should be conducted every 6 months until two consecutive blood samples & analysis are acceptable. The sampling & monitoring should be performed at least monthly during the removal period. Any employee with elevated blood levels should be temporarily removed. Employees should be notified in writing within five days when lead levels are not acceptable. The standard requires temporary medical removal with Medical Removal Protection benefits.

14. The employer must provide decontamination and changing facilities. Hygiene facilities should also be provided.

15. Signs should be posted in the Regulated Work Area.
Airborne Contaminants

It is important that an employee recognize the Threshold Limit Values or Permissible Exposure Limits of airborne contaminants and physical agents in the workplace. A procedural manual or set of instructions must be part of the program, with periodic inspections that clearly indicate whether an employee may be mishandling a chemical or endangering himself or others. Part of the manual or procedures must establish a standard of when and how to deal with chemical spills, neutralizing, and disposing of spills or overflows. These procedures must also be posted in an area that is easily accessible for reference usage.

First Aid training and equipment will be routine in any facility where chemicals are used. Employees must know how to handle equipment in emergency situations, what equipment needs to be used and whether the equipment is adequate for the situation. Respirators may be used either as protective safety equipment or for emergency usage. Therefore, the employee should recognize that respirators need to be stored in a clean, sanitary and convenient location and inspected on a regular basis. Also what respirators are approved by NIOSH for their particular applications. With a first aid program an employee will recognize when a problem may be occurring by exposure to a chemical ranging from headaches, nausea, dermatitis problems to other factors of discomfort when they use solvents or chemicals. In the design of a facility that transports chemicals from storage to vats, the content of pipes and storage containers must be clearly marked. Within that facility design there must be an emergency shut off system in case of accident. Each employee will be trained as to these emergency shut-off systems.

Ventilation is another major factor in the design of any facility. Whether by natural means or mechanical, the system must be designed to control dust, fumes, solvents, gases, smoke or vapors which may be generated in the workplace. It is also important that a medical or biological monitoring system be in operation as part of the safety standards. If internal combustion engines are used in the facility, or if there is a chance of leakage or mixture with a chemical that could create a toxic gas, atmospheric gas levels must be monitored. If toxic chemicals are used and stored in the facility they should be located in an isolated area to guarantee safety.

Hazardous Substances Communication

When hazardous substances are used in the workplace, a hazard communication program dealing with Material Safety Data Sheets (MSDS), labeling and employee training will be in operation. MSDS materials will be readily available for each hazardous substance used. A training program plus regular question and answer sessions on dealing with hazardous materials will be given to keep employees informed. The program will include an explanation of what an MSDS is and how to use and obtain one; MSDS contents for each hazardous substance or class of substances; explanation of the “Right to Know”; identification of where employees can see the employer’s written hazard communication program and where hazardous substances are present in their work area; the health hazards of substances in the work area, how to detect their presence, and specific protective measures to be used; as well as informing them of hazards of non-routine tasks and unlabeled pipes.

Electrical

The workplace will be aware of the OSHA Electrical Safety Orders and will comply with the
same. Employees will be required to report any hazard to life or property that is observed in connection with a job, electrical equipment or lines. Employees will be expected to make preliminary inspections or appropriate tests to determine conditions before starting work. When equipment or lines are to be serviced, maintained or adjusted, employees must be aware of open switches. Lockouts must be tagged whenever possible. Equipment such as electrical tools or appliance must be grounded or of the double insulated type. Extension cords being used must have a grounding conductor. The workplace supervisor must be aware if multiple plug adaptors are prohibited. If ground-fault circuit interrupters are installed on each temporary 15 or 20 ampere, 120 volt AC circuit at locations where construction, demolition, modifications, alterations or excavations are being performed, temporary circuits must be protected by suitable disconnecting switches or plug connectors with permanent wiring at the junction.

**Electricians must be aware of the following:**
Exposed wiring and cords with frayed or deteriorated insulation must be repaired or replaced. Flexible cords and cables must be free of splices or taps. Clamps or other securing means must be provided on flexible cords or cables at plugs, receptacles, tools, equipment. The cord jacket must be held securely in place. All cord, cable and raceway connections must be intact and secure. In wet or damp locations, electrical tools and equipment must be appropriate for the use or location, or otherwise protected. The location of electrical power lines and cables (overhead, underground, under floor, other side of walls) must be determined before digging, drilling or similar work is begun. All metal measuring tapes, ropes, hand lines or similar devices with metallic thread woven into the fabric are prohibited for use where they could come in contact with energized parts of equipment or circuit conductors.

The use of metal ladders is prohibited in areas where the ladder or the person using the ladder could come in contact with energized parts of equipment, fixtures or conductors. All disconnecting switches and circuit breakers must be labeled to indicate their use or equipment served. A means for disconnecting equipment must always be opened before fuses are replaced. All interior wiring systems must include provisions for grounding metal parts or electrical raceways, equipment and enclosures. All electrical raceways and enclosures must be fastened securely in place. All energized parts of electrical circuits and equipment must be guarded against accidental contact by approved cabinets or enclosures. Sufficient access and working space will be provided and maintained around all electrical equipment to permit ready and safe operations and maintenance. All unused openings (including conduit knockouts) in electrical enclosures and fittings must be closed with appropriate covers, plugs or plates.

**Electrical enclosures such as switches, receptacles, and junction boxes must be provided with tight-fitting covers or plates.**

**Motors**
Disconnecting switches for electrical motors in excess of two horsepower must be capable of opening the circuit when the motor is in a stalled condition without exploding. (Switches must be horsepower rated equal to or in excess of the motor hp rating.) Low voltage protection
must be provided in the control device of motor driven machines or equipment which could cause injury from inadvertent starting. A motor disconnecting switch or circuit breaker must be located within sight of the motor control device.

**Motors:**
a) Must be located within sight of their controller;
b) Must have their controller disconnecting means capable of being locked in the open position;
c) or must have separate disconnecting means installed in the circuit within sight of the motor.

A controller for a motor in excess of two horsepower must be rated equal to but not in excess of the motor it services. Employees who regularly work on or around energized electrical equipment or lines will be instructed in cardio-pulmonary resuscitation (CPR) methods. Employees will be trained on how to work on energized lines or equipment over 600 volts.

**NFPA 70E**

**Purpose**
The purpose of this program is to set forth procedures for the safe use of electrical equipment, tools, and to comply with NFPA 70E requirements.

**Scope**
This program applies to all Resource Production Co employees, temporary employees, and contractors. When work is performed on a non-owned or operated site, the operator’s program shall take precedence, however, this document covers Resource Production Co employees and contractors and shall be used on owned premises, or when an operator’s program doesn’t exist or is less stringent.

Resource Production Co shall advise the host employer of:

- Any unique hazards presented by the contract employer’s work,
- Any unanticipated hazards found during work by Resource Production Co that the host employer did not mention, and
- The measures Resource production Co took to correct any hazards reported by the host employer to prevent such hazards from recurring in the future.

**Responsibilities**

**Managers/Supervisor**
The HSE Manager will develop electrical safety programs and procedures in accordance with OSHA requirements and/or as indicated by events and circumstances.
Operations Managers and Supervisors are responsible for ensuring that only qualified employees and or qualified contractors perform electrical repairs or installations. Unqualified persons shall not be permitted to enter spaces that are required to be accessible to qualified employees only, unless the electric conductors and equipment involved are in an electrically safe work condition.

Operations Managers and Supervisors shall ensure a documented job briefing is held before starting each job and will include all employees involved. The briefing will cover hazards associated with the job, work procedures involved, special precautions, energy source controls and PPE requirements.

Operations Managers are also responsible for ensuring all applicable electrical safety programs are implemented and maintained at their locations.

Employees are responsible to use electrical equipment, tools, and appliances according to this program, for attending required training sessions when directed to do so and to report unsafe conditions to their supervisor immediately.

Only qualified employees may work on electric circuit parts or equipment that has not been de-energized. Such employees shall be made familiar with the use of special precautionary techniques, PPE, insulating and shielding materials and insulated tools.

**Safe Work Practices**

Prior to any work being done within the Limited Approach Boundary a hazard risk analysis shall be performed. The analysis shall contain event severity, frequency, probability and avoidance to determine the level of safe practices employed.

**Safe Work Practices for Working within the Limited Approach Boundary**

The limited approach boundary is the distance from an exposed live part within which a shock hazard exists.
The restricted approach boundary is the closest distance to exposed live parts a qualified person can approach with without proper PPE and tools. Inside this boundary, accidental movement can put a part of the body or conductive tools in contact with live parts or inside the prohibited approach boundary. To cross the restricted approach boundary, the qualified person must:

A job briefing of all affected employee’s should be held before starting each job. The briefing should cover hazards associated with the job, work procedures involved, special precautions, energy source controls, and PPE requirements.

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

The prohibited approach boundary is the minimum approach distance to exposed live parts to prevent flashover or arcing. Approaching any closer is comparable to making direct contact with a live part. To cross the prohibited approach boundary, the qualified person must:

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

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

- Use PPE appropriate for working near exposed live parts and rated for the voltage and energy level involved.
- For systems of 600 volts and less, the flash protection boundary is 4 feet, based on an available bolted fault current of 50 kA and a clearing time of 6 cycles for the circuit breaker to act, or any combination of fault currents and clearing times not exceeding 300 kA cycles.
- When working on de-energized parts and inside the flash protection boundary for nearby live exposed parts - If the parts cannot be de-energized, use barriers such as insulated blankets to protect against accidental contact or wear proper PPE.
Arc Flash Hazard Analysis

An arc flash hazard analysis includes the following:

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

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

- If the parts cannot be de-energized, barriers such as insulated blankets must be used to protect against accidental contact or PPE must be worn.
- Employees shall not reach blindly into areas that might contain exposed live parts.
- Employees shall not enter spaces containing live parts unless illumination is provided that allows the work to be performed safely.
- Conductive articles of jewelry and clothing (such as watchbands, bracelets, rings, key chains, necklaces, metalized aprons, cloth with conductive thread, metal headgear, or metal frame glasses) shall not be worn where they present an electrical contact hazard with exposed live parts.
- Conductive materials, tools, and equipment that are in contact with any part of an employee’s body shall be handled in a manner that prevents accidental contact with live parts. Such materials and equipment include, but are not limited to long conductive objects such as ducts, pipes, tubes, conductive hose and rope, metal-lined rules and scales, steel tapes, pulling lines, metal scaffold parts, structural members, and chains.
When an employee works in a confined space or enclosed spaces (such as a manhole or vault) that contains exposed live parts, the employee shall use protective shields, barriers or insulating materials as necessary to avoid contact with these parts. Doors, hinged panels, and the like shall be secured to prevent them from swinging into employees. Refer to the confined space entry program.

**Inspections**
- Electrical equipment, tools, and appliances must be inspected prior to each use.
- The use of a hard fixed GFCI or a portable GFCI adapter shall be used with all portable hand tools, electric extension cords, drop lights and all 110 volt equipment.
- Faulty equipment, tools, or appliances shall be removed from service immediately and tagged “Out of Service”, dated and signed by the employee applying the tag.

**Equipment**
Test instruments, equipment, and their accessories shall meet the requirements of ANSI/ISA-61010-1-Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use Part 1 General Requirements, for rating and design requirements for voltage measurement and test instruments intended for use on electrical systems 1000 Volts and below.

When test instruments are used for the testing for the absence of voltage on conductors or circuit parts operating at 50 volts or more, the operation of the test instrument shall be verified before and after an absence of voltage test is performed.

**Personal Protective Equipment**
All insulating PPE must be inspected before each day's use and immediately following any incident that can reasonably be suspected of having caused damage. Insulating gloves shall be given an air test, along with the inspection.

Maximum test intervals for rubber insulating personal protective equipment shall include:
- Blankets—before first issue/every 12 months thereafter
- Gloves—before first issue and every 6 months
- Sleevers before first issue and every 12 months
- Covers and line hose shall be testing if insulating value is suspect.

**Energized Electrical Work Permit**
Work on energized electrical conductors or circuit parts that are not placed in an electrically safe work condition shall be considered energized electrical work and shall be performed by written permit only.
Lighting
Employees shall not enter spaces containing electrical hazards unless illumination is provided that enables the employees to perform the work safely. Where lack of illumination or an obstruction precludes observation of the work to be performed employees shall not perform any task within the Limited Approach Boundary of energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists.

Extension Cords
- Use only three-wire, grounded, extension cords and cables that conform to a hard service rating of 14 amperes or higher, and grounding of the tools or equipment being supplied.
- Only commercial or industrial rated-grounded extension cords may be used in shops and outdoors.
- Cords for use other than indoor appliances must have a rating of at least 14 amps.
- Cords must have suitable strain relief provisions at both the plug the receptacle ends.
- Work lamps (drop light) used to power electrical tools must have a 3 wire, grounded outlet, unless powering insulated tools.
- Adapters that allow three wire, grounded prongs, connected to two wire non-grounded outlets are strictly prohibited.
- Cords must have a service rating for hard or extra-hard service and have S, AJ, ST, SO, SJO, SJT, STO, or SJTO printed on the cord.

- Cords may not be run through doorways, under mats or carpets, across walkways or aisles, concealed behind walls, ceilings or floors, or run through holes in walls, or anywhere where they can become a tripping hazard.
- High current equipment or appliances should be plugged directly into a wall outlet whenever possible.
  - All extension cords shall be plugged into one of the following:
    - A GFCI outlet;
    - A GFCI built into the cord;
    - A GFCI adapter used between the wall outlet and cord plug.

- All extension cords and or electrical cords shall be inspected daily or before each use, for breaks, plug condition and ground lugs, possible internal breaks, and any other damage. If damage is found, the extension cord or electrical cord shall be remove from service and repaired or replaced.
- Extension cords shall not be used on compressor skid to operated heat tapes or any other type of equipment on a temporary basis. Heat tapes or other equipment shall be hard wired per applicable electrical codes.
Outlets

- Outlets connected to circuits with different voltages must use a design such that the attachment plugs on the circuits are not interchangeable.

Multiple Outlet Boxes

- Multiple outlet boxes must be plugged into a wall receptacle.
- Multiple outlet boxes must not be used to provide power to microwave ovens, toasters, space heaters, hot plates, coffeepots, or other high-current loads.

Double Insulated Tools

- Double insulated tools must have the factory label intact indicating the tool has been approved to be used without a three wire grounded supply cord connection.
- Double insulated tools must not be altered in any way, which would negate the factory rating.

Switches, circuit breakers, and disconnects

- All electrical equipment and tools must have an on and off switch and may not be turned on or off by plugging or unplugging the supply cord at the power outlet.
- Circuit breaker panel boxes and disconnects must be labelled with the voltage rating.
- Each breaker within a breaker panel must be labelled for the service it provides.
- Disconnect switches providing power for individual equipment must be labelled accordingly.

Ladders

- Only approved, non-conductive ladders, may be used when working near or with electrical equipment, which includes changing light bulbs.
- Ladders must be either constructed of wood, fiberglass, or have non-conductive side rails.
- Wood ladders should not be painted, which can hide defects, except with clear lacquer.
- When using ladders they shall be free from any moisture, oils, and greases.

Energized and Overhead High Voltage Power Lines & Equipment

- A minimum clearance of 10 feet from high voltage lines must be maintained when operating vehicular and mechanical equipment such as forklifts, cranes, winch trucks, and other similar equipment.
- When possible, power lines shall be de-energized and grounded or other protective measures shall be provided before work is started.
- Minimum approach distance to energized high power voltages lines for unqualified employees is 10 feet.
Confined or Enclosed Work Spaces

- When an employee works in a confined or enclosed space that contains exposed energized parts, the employee shall isolate the energy source and turn off the source and lock and tag out the energy source (Only qualified electricians can work on an exposed energy source).
- Protective shields, protective barriers or insulating materials as necessary shall be provided.

Enclosures, Breaker Panels, and Distribution Rooms

- A clear working space must be maintained in the front, back and on each side of all electrical enclosures and around electrical equipment for a safe operation and to permit access for maintenance and alteration.
- A minimum two-foot working floor space in front of panels and enclosures shall be painted yellow.
- Employees may not enter spaces containing exposed energized parts unless illumination is provided that enables the employees to work safely.
- Housekeeping in distribution rooms must receive high priority to provide a safe working and walking area in front of panels and to keep combustible materials to the minimum required to perform maintenance operations.
- All enclosures and distribution rooms must have “Danger: High Voltage – Authorized Personnel Only” posted on the front panel and on entrance doors.
- Flammable materials are strictly prohibited inside distribution rooms (Boxes, rags, cleaning fluids, etc.).

Lock Out/Tag Out

- No work shall be performed on (or near enough to them for employees to be exposed due to the dangers of tools or other equipment coming into contact with the live parts) live parts and the hazards they present.
- If any employee is exposed to contact with parts of fixed electric equipment or circuits which have been deenergized, the circuits energizing the parts shall be locked out or tagged or both.
- Conductors and parts of electrical equipment that have been de-energized but not been locked or tagged out shall be treated as live parts.
- Per Attest Inspection, LLC policy all electrical will be outsourced and performed only by qualified and licensed electrical contractors who are familiar with the use of special precautionary techniques, PPE, insulating and shielding materials and insulated tools. Any equipment being made ready for maintenance will be locked out using Attest Inspection, LLC’s Control of Hazardous Energy – Lock Out/Tag Out Program. Lockouts are performed by the HSE Manager, Shop Foreman or Branch Manager. Designated employees in some branches may be trained by local management to lock out equipment. If live sources are to be worked it will only be performed with the knowledge of local management. Only certified electricians may work on electric circuit parts or equipment.
• Only authorized personnel may perform lock out/tag out work on electrical equipment and will follow Attest Inspection, LLC’s Control of Hazardous Energy – Lock out/Tag Out Program.
• Authorized personnel will be trained in lock out/tag out procedures.
• Affected personnel will be notified when lock out/tag out activities are being performed in their work area.

**Contractors**

• Only approved, certified, electrical contractors may perform construction and service work on Attest Inspection, LLC or client property.
• It is the Manager/Supervisors responsibility to verify the contractor’s certification.

**Fire Extinguishers**

• Approved fire extinguishers must be provided near electrical breaker panels and distribution centers.
• Water type extinguishers shall not be located closer than 50 feet from electrical equipment.

**Electric Shock-CPR:**

• If someone is discovered that has received an electric shock and is unconscious, first check to see if their body is in contact with an electrical circuit. Do not touch a person until you are sure there is no contact with an electrical circuit.
• When it is safe to make contact with the victim, begin CPR if the person’s heart has stopped or they are not breathing.
• Call for help immediately.

**Electric Welders**

• A disconnecting means shall be provided in the supply circuit for each motor-generator arc welder, and for each AC transformer and DC rectifier arc welder which is not equipped with a disconnect mounted as an integral part of the welder.
• A switch or circuit breaker shall be provided by which each resistance welder and its control equipment can be isolated from the supply circuit. The ampere rating of this disconnecting means may not be less than the supply conductor ampacity.

**Equipment Grounding**

• All gas compressors, air compressors, separators, vessels, etc. shall be grounded by means of using a lug and ground strap, nominal in size to a ½” bolt or larger, attached to a ground rod six feet or longer.
• Equipment bonding jumpers shall be of copper or other corrosion-resistance material.
• The transfer of hazardous or flammable material from a metal or plastic container with a flash point of 100 degrees F or less shall have a ground strap from the container and attached to the skid or a ground rod placed in the ground.

**Training**

• Employees shall be trained in safety-related work practices and procedural requirements as necessary to provide protection from the electrical hazards associated
with their respective jobs. Employees shall be trained to identify and understand the relationship between electrical hazards and possible injury. Documentation shall be made when the employee demonstrates proficiency, be maintained for the duration of the employee's employment, and contain each employee's name and date of training.

- Only qualified persons shall perform tasks such as testing, troubleshooting, and voltage measuring within the limited approach boundary of energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists.50
- Employees shall be trained in the skills and techniques to distinguish exposed energized electrical conductors and circuit parts from other parts of electrical equipment, to determine the nominal voltage of exposed energized electrical conductors and circuit parts, the approach distances specified in Table 130.2 (below), and the decision making process necessary to determine the degree and extent of the hazard and the personal protective equipment and job planning necessary to perform the task safely.

<table>
<thead>
<tr>
<th>Nominal system voltage range, phase to phase</th>
<th>Exposed movable conductor</th>
<th>Exposed fixed-circuit part</th>
<th>Restricted approach boundary (allowing for accidental movement)</th>
<th>Prohibited approach boundary</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 50 volts</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
<td>Not specified</td>
</tr>
<tr>
<td>51 to 300 volts</td>
<td>10 ft. 0 in.</td>
<td>3 ft. 6 in.</td>
<td>Avoid contact</td>
<td>Avoid contact</td>
</tr>
<tr>
<td>301 to 750 volts</td>
<td>10 ft. 0 in.</td>
<td>3 ft. 6 in.</td>
<td>1 ft. 0 in.</td>
<td>0 ft. 1 in.</td>
</tr>
<tr>
<td>751 to 15 KV KV</td>
<td>10 ft. 0 in.</td>
<td>5 ft. 0 in.</td>
<td>2 ft. 2 in.</td>
<td>0 ft. 7 in.</td>
</tr>
<tr>
<td>15.1 kV to 36 KV</td>
<td>10 ft. 0 in.</td>
<td>6 ft. 0 in</td>
<td>2 ft. 7 in.</td>
<td>0 ft. 10 in.</td>
</tr>
<tr>
<td>36.1 kV to 46 KV</td>
<td>10 ft. 0 in.</td>
<td>8 ft. 0 in</td>
<td>2 ft. 9 in.</td>
<td>1 ft. 5 in.</td>
</tr>
<tr>
<td>46.1 kV to 72.5 KV</td>
<td>10 ft. 0 in.</td>
<td>8 ft. 0 in</td>
<td>3 ft. 2 in.</td>
<td>2 ft. 1 in.</td>
</tr>
<tr>
<td>72.6 KV to 121 KV</td>
<td>10 ft. 8 in.</td>
<td>8 ft. 0 in</td>
<td>3 ft. 3 in.</td>
<td>2 ft. 8 in.</td>
</tr>
<tr>
<td>138 to 145</td>
<td>11 ft 0 in</td>
<td>10 ft. 0 in</td>
<td>3 ft. 7 in</td>
<td>3 ft. 1 in.</td>
</tr>
<tr>
<td>161 KV to 169 KV</td>
<td>11 ft 8 in.</td>
<td>11 ft. 8 in</td>
<td>4 ft. 0 in</td>
<td>3 ft. 6 in.</td>
</tr>
<tr>
<td>230 KV to 242 KV</td>
<td>13 ft. 0 in.</td>
<td>13 ft. 0 in</td>
<td>5 ft. 3 in</td>
<td>4 ft. 9 in.</td>
</tr>
</tbody>
</table>
Employees shall be trained in safety related work practices that pertain to their respective job assignments.

Safe work practices shall be employed to prevent electric shock or other injuries resulting for either direct or indirect electrical contacts when work is performed near or on equipment or circuits which are or may be energized.

Retraining
All employee’s shall receive additional training (or retraining) under any of the following conditions:
(1) If the supervision or annual inspections indicate that the employee is not complying with the safety-related work practices.
(2) If new technology, new types of equipment, or changes in procedures necessitate the use of safety-related work practices that are different from those that the employee would normally use.
(3) If he or she must employ safety-related work practices that are not normally used during his or her regular job duties.
(4) Retraining shall be performed at intervals not to exceed 3 years.

Noise
Noise levels are measured using a sound level meter or an octave bank analyzer and records kept. Engineering controls will be used to reduce excessive noise levels. When engineering controls are not feasible, administrative controls (i.e., worker rotation) will be used to minimize individual employee exposure to noise. An ongoing preventive health program will be utilized to educate employees in safe levels of noise, exposure, effects of noise on their health, and use of personal protection. Approved hearing protective equipment (noise attenuating devices) will be available to every employee working in areas where continuous noise levels exceed 85 dB. To be effective, ear protectors must be properly fitted and employees will be instructed in their use and care.

Fueling
Where flammable liquids are used, employees will be trained to deal with spillage during fueling operations, how it is to be cleaned, the types and designs of fueling hoses and the specific types of fuel it can handle, whether fueling is being done with a nozzle that is a gravity flow system or self-closing, how to avoid spills and recognition that if a spill does occur, the safety of restarting an engine. Employees must be aware that an open flame or light near any
fuel is prohibited when fueling or the transfer of fuel is occurring. "NO SMOKING" signs will be posted conspicuously.

**Piping Systems**
Substances that are transported through piping need to be identified by color or labeling. Signs must be posted identifying the substance being transported through the pipes as to whether it is hazardous and where turn-off valves, connections and outlets are located. All tags used for labeling will be of a durable material with distinguishable and clearly written print. When non-potable water is piped through a facility, outlets or taps, notices will be posted to alert employees that it is unsafe and not to be used for drinking, washing or personal use. When pipelines are heated by electricity, steam or other external sources, warning signs or tags placed at unions, valves, or other serviceable parts will be part of the system.

**Material Handling**
In the handling of materials, employees must know the following: There must be safe clearance for equipment through aisles and doorways. Aisle ways must be designated, permanently marked, and kept clear to allow unhindered passage. Motorized vehicles and mechanized equipment will be inspected daily or prior to use. Vehicles must be shut off and brakes must be set prior to loading or unloading. Containers of combustibles or flammables, when stacked while being moved, must be separated by dunnage sufficient to provide stability. If dock boards (bridge plates) are used when loading or unloading operations are taking place between vehicles and docks, precautions must be observed. Trucks and trailers will be secured from movement during loading and unloading operations. Dock plates and loading ramps will be constructed and maintained with sufficient strength to support imposed loading. Hand trucks must be maintained in safe operating condition. Chutes must be equipped with sideboards of sufficient height to prevent the handled materials from falling off. At the delivery end of rollers or chutes, provisions must be made to brake the movement of the handled materials. Pallets must be inspected before being loaded or moved. Hooks with safety latches or other arrangements will be used when hoisting materials, so that slings or load attachments won't accidentally slip off the hoist hooks. Securing chains, ropes, chokers or slings must be adequate for the job to be performed. When hoisting material or equipment, provisions must be made to assure no one will be passing under the suspended loads. Material Safety Data Sheets will be available to employees handling hazardous substances.

**Transporting Employees & Materials**
When employees are transporting either employees or materials, they must have an operator's license for that classification of vehicle and be certified or trained in the operation of that vehicle. For a safety program to be effective, they must also have knowledge of First Aid courses and safety equipment, as well as the vehicle and how it operates. As employees are transported by truck, provisions must be provided to prevent their falling from the vehicle. Vehicles should be in good working condition, inspected on a regular basis and must be equipped with lamps, brakes, horns, mirrors, windshields and turn signals in good working order. If the vehicle transports numerous individuals it must be equipped with handrails,
steps, stirrups or similar devices, placed and arranged so that employees can safely mount or
dismount. Safety measures to ensure passenger safety should be observed. When cutting
tools with sharp edges are carried in the passenger compartment, they must be placed in
closed boxes or secured containers. Carrying flares and two reflective type flares and a fire
extinguisher must be part of the standard emergency equipment carried in the vehicle at all
times.

**Ventilation**

In the operation of any facility ventilation system, there needs to be a design to integrate
several systems of control which will expel contaminates and provide clean air. The systems
must take into consideration the volume and velocity that will be needed to successfully
remove contaminates. The system must not fail in the case of an emergency situation where
two contaminates are exposed to each other when a fire or explosion occurs. In the design of
the system, clean-out ports or doors that are provided at intervals will not exceed 12 feet in
all horizontal runs of exhaust ducts. The system must be operational so that it will not offset
the functions of other operations.

**Sanitizing Equipment & Clothing**

In any operation where protective clothing is used, a set of standards of the handling,
cleaning, and disposal of the clothing will be developed. In the line of work where an
employee is exposed to a hazardous substance, is the employee required to change or take a
shower? If so, both a change and shower room will be provided along with appropriate
disposal areas of collection for the cleaning and sanitizing of the clothing. When working in a
facility where employees need protective clothing, a training course will be held. Employees
will also know where and when they can eat or smoke in such a facility. Conspicuously posted
signs will be arranged throughout the plant.

**Infection Control**

When a facility is engaged in using a laboratory or any research that involves the handling of
infectious diseases, or other biotechnological materials, the personnel will be trained in the
handling of such materials. Technicians must have training in the handling of these materials
as safety precautions must be observed on a constant basis. The facilities will be designed to
comply with the needed and standardized practices that are used by the industry and
recognized by state licensing agencies. The standards used and developed by the facility must
also take into consideration environmental hazards and laws which are applicable.
Technicians normally will handle cultures which contain human specimens as blood or body
fluids that carry infectious bacteria. The practices of a laboratory will include proper
ventilation, emergency equipment, necessary protective clothing, refrigeration, hand-washing
sinks, bio-hazard tags, labels, needle containers, detergents/disinfectants and a manual on
emergency procedures in case of an accident. The training of the technician will include
universal precautions, how to manage and handle a needle stick exposure, HVB evaluations,
antibody testing and vaccinations and how to dispose of these materials when finished with
testing or evaluation. The workplace must be equipped with the proper equipment to meet
the safety precautions universally recognized by the state licensing agency. A general practice
of cleaning and disinfecting the equipment and environment must be observed.
**Blood borne Pathogens**

Employer should have in the plan the different labels & signs that serve as warnings of infectious materials. Employer shall ensure that all employees with occupational exposure participate in a training program. Employees shall be provided training at the time of initial assignment & annual training for all employees should be provided within 1 year of their previous training.

OSHA requires that all employers that can "reasonably anticipate exposure" of employees to infectious material to prepare and implement a written exposure control plan.

Each employer who has employees with occupational exposure as defined in 1910.1030(b) shall prepare an exposure determination.

Employers who have personnel trained in First Aid and are expected to provide emergency Services.

The exposure determination shall be made without regards to the use of personal protective equipment.

Under circumstances in which differential between body fluids is difficult or impossible, all body fluids will be considered potentially infectious.

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

Engineering and work practice controls shall be used to eliminate or minimize employee exposure. Procedures should detail steps to take in the event of an exposure incident. PPE should be addressed.

If provisions for hand washing facilities are not feasible, the employer shall provide either an appropriate antiseptic hand cleanser in conjunction with cloth/paper towels or antiseptic towelettes.

Specimens of blood or other potentially infectious materials must be put in leak proof bags for handling, storage and transport.

When the possibility of occupational exposure is present, PPE is to be provided at no cost to the employee such as gloves, gowns, etc. PPE shall be used unless the employer shows that employees temporarily declined to use PPE under rare circumstances. The employer shall ensure that appropriate PPE in the appropriate sizes is readily accessible. PPE should be cleaned, laundered & properly disposed. The employer shall repair & replace PPE as needed to maintain its effectiveness.

All equipment or environmental surfaces shall be cleaned & decontaminated after contact with blood or other infectious materials.

The employer shall make available the hepatitis B vaccine to all employees that have occupational exposure at no cost to the employee(s).

The employer shall establish and maintain an accurate record for each employee with occupational exposure in accordance with CFR 1910.1020. Training records will include the following: Dates and Contents of Training, Names and Job Titles of persons attending. Training records shall be maintained for 3 years from the date of training and medical records shall be maintained for at least the duration of employment plus 30 years.

The employer shall ensure that all records required by this section shall be made available upon request of employees, Assistant Secretary & the Director for examination & copying. Medical records must have written consent of employee before released. The employer shall comply with the requirements involving transfer of records set forth in 29 CFR 1910.1020(h).
**Ergonomics**

With the introduction of computers into the workplace, new areas of physical debilitation have been recognized. These new potential hazards have required a redesigning of both the workplace and how employees work. A set of standards will be developed and practiced with this new technology. Furniture will be adjustable, positioned and arranged to minimize strain on all parts of the body. The glare of a computer screen will be minimized by a glare screen to prevent eye strain. Repetitive motions can harm, back, shoulders, neck, wrists and other parts of the body, so employees will not proceed with a task when they are physically feeling impairment. Each employee will be entitled to a rest break.

**Ventilation for Indoor Air Quality**

HVAC systems should provide at least the quantity of outdoor air required by the State Building Standards code, Title 24, Part 2. The HVAC systems should be inspected annually for any potential problems and there should be an approved inspection certificate available for review. Records should be retained for a minimum five year period.

**Crane Checklist**

With the operation of cranes there are several functional areas to be considered. Cranes should be inspected on a biannual basis with the inspection certificate available when a question arises. The crane must be utilized in an operation which does not violate OSHA regulations. Cranes will be visually inspected for defective components prior to any work shift. Electrically operated cranes will be effectively grounded, preventive maintenance established, have a clearly visible load; operating controls clearly identified; a fire extinguisher provided at the operator's station; rated capacity visibly marked; an audible warning device mounted on the crane, and sufficient illumination. Crane design shall be such that the boom will not fall over backwards when equipped with boom stops.

**Safety Posters**

Resource Production Company is required to post certain employment related information. The required information is maintained on bulletin board where employees can find the following required posters: Various state and federal orders regulating the Wages, Hours and Working Conditions in certain industries. Pay Day Notice Anti-Discrimination Poster Equal Employment Opportunity is the Law (EEOC form) OSHA Safety and Health Protection on the Job Notice of Workers Compensation Carrier Notice to Employees: Unemployment Insurance and Disability Insurance Notice: Employee Polygraph Protection Act (form WH 1462) Access to Medical and Exposure Records Notice to Employees: Time Off to Vote In addition to the above listed notices, a copy of this injury prevention program, a log and summary of Occupational Injuries and Illnesses, a copy of Resource Production Company’s code of Safe Work Practices and a Fire Prevention and Evacuation Plan will be posted.

**Material Data Safety Sheets for Resource Production Company's premises are available on the [MSDS location].** When employees are required to work on the premises of any other employer, such as a service call or installation situation, the job site will maintain a collection of Material Data Safety Sheets that describe any hazards unique to that site. Check with the other employer's job site coordinator or supervisor for the exact location of the MSDS information.
In addition to these required safety postings, emergency numbers are maintained in each building and safety manual. In most cases of real emergency call 911. State your name, the nature of the emergency and exact location of the injury. Answer all questions completely. Do NOT use 911 for routine calls to police or fire departments.

**Licenses & Permits**
In addition to other postings required by law, Resource Production Company maintains a copy of all necessary business licenses, permits, and notices required by the National Labor Relations Board or other governmental bodies, notices of citations during abatement periods, and other required information which are posted during the appropriate times on bulletin board.

**Personal Protective Equipment Clothing**
Where there is a danger of flying particles or corrosive materials, employees must wear protective goggles and/or face shields provided [or approved] by Resource Production Company.
Employees are required to wear safety glasses at all times in areas where there is a risk of eye injuries such as punctures, contusions or burns.
Employees who need corrective lenses are required to wear only approved safety glasses, protective goggles, or other medically approved precautionary procedures when working in areas with harmful exposures, or risk of eye injury.
Employees are required to wear protective gloves, aprons, shields and other means provided in areas where they may be subject to cuts, corrosive liquids and/or harmful chemicals.
Hard hats must be worn in areas subject to falling objects, and at all times while at construction sites.
Appropriate footwear including steel toed shoes must be worn in an area where there is any risk of foot injuries from hot, corrosive, poisonous substances, falling objects, crushing or penetrating action.
When necessary employees must use the approved respirators which are provided for regular and emergency use.
All safety equipment must be maintained in sanitary condition and ready for use. Report any defective equipment immediately.
An eye wash facility is located in the entry way between the small & large warehouse. If any irritant gets into an employee's eyes, call for medical assistance immediately and flush the eye out with clean water.
A shower is provided for emergencies. Ask your supervisor for more details on use of this facility.
Food may not be eaten in work areas, or in places where there is any danger of exposure to toxic materials or other health hazards. Ask your supervisor to identify safe eating places.
In cases where the noise level exceeds certain levels, ear protection is required.
In cases of cleaning toxic or hazardous materials, protective clothing provided must be worn.
**Hardhats**

In Resource Production Company, hardhats are required [at all times, in designated areas, when appropriate]. Hardhats are common in our industry. There was a time, about one hundred years ago, when no one wore a hardhat. But, over time, the value of hardhats to save lives was firmly proven, so that the entire industry now accepts this safety device as a natural article of clothing, like a football player wearing a helmet during a game. Sometimes a person fails to wear a hardhat, either through forgetfulness or through underestimating the risk of head injury which can be prevented by wearing one. Remember that all it takes is a carelessly dropped tool or piece of material coming down on your head to cause severe injury or even death. There are a number of workers disabled with various type of head injuries and vision problems because they didn't wear a hardhat. When you wear a hardhat, wear it right. Keep it squarely on your head with the inside band properly adjusted. See your supervisor if you are having trouble adjusting the hardhat.

**Work Environment**

Work sites must be clean and orderly. Work surfaces must be kept dry or appropriate means taken to assure the surfaces are slip-resistant. Spills must be cleaned up immediately. All combustible scrap, debris and waste must be stored safely and removed promptly. Combustible dust must be cleaned up with a vacuum system to prevent the dust from going into suspension. The accumulated combustible dust must be removed routinely. Metallic or conductive dust must be prevented from entering or accumulating on or around electrical enclosures or equipment. Waste containers must be covered. Oily and paint soaked rags are combustible and should be discarded in sealable metal containers only. Paint spray booths, dip tanks and paint areas must be cleaned regularly. All oil and gas fired devices should be equipped with flame failure controls that will prevent flow of fuel if pilots or main burners are not working. Ask your supervisor where these controls are located. Make sure all pits and floor openings are either covered or otherwise guarded.

**Walkways**

All aisles and passageways must be kept clear. Also, aisles and passageways should be clearly marked. Wet surfaces must be covered with non-slip material and all holes properly covered or marked with warning guards. All spills must be cleaned up immediately, and a caution sign placed on all wet or drying surfaces. In cases of passageways used by forklifts, trucks or other machinery, use a separate aisle for walking, if available. If no separately marked aisle is available, use extreme caution. Remember, walking in a passageway used by machinery is like walking in the middle of a street used by cars: You may have the right of way, but the heavier vehicle can't always see you and can't always stop in time. The key to moving around in such circumstances is to stop, look and listen and then to move when there is no danger. Make eye contact with the drivers of moving vehicles so that you know that they know you are there. Equipment must be properly stored so that sharp edges do not protrude into walkways. Changes in elevations must be clearly marked, as must passageways near dangerous operations like welding, machinery operation or painting. If there is a low ceiling, a warning sign must be posted. If the walkway or stairway is more than thirty inches above the floor or ground, it must have a guardrail. If an employee is aware of any breach of these standards, please inform the workplace supervisor.
Floor & Wall Openings
Be careful when working near floor and wall openings. All floor openings (holes) should be guarded by a cover, guardrail or equivalent barrier on all sides except at the entrance to stairways and ladders. Toe boards must be installed around the edges of a permanent floor opening. Skylights must be able to withstand at least 200 pounds pressure. Glass used in windows, doors, and walls (including glass block) must be able to withstand a human impact, and if required by code, be shatterproof "safety glass." Before beginning work at a new location, inspect it to insure that all floor openings which must remain open, such as floor drains, are covered with grates or similar covers. In roadways and driveways, covers with capacity to carry a truck rear axle load of at least 20,000 pounds must protect all manholes and trenches. In office buildings, fire resistive construction requires that the doors and hallway closures be properly rated and be equipped with self-closing features. Be sure that there are at least two fire emergency exits accessible from your location at all times.

Work Area
Fire extinguishers must remain accessible at all times. Means of egress should be kept unblocked, well-lighted and unlocked during work hours. Excessive combustibles (paper) may be not stored in work areas. Aisles and hallways must keep clear at all times. Designated employees have been trained to respond to a fire or other emergency. Workplaces are to be kept free of debris, floor storage and electrical cords. Adequate aisle space is to be maintained. File cabinet drawers should be opened one at a time and closed when work is finished. Proper lifting techniques are to be used by employees to avoid over exertion and strain when carrying loads. No alcohol or any intoxicating substance may be consumed prior to or during work.

Driving
Drive safely. If vehicles are used during the work day, seat belts and shoulder harnesses are to be worn at all times. Vehicles must be locked when unattended to avoid criminal misconduct. Do not exceed the speed limit. Vehicles must be parked in legal spaces and must not obstruct traffic. Defensive driving must be practiced by all employees. Employees should park their vehicles in well-lighted areas at/or near entrances to avoid criminal misconduct.

Vehicle Maintenance
Work safely when repairing vehicles. Where tires are mounted and/or inflated on drop center wheels, a safe practice procedure must be posted and enforced. Where tires are mounted and/or inflated on wheels with split rims and/or retainer rings, a safe practice procedure must be posted and enforced. Each tire inflation hose must have a clip-on chuck with at least 24 inches of hose between the chuck and an in-line hand valve and gauge. The tire inflation control valve should automatically shut off the air flow when the valve is released. A tire restraining device such as a cage, rack or other effective means must be used while inflating tires mounted on split rims, or rims using retainer rings. Employees are strictly forbidden from taking a position directly over or in front of a tire while it's being inflated. Proper lifting techniques must be used by employees to avoid over-exertion when lifting packages.
Cleanliness
All work sites must be clean and orderly. All work surfaces must be kept dry or appropriate means taken to assure that surfaces are slip-resistant. All spill materials or liquids should be cleaned up immediately and combustible scrap, debris and waste stored safely and removed from the work site promptly. Any accumulations of combustible dust must be routinely removed from elevated surfaces including the overhead structure of buildings. Combustible dust should be cleaned up with a vacuum system to prevent the dust going into suspension. Metallic or conductive dust must be prevented from entering or accumulating on or around electrical enclosures or equipment. Covered metal waste cans are provided for oily and paint-soaked waste. Use them. All oil and gas fired devices must be equipped with flame failure controls that will prevent flow of fuel if pilots or main burners are not working. Paint spray booths, dip tanks, etc., must be cleaned regularly. Washing facilities are provided, so wash your hands after handling materials.

Tool Maintenance
Faulty or improperly used hand tools are a safety hazard. All employees shall be responsible for ensuring that tools and equipment (both company and employee-owned) used by them or other employees at their workplace are in good condition. Hand tools such as chisels, punches, etc., which develop mushroom heads during use, must be reconditioned or replaced as necessary. Broken or fractured handles on hammers, axes and similar equipment must be replaced promptly. Worn or bent wrenches should be replaced regularly. Appropriate handles must be used on files and similar tools. Appropriate safety glasses, face shields, etc., must be worn while using hand tools or equipment which might produce flying materials or be subject to breakage. Eye and face protection must be worn when driving in tempered spuds or nails. Check your tools often for wear or defect. Jacks must be checked periodically to assure they are in good operating condition. Tool handles must be wedged tightly into the heads of tools. Tool cutting edges should be kept sharp enough so the tool will move smoothly without binding or skipping. When not in use, tools should be stored in a dry, secure location.

Ladders
Check ladders each and every time before you climb. Ladders should be maintained in good condition: joints between steps and side rails should be tight; hardware and fittings securely attached; and movable parts operating freely without binding or undue play. Non-slip safety feet are provided on each ladder. Ladder rungs and steps should be free of grease and oil. Employees are prohibited from using ladders that are broken, missing steps, rungs, or cleats, or that have broken side rails or other faulty equipment. It is prohibited to place a ladder in front of doors opening toward the ladder except when the door is blocked open, locked or guarded. It is prohibited to place ladders on boxes, barrels, or other unstable bases to obtain additional height. Face the ladder when ascending or descending. Be careful when you climb a ladder. Do not use the top step of ordinary stepladders as a step. When portable rung ladders are used to gain access to elevated platforms, roofs, etc., the ladder must always extend at least 3 feet above the elevated surface. It is required that when portable rung or cleat type ladders are used, the base must be so placed that slipping will not occur, unless it is lashed or otherwise held in place.
All portable metal ladders must be legibly marked with signs reading “CAUTION” – “Do Not
Use around Electrical Equipment.” Employees are prohibited from using ladders as guys, braces, skids, gin poles, or for other than their intended purposes. Only adjust extension ladders while standing at a base (not while standing on the ladder or from a position above the ladder). Metal ladders should be inspected for tears and signs of corrosion. Rungs of ladders should be uniformly spaced at 12 inches, center to center.

**Portable Power Tools**

Portable power tools pose a special danger to employees because they are deceptively small and light, yet they can do great bodily harm if used improperly or poorly maintained. These rules apply to all power tools, but are especially important when handling portable saws, drills and power screw drivers. Check your equipment before you use it. All grinders, saws and similar equipment should be equipped with appropriate safety guards. Power tools should not be used without the correct shield, guard, or attachment, recommended by the manufacturer. Portable circular saws must be equipped with guards above and below the base shoe. Circular saw guards should be checked periodically and before each use to assure they are not wedged up, thus leaving the lower portion of the blade un guarded. All rotating or moving parts of equipment should be guarded to prevent physical contact.

All cord-connected, electrically-operated tools and equipment should be effectively grounded or of the approved double insulated type. Effective guards must be in place over belts, pulleys, chains, sprockets, on equipment such as concrete mixers, air compressors, etc. If portable fans are provided, they must be equipped with full guards or screens having openings 1/2 inch or less. Do not attempt to lift heavy objects without proper equipment. Hoisting equipment will be made available for lifting heavy objects, with hoist ratings and characteristics appropriate for the task. Power tools are either battery operated or wired. If battery operated, don't under-estimate their power. A small electric drill or power screw driver can cause a severe injury if it lands in the wrong place. While not usually a shock hazard, the battery pack contains toxic chemicals and does emit a low voltage electric current. Don't drop or incinerate the battery pack, or a tool with a self-contained power source. Hard wired equipment can be portable or fixed. Typically used with extension cords, the more powerful hard wired equipment presents a double safety problem: the actual equipment plus its electrical power source. Ground-fault circuit interrupters must be provided on all temporary electrical 15 and 20 ampere circuits used during periods of construction. Pneumatic and hydraulic hoses on power-operated tools should be checked regularly for deterioration or damage.

**Abrasive Wheel Equipment (Grinders)**

The work rest used should be kept adjusted to within 1/8 inch of the wheel. The adjustable tongue on the top side of the grinder should be kept adjusted to within 1/4 inch of the wheel. The side guards should cover the spindle, nut and flange and 75 percent of the wheel diameter. Bench and pedestal grinders should be permanently mounted. Goggles or face shields should always be worn when grinding. The maximum RPM rating of each abrasive wheel should be compatible with the RPM rating of the grinder motor. Fixed or permanently mounted grinders must be connected to their electrical supply system with metallic conduit or by other permanent wiring method. Each grinder should have an individual on and off control switch. The switch should be easily accessible anytime you operate the machine. Each
electrically operated grinder is effectively grounded. Do not defeat the grounding mechanism, especially by using non-three prong plug adapters. Note the method by which new abrasive wheels are mounted. Visually inspect and ring test new abrasive wheels. The dust collectors and powered exhausts provided on grinders must be used in operations that produce large amounts of dust. The splash guards mounted on grinders that use a coolant should be mounted so that no one is ever splashed with the coolant. The work area around a grinder must be kept clean at all times. It is your responsibility as operator of any machine to ensure the necessary safety precautions are taken before using the machine.

**Combustible Materials**

All combustible scrap, debris and waste materials (oily rags, etc.) must be stored in covered metal receptacles and removed from the work site promptly. Proper storage to minimize the risk of fire, including spontaneous combustion must be practiced. Only approved containers and tanks are to be used for the storage and handling of flammable and combustible liquids. All connections on drums and combustible liquid piping, vapor and liquid must be kept tight. All flammable liquids should be kept in closed containers when not in use (e.g., parts-cleaning tanks, pans, etc.). Bulk drums of flammable liquids must be grounded and bonded to containers during dispensing.

Storage rooms for flammable and combustible liquids must have explosion-proof lights. Storage rooms for flammable and combustible liquids should have mechanical or gravity ventilation. Liquefied petroleum gas must be stored, handled, and used in accordance with safe practices and standards. No smoking signs must be posted on liquefied petroleum gas tanks. Liquefied petroleum storage tanks should be guarded to prevent damage from vehicles. All solvent wastes and flammable liquids should be kept in fire-resistant, covered containers until they are removed from the work site.

Vacuuming should be used whenever possible rather than blowing or sweeping combustible dust. Fire separators should be placed between containers of combustibles or flammables when stacked one upon another to assure their support and stability. Fuel gas cylinders and oxygen cylinders must be separated by distance, fire resistant barriers, etc., while in storage. Fire extinguishers are selected for the types of materials and placed in areas where they are to be used.

**These fire extinguishers are classified as follows:**

- **Class A** - Ordinary combustible materials fires.
- **Class B** - Flammable liquid, gas or grease fires.
- **Class C** - Energized-electrical equipment fires.

Appropriate fire extinguishers must be mounted within 75 ft. of outside areas containing flammable liquids, and within 10 ft. of any inside storage area for such materials. All extinguishers must be serviced, maintained and tagged at intervals not to exceed one year. Extinguishers should be placed free from obstructions or blockage. All extinguishers must be fully charged and in their designated places unless in use. Where sprinkler systems are permanently installed, are the nozzle heads arranged so that water will not be sprayed into operating electrical switch boards and equipment? Check to see that heads have not been bent or twisted from their original position.

“NO SMOKING” rules will be enforced in areas involving storage and use of hazardous materials. “NO SMOKING” signs have been posted where appropriate in areas where
flammable or combustible materials are used and/or stored. Safety cans must be used for dispensing flammable or combustible liquids at point of use. All spills of flammable or combustible liquids must be cleaned up promptly. Storage tanks should be adequately vented to prevent the development of excessive vacuum or pressure as a result of filling, emptying, or atmosphere temperature changes. Storage tanks are equipped with emergency venting that will relieve excessive internal pressure caused by fire exposure.

**Mechanical Lockout / Tagout**

Point of operation devices shall protect the operator by:

- Preventing and/or stopping normal stroking of the press if the operator's hands are inadvertently placed in the point of operation; or
- Preventing the operator from inadvertently reaching into the point of operation or withdrawing his/her hands if they are inadvertently located in the point of operation, as the dies close; or
- Preventing the operator from inadvertently reaching into the point of operation at all times; or
- Requiring application of both of the operator's hands to machine operating controls and locating such controls at such a safety distance from the point of operation that the slide completes the downward travel or stops before the operator can reach into the point of operation with his/her hands; or
- Enclosing the point of operation before a press stroke can be initiated and maintaining this closed condition until the motion of the slide had ceased; or

Enclosing the point of operation before a press stroke can be initiated, so as to prevent an operator from reaching into the point of operation prior to die closure or prior to cessation of slide motion during the downward stroke. A gate or movable barrier device shall protect the operator. A presence sensing point of operation device shall protect the operator by interlocking into the control circuit to prevent or stop slide motion if the operator's hand or other part of his/her body is within the sensing field of the device during the down-stroke of the press slide. The device may not be used on machines using full revolution clutches. The device may not be used as a tripping means to initiate slide motion. The device shall be constructed so that a failure within the system does not prevent the normal stopping action from being applied to the press when required, but does prevent the initiation of a successive stroke until the failure is corrected. The failure shall be indicated by the system. Muting (bypassing of the protective function) of such device, during the upstroke of the press slide, is permitted for the purpose of parts ejection, circuit checking, and feeding only. The safety distance from the sensing field to the point of operation shall be greater than the distance determined by the following formula: $D_s = 63 \text{ inches/second} \times T_s$ where: $D_s =$ minimum safety distance (inches); 63 inches/second = hand speed constant; and $T_s =$ stopping time of the press measured at approximately 90@ position of crankshaft rotation (seconds).

Guards shall be used to protect all areas of entry to the point of operation not protected by the presence sensing device. The pull-out device shall protect the operator and shall include attachments for each of the operator’s hands.Attachments shall be connected to and operated only by the press slide or upper die. Attachment shall be adjusted to prevent the operator from reaching into the point of operation or to withdraw the operator’s hands from the point of operation before the dies close. A separate pull-out device shall be provided for
each operator if more than one operator is used on a press. Each pull-out device in use shall be visually inspected and checked for proper adjustment at the start of each operator shift, following a new die set-up, and when operators are changed.

Necessary maintenance or repair or both shall be performed and completed before the press is operated. The sweep device, shall protect the operator as specified in this subsection, by removing his/her hands safely to a safe position if they are inadvertently located in the point of operation, as the dies close or prior to tripping the clutch. Devices operating in this manner shall have a barrier, attached to the sweep arm in such a manner as to prevent the operator from reaching into the point of operation, past the trailing edge of the sweep arm on the downward stroke of the press. This device may not be used for point of operation safeguarding. The sweep device must be activated by the slide or by motion of a foot pedal trip rod. The sweep device must be designed, installed and operated so as to prevent the operator from reaching into the point of operation before the dies close. The sweep device must be installed so that it will not itself create an impact or shear hazard between the sweep arm and the press tie rods, dies, or any other part of the press or barrier.

Partial enclosure conforming with this subsection, as to the area of entry which they protect, must be provided on both sides of the point of operation to prevent the operator from reaching around or behind the sweep device and into the point of operation after the dies start to close. Partial enclosures shall not themselves create a pinch point or shear hazard. A holdout or a restraint device shall protect the operator and shall include attachments for each of the operator’s hands. Such attachments shall be securely anchored and adjusted in such a way that the operator is restrained from reaching into the point of operation. A separate set of restraints shall be provided for each operator if more than one operator is required on a press. The two hand control device shall protect the operator.

When used in press operations requiring more than one operator, separate two hand controls shall be provided for each operator, and shall be designed to require concurrent application of all operators’ controls to activate the slide. The removal of a hand from any control button shall cause the slide to stop. The safety distance between each two hand control device and the point of operation shall be greater than the distance determined by the following formula: \( D_s = 63 \text{ inches/second} \times T_s \), where: \( D_s = \text{minimum safety distance (inches)} \); 63 inches/second = hand speed constant; and \( T_s = \text{stopping time of the press measured at approximately 90@ position of crankshaft rotation (seconds)} \).

Lockout Tagout

The training must include recognition of hazardous energy source, type & magnitude of energy available, methods & means necessary for energy isolation & control. Each authorized employee shall receive adequate training. The training should address that all affected employees are instructed in the purpose & use of the energy control procedure. There should be training provisions included for any other employee whose work operations are or may be in an area where energy control procedures may be utilized. The employee training should also address when tagout systems are used including the limitations of a tag (tags are warning devices & do not provide physical restraint). The training should also include that a tag is not to be removed without authorization. The tag is never to be ignored or defeated in any way. Retraining is required when there is a change in job assignments, in machines, a change in the energy control procedures, or a new hazard is introduced. All training and/or retraining must be documented with employee's name and dates of training.
Program must address: 1) who controls it. 2) How is program enforced? 3) Specific procedures that outline the scope, purpose, authorization, rules and techniques to be utilized. 4) Training. 5) Inspections, etc. where unexpected energizing start up or release of stored energy could occur & cause injury. 6) Equipment listings & surveys should be provided.

If an energy source can be locked out this method shall be utilized. LOCKOUT DEVICE: A device that 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 shall be utilized.

TAGOUT DEVICE: A warning tag (weather & chemical resistant) standardized in size, color, with wording warning of hazardous energy (Do Not Start) (Do Not Open) (Do Not Close) (Do Not Energize) (Do Not Operate).

Devices shall indicate the identity of the employee applying the device.

The program should address who performs the inspection (it must be someone other than those actually using the lockout/tagout in progress). A certified review of the inspection including date, equipment, employees & the inspector should be documented.

The established procedures for the application of energy control shall cover the following elements (Refer to Item # 7 -12 below) & shall be done in sequence.

Before an authorized or affected employee turns off a machine or equipment, the authorized employee shall have knowledge of the type & magnitude of the energy, the hazards of the energy to be controlled, & the methods or means to control the energy.

The machine or equipment shall be turned off or shutdown 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.

All energy isolating devices that are needed to control the energy to the machine or equipment shall be physically located & operated in such a manner as to isolate the machine or equipment from the energy source.

1.) Lockout or tagout devices shall be affixed to each energy isolating device by authorized employees. 2) Lockout devices, where used, shall be affixed in a manner that will hold the energy isolating devices in a safe or off position. 3) 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. 4) 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. 5) Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely as possible to the device in a position that will be immediately obvious to anyone attempting to operate the device.

Following the application of lockout or tagout devices to energy isolating devices, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained & otherwise rendered safe. 2) If there is a possibility of reaccumulation of stored energy level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

Prior to starting work on machines or equipment that have been locked or tagged out; the authorized employee shall verify that isolation & deenergization of the machine or equipment have been accomplished.

The written requirements must be in this order: Clear away tools; remove employees; remove the LOTO device; energize & proceed with testing; de-energize & reapply control measures.
This procedure should be documented (i.e., who performs & verifies). The procedures should address different crafts, departments, etc. The procedures should afford the group of employees a level of protection equal to that provided by a personal lockout or tagout device.

The authorized employee should ascertain the exposure status of individual group members. Each employee shall attach a personal lockout or tagout device to the group's device while he/she is working & then removes it when finished. During shift change or personnel changes, there should be specific procedures to ensure the continuity of lockout or tagout procedures. Documentation should be specific.

**First Aid Kits**

First-aid kits and required contents are maintained in a serviceable condition. Unit-type kits have all items in the first-aid kit individually wrapped, sealed, and packaged in comparable sized packages. The commercial or cabinet-type kits do not require all items to be individually wrapped and sealed, but only those which must be kept sterile. Items such as scissors, tweezers, tubes of ointments with caps, or rolls of adhesive tape, need not be individually wrapped, sealed, or disposed of after a single use or application. Individual packaging and sealing shall be required only for those items which must be kept sterile in a first-aid kit.

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.

**First-aid kits shall contain at least the following items:**

**10 Package Kit:**

- 1 Pkg. Adhesive bandages, 1" (16 per pkg.)
- 1 Pkg. Bandage compress, 4" (1 per pkg.)
- 1 Pkg. Scissors* and tweezers (1 each per pkg.)
- 1 Pkg. Triangular bandage, 40" (1 per pkg.)
- 1 Pkg. Antiseptic soap or pads (3 per pkg.)
- 5 Pkgs. of consulting physician's choice

**16 Package Kit:**

- 1 Pkg. Absorbent gauze, 24" x 72" (1 per pkg.)
- 1 Pkg. Adhesive bandages, 1" (16 per pkg.)
- 2 Pkgs. Bandage compresses, 4" (1 per pkg.)
- 1 Pkg. Eye dressing (1 per pkg.)
- 1 Pkg. Scissors* and tweezers (1 each per pkg.)
- 2 Pkgs. Triangular bandages, 40" (1 per pkg.)
- 1 Pkg. Antiseptic soap or pads (3 per pkg.)
- 7 Pkgs. of consulting physician's choice
24 Package Kit:
- 2 Pkgs. Absorbent gauze, 24" x 72" (1 per pkg.)
- 2 Pkgs. Adhesive bandages, 1" (16 per pkg.)
- 2 Pkgs. Bandage compresses, 4" (1 per pkg.)
- 1 Pkg. Eye dressing (1 per pkg.)
- 1 Pkg. Scissors* and tweezers (1 each per pkg.)
- 6 Pkgs. Triangular bandages (1 per pkg.)
- 1 Pkg. Antiseptic soap or pads (3 per pkg.)
- 9 Pkgs. of consulting physician’s choice

36 Package Kit:
- 4 Pkgs. Absorbent gauze, 24" x 72" (1 per pkg.)
- 2 Pkgs. Adhesive bandages, 1" (16 per pkg.)
- 5 Pkgs. Bandage compresses, 4" (1 per pkg.)
- 2 Pkgs. Eye dressing (1 per pkg.)
- 1 Pkg. Scissors* and tweezers (1 each per pkg.)
- 8 Pkgs. Triangular bandages, 40" (1 per pkg.)
- 1 Pkg. Antiseptic soap or pads (3 per pkg.)
- 13 Pkgs. of consulting physician’s choice Scissors shall be capable of cutting 2 layers of 15
- 1 oz. cotton cloth or its equivalent.

The first-aid kits are maintained at the ten, sixteen, twenty-four or thirty-six package level. Where the eyes or body of any person may be exposed to injurious chemicals and/or materials, suitable facilities for quick drenching or flushing of the eyes and body are provided, within the work area, for immediate emergency use. A poster shall be fastened and maintained either on or in the cover of each first-aid kit and at or near all phones plainly stating, the phone numbers of available doctors, hospitals, and ambulance services within the district of the work site.

First Aid & CPR
A person(s) who has a valid certificate in first aid training, the American Red Cross or equivalent shall be available at work sites to render emergency first aid. Provisions shall be made prior to commencement of a project for prompt medical attention in case of serious injury.
First aid supplies shall be easily accessible when required. First aid kits shall consist of appropriate items and stored in a weather proof container with individual sealed packages of each type.
The contents of the first aid kits shall be checked before being sent out to each job & at least weekly on each job to ensure that the expended items are replaced.
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. The telephone numbers of the physicians, hospitals or ambulances shall be conspicuously posted.
Where the eyes or body of any person may be exposed to injurious corrosive materials, suitable Drenching or Flushing facilities shall be provided within the work area.
First Aid Station

If a fixed establishment employs more than 200 employees at one central location, First-aid stations shall be located as close as practicable to the highest concentration of personnel. First-aid stations shall be well marked and available to personnel during all working hours. One person holding a valid first-aid certificate shall be responsible for the proper use and maintenance of the first-aid station. First-aid stations shall be equipped with a minimum of two first-aid kits, the size of which shall be dependent upon the number of personnel normally employed at the work site. One first-aid kit may be a permanent wall-mounted kit, but in all cases the station shall be equipped with at least one portable first-aid kit. When required by the circumstances, the station shall be equipped with two wool blankets and a stretcher in addition to first-aid kits. A roster, denoting the telephone numbers and addresses of doctors, hospitals and ambulance services available to the work site, shall be posted at each first-aid station.

Late Night Crime Prevention

All establishments operating between the hours of 11:00 p.m. and 6:00 a.m. should provide crime prevention training to their employees. Crime prevention training shall be a part of the accident prevention program. Training will be made available to ensure that the purpose and function of robbery and violence prevention are understood by employees and that the knowledge and skills required for their safety have been provided. The training and training materials outline security policies, safety and security procedures, and personal safety and crime avoidance techniques. Formal instruction through a training seminar or training video presentation will be made available and upon completion the employee shall sign off on the date, time, and place of training. The training documentation will be placed in the employee’s personnel file.

The following elements will be covered in the crime prevention training program:

- An explanation of the importance of keeping the location clean, neat, and uncluttered thereby makes it as unattractive as possible to robbers.
- An explanation of the purpose of maintaining an unobstructed view of the cash register from outside the store provided the cash register is located in a position visible from the street. Instruction on reasons for operating only minimum number of cash registers at night.
- Keeping the cash register fund to a minimum.
- Taking extra precautions after dark, i.e., keep alert; observe lighting and dark corners, spot possible hiding places.
- Violence prevention procedures in case of robbery.
- A refresher course on crime prevention on or near the employee's anniversary date.
- Videotape and crime prevention material shall be available for employee's review at their request.

In addition to providing crime prevention training as defined in this section, the company posts a conspicuous sign in the window or door which states that there is a safe on the premises and it is not accessible to the employees on the premises and that the cash register contains only the minimal amount of cash needed to conduct business. All displays, and any other material posted in window(s) or door(s) should be arranged so as to provide a clear and unobstructed view of the cash register; provided the cash register is located in such a position so as to be visible from the street. If there is any cash on the premises after dark, the
Company has a drop-safe, limited access safe or comparable device on the premises. Please use it. In addition, the outside lights will be on for that portion of the approach and parking area that is necessary to accommodate customers during all night hours the late night retail establishment is open.

**Company Fire Brigades**

In some industries, the company establishes a fire fighting brigade. The company does this by drafting a policy statement that announces the existence of a fire brigade; the basic organizational structure; the type, amount, and frequency of training to be provided to fire brigade members; the expected number of members in the fire brigade; and the functions that the fire brigade is to perform at the workplace. The organizational statement is available for inspection by government officials and by employees or their designated representatives. Employees who are expected to do interior structural fire fighting must be physically capable of performing duties which may be assigned to them during emergencies. The employer shall not permit employees with known heart disease, epilepsy, or emphysema, to participate in fire brigade emergency activities unless a physician's certificate of the employees' fitness to participate in such activities is provided. Approved self-contained breathing apparatus shall be provided to and worn by fire brigade members while working inside buildings or confined spaces where toxic products of combustion or an oxygen deficiency may be present. Such apparatus shall also be worn during emergency situations involving toxic substances. Approved self-contained breathing apparatus may be equipped with either a “buddy-breathing” device or a quick disconnect valve, even if these devices are not certified by NIOSH. If these accessories are used, they shall not cause damage to the apparatus, or restrict the air flow of the apparatus, or obstruct the normal operation of the apparatus. Approved self-contained compressed air breathing apparatus may be used with approved cylinders from other approved self-contained compressed air breathing apparatus provided that such cylinders are of the same capacity and pressure rating. All compressed air cylinders used with self-contained breathing apparatus shall meet DOT and NIOSH criteria. Self-contained breathing apparatus shall have a minimum service life rating of thirty minutes in accordance with the methods and requirements of the mine safety and health administration (MSHA) and NIOSH, except for escape self-contained breathing apparatus (ESCBA) used only for emergency escape purposes. Self-contained breathing apparatus shall be provided with an indicator which automatically sounds an audible alarm when the remaining service life of the apparatus is reduced to within a range of twenty to twenty-five percent of its rated service time.

**Positive Pressure Breathing Apparatus**

Self-contained breathing apparatus ordered or purchased after January 1, 1982, for use by fire brigade members performing interior structural fire fighting operations, are of the pressure-demand or other positive-pressure type. Effective July 1, 1983, only pressure-demand or other positive-pressure self-contained breathing apparatus shall be worn by fire brigade members performing interior structural fire fighting. This does not prohibit the use of a self-contained breathing apparatus where the apparatus can be switched from a demand to a positive-pressure mode. However, such apparatus shall be in the positive-pressure mode when fire brigade members are performing interior structural fire fighting operations.
Negative-pressure self-contained breathing apparatus with a rated service life of more than two hours and which have a minimum protection factor of 5,000, as determined by an acceptable quantitative fit test performed on each individual, is acceptable for use only during those interior structural fire fighting situations for which the employer demonstrates that long duration breathing apparatus is necessary. Quantitative fit test procedures shall be available for inspection by the director or authorized representative. Such negative-pressure breathing apparatus will continue to be acceptable for eighteen months after a positive-pressure breathing apparatus with the same or longer rated service life is certified by NIOSH. After this eighteen-month period, all self-contained breathing apparatus used for these long duration situations shall be of the positive-pressure type.

This section does not require an employer to organize a fire brigade.

It is suggested that pre-fire planning be conducted by the local fire department and/or the workplace fire brigade in order for them to be familiar with the workplace and process hazards. Involvement with the local fire department or fire prevention bureau is encouraged to facilitate coordination and cooperation between members of the fire brigade and those who might be called upon for assistance during a fire emergency.

Body protection
Fire brigade members may wear a fire-resistive coat in combination with fully extended boots, or they may wear a fire-resistive coat in combination with protective trousers. Fire-resistive coats and protective trousers meeting all of the requirements contained in NFPA 1971-1975, “Protective Clothing for Structural Fire Fighters,” are acceptable as meeting the requirements of this standard. The lining is required to be permanently attached to the outer shell. However, it is permissible to attach the lining to the outer shell material by stitching in one area such as at the neck. Fastener tape or snap fasteners may be used to secure the rest of the lining to the outer shell to facilitate cleaning. Reference to permanent lining does not refer to a winter liner which is a detachable extra lining used to give added protection to the wearer against the effects of cold weather and wind.

Hand protection
Fire fighters should wear protective gloves or a glove system. A glove system consists of a combination of different gloves. The usual components of a glove system consist of a pair of gloves, which provide thermal insulation to the hand, worn in combination with a second pair of gloves which provide protection against flame, cut and puncture. Protective gloves should provide dexterity and a sense of feel for objects. Criteria and test methods for dexterity are contained in the NIOSH publications, “The Development of Criteria for Firefighters’ Gloves; Vol. I: Glove Requirements,” and “Vol. II: Glove Criteria and Test Methods.” These NIOSH publications also contain a permissible modified version of Federal Test Method 191, Method 5903, (paragraph of Appendix E) for flame resistance when gloves, rather than glove material, are tested for flame resistance.

Head, eye & face protection
Head protective devices which meet the requirements contained in NFPA No. 1972 are acceptable as meeting the requirements of this standard for head protection. Head protective devices are required to be provided with ear flaps so that the ear flaps will be available if
needed. It is recommended that ear protection always be used while fighting interior structural fires. Many head protective devices are equipped with face shields to protect the eyes and face. These face shields are permissible as meeting the eye and face protection requirements of this paragraph as long as such face shields meet the requirements of the general safety and health standards. Additionally, full face pieces, helmets or hoods of approved breathing apparatus are also acceptable as meeting the eye and face protection requirements. It is recommended that a flame resistant protective head covering such as a hood or snood, which will not adversely affect the seal of a respirator face piece, be worn during interior structural fire fighting operations to protect the sides of the face and hair.

Responsible Safety Officer

General Statement

The Responsible Safety Officer is the person who has been delegated the authority to develop and administer Resource Production Company’s health and safety program.

Duties

By law, the Responsible Safety Officer is the person designated by the company with the duty and authority to implement and maintain Resource Production Company’s Injury and Illness Prevention Program. The Responsible Safety Officer is assigned the responsibility of providing technical guidance and services in the field of health and safety needed by Resource Production Company management. To fulfill this objective the Responsible Safety Officer is required to:

Provide management at all levels with the information, advice, and assistance needed to formulate Resource Production Company’s health and safety policy, directives, procedures, and standards.

Assist management at all levels in establishing and maintaining a healthful and safe working environment free from unacceptable risks, in conformance with OSHA health and safety guidelines and in compliance with applicable standards, codes, and regulations.

Monitor operations within Resource Production Company and, where appropriate at off-site facilities, provide management with the information needed to maintain a healthful and safe working environment, free from unacceptable risks.

Develop and provide general safety education and training programs. Assist in the development of specific job safety training programs.

Develop plans and train response personnel to control emergency situations (earthquake, radiation, injury, fire, etc.).

Provide health and safety support services assigned by the Company Officer to whom the Responsible Safety Officer reports.

Maintain a staff of specialists or consultants knowledgeable in all areas of safety.

Prepare and maintain Resource Production Company’s Health and Safety Manual and other documents that relate to safety. Specify proper protective equipment for issuing to employees.
Check plans of all new projects for construction safety, industrial safety, and other safety reviews as required by OSHA and Resource Production Company regulations.

Stop hazardous operations where life hazard or major property damage is imminent and follow with documented evidence.

To carry out its responsibilities, the Responsible Safety Officer maintains a staff of specialists and outside consultants in the appropriate environment, health, and safety disciplines. These disciplines include: Construction Safety, Engineering Services, Environmental Protection, Industrial Hygiene, Laser Safety, Mechanical Safety, Non-destructive Testing, Occupational Safety, Radiation Safety, Safety Training, and Education Seismic Safety

Five Functions
The functions of the Responsible Safety Officer are divided into five areas:
1. Operations
2. Health Physics
3. Engineering Services/Occupational Safety
4. Industrial Hygiene
5. Environmental Protection

Some of these functions may be delegated in whole or in part to staff and/or outside consultants.

Operations
This area deals with the day-to-day safety operations of the Resource Production Company. It includes the following personnel: Field Supervisors or Field Safety Officers help in the planning or preparation of hazardous projects and analysis of difficult safety problems. They provide on-site training; protective equipment and other safety-related equipment for hazardous operations; maintenance of environmental monitoring devices; evaluation of ventilation and air cleaning equipment; and radioactive or chemical source inventory. Decontamination and Waste Disposal Contractors provide services to decontaminate special equipment; assistance with clean-up of radioactive or hazardous chemical spills; collection and disposal of radioactive materials and hazardous chemicals. Special Transportation Contractor provides services for receiving and shipping of radioisotopes and consultation on the regulations concerning transportation of hazardous chemicals.

Radiation Physics
This area is composed of the following functions: The Radiation Physics Section is primarily concerned with the radiation safety aspects of accelerators. The areas of immediate concern are the following:
- Radiation intensity in occupied areas
- Adequacy of radiation safety interlock systems
- Access control to radiation areas
- Proper sign and warning systems
- Review and approval of facility radiation Operational Safety Procedures

In addition, the Radiation Physics Section performs the following functions:
- Experimental beam line safety analysis
- Shielding calculations for proposed new accelerators
- Radiation damage studies
- Development of measurement instruments and techniques
- Experimental source term measurements
- Neutron energy spectral measurements

The X-Ray Safety Section evaluates the use of x-ray equipment at Resource Production Company. This is accomplished by periodic radiation surveys, physical inspection of x-ray facilities and logbooks, approval of Operational Safety Procedures, and the receipt of Certification of Training documents. This Section also advises on matters of instrument selection, measurement techniques, and safety apparatus design (interlocks, barriers, monitors, etc.). This Section files and distributes all documentation generated by the above operations.

**Engineering Occupational Safety**

The primary concern of this area is the general safety of Resource Production Company. Its responsibilities include:

- Occupational Safety: Investigation, statistical analysis, and review of personal injury, property damage, and vehicle accident reports.
- Recommendation on protective clothing and equipment for eyes, head, feet, and hands to prevent traumatic injury.
- Evaluation of material-handling and storage facilities, such as manual and mechanical handling devices, slings, ropes, chains, and hooks.
- Review of design, layout, and code compliance of new or modified facilities and buildings and follow-up inspections of construction sites.
- Recommendation on proper use and care of ladders, ramps, elevated walks, and work platforms.
- Review of traffic safety, such as traffic signs and markings, traffic patterns, and layout planning.
- Determination of qualified operators of special vehicles and equipment.
- Mechanical Safety: Review/design/inspection of hazardous equipment.
- Advise on vehicle safety (design, consultation).
- Recommendation of adherence to mechanical design codes, standards, and procedures.
- Provision of non-destructive testing services.
- Reviews of Operational Safety Procedure relating to hazardous equipment.
- Seismic Safety: Design of anchoring or restraining devices. Inspections and consultations. Interface with building and construction contractors.

**Industrial Hygiene**

This function must recognize, evaluate, and recommend control for occupational health hazards. Outside consultants are responsible for providing the following services:

- Toxicology of occupational chemical hazards
- Control of non-ionizing electromagnetic spectrum hazards, such as lasers, ultraviolet, infrared, and microwave-radio frequency radiation
Evaluation of ventilation for comfort, dilution, and local exhaust
Noise and sound analysis
Illumination evaluation
Environmental sanitation, such as food, water, and vector and pest control
Measurement of physiological stresses, such as temperature extremes
Provision of protective equipment, such as respiratory, hearing, and special eye protection
Control of bio-hazards
Laser safety

Environmental Protection
This area is involved with the identification and quantification of environmental quality concerns, development and maintenance of operating permits, assessment of pollution abatement programs, and liaison with environmental protection agencies. It includes the following services:
- Environmental monitoring, surveillance and analysis of contaminants in air, rain, surface water, soil, and stack exhaust
- Air pollution control
- Water pollution control
- Polychlorinated biphenyl inventory in transformers and capacitors.
- Underground tank monitoring and reporting
- Treatment facilities permitting and sampling for regulatory compliance
- Environmental remediation of contaminated sites.

Common Functions
All the functions of the Responsible Safety Officer include the following areas of responsibilities:
- Environmental Monitoring, including both workplace and office data collection and measurement techniques.
- Decontamination and Waste Disposal.
- Safety Resource Library Maintenance.
- The Responsible Safety Officer should either maintain or have the Company maintain a library that contains copies of codes, standards, safety manuals, and reports that regulate Resource Production Company's safety program. The library also contains copies of texts and reports regarding health and safety.
- Industrial Hygiene and Environmental Protection.
- Health Physics laboratory. Maintain extra protective clothing, safety glasses and safety shoes for guests and existing employees needing temporary replacement of their protective equipment.

Safety Training
Resource Production Company policy and federal law require that Resource Production Company staff, participating guests, and visitors receive appropriate health and safety training. Managers are responsible for ensuring that employees and guests under their supervision receive this training so they are fully informed about possible occupational health hazards and know how to work safely. Training must include Resource Production Company's
health and safety orientation for new employees plus any additional training specific to the nature of hazards on the job; employees must complete this training before they can work unsupervised. All new employees must attend the new employee orientation within the first month of employment.

OSHA and other federal regulations spell out several specific health and safety training requirements for special hazards. These include, but are not limited to, radiation safety, hazard communication for exposure to hazardous substances, asbestos exposure, respirator use, hearing conservation, laser safety, confined space hazards, and certification for using material in moving equipment such as forklifts and overhead cranes. Employees who do hazardous work, such as working with high-voltage power supplies, or who are members of building emergency teams are required to have CPR and First Aid certification.

Managers should identify training needs for the job classifications for which they are responsible. Please refer to specific chapters in this manual for further information on training requirements. Consult with the Responsible Safety Officer staff about other training needs and requirements. Training not provided by Responsible Safety Officer, such as on-the-job training, is the responsibility of line management. This includes information on procedural changes or system modifications that impact safety.

Responsible Safety Officer provides several health and safety training courses, technical assistance on training needs, and resources to help supervisors fulfill their training responsibilities. An announcement describing health and safety courses offered by Responsible Safety Officer is distributed quarterly. Educational resources such as fact sheets, hazard summaries, and other written materials, as well as videos and slide shows, are available from Responsible Safety Officer.

Supervisors can get a catalog from Responsible Safety Officer describing audio-visual materials that may be used to supplement safety training programs. ALL health and safety training must be documented. Supervisors must note the participants’ names and employee numbers, topics discussed, instructor(s), and date. Supervisors are responsible for maintaining training records. A copy of this information should be sent to the Responsible Safety Officer training/education coordinator for inclusion in Resource Production Company’s training database.

PSM Contractor Responsibilities

The contract employer shall assure that each contract employee is trained in the work practices necessary to perform his/her job.

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.

The contract employer shall document that each employee has received & understood the required training. The contract employer shall prepare a record which contains the identity of the contract employee, the date of training & the means used to verify that the employee understood the training.

To prevent or minimize consequences of catastrophic releases of toxic, reactive, flammable or explosive chemicals in various industries such as refineries, etc.

Contractor employees shall 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.
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. Contract employees shall not perform hot work until a hot work permit is obtained from employer. The permit shall document that provisions of CFR 1910.252(a) have been met. Employees must immediately report all accidents, injuries and near misses. An incident investigation must be initiated within 48 hours. Resolutions and corrective actions must be documented and maintained 5 years.

All contract employers must respect the confidentiality of trade secret information when the process safety information is released to them.

**Behavior-Based Safety**

Behavioral Observation and Feedback

This is one of the most important components of the process. Observations provide direct, measurable information on employees’ safe work practices. Employees are observed performing their routine task. The observer documents both safe and unsafe behaviors. The employee is then provided positive feedback on the safe behaviors and non-threatening feedback on the unsafe behaviors. They are also provided with suggestions on correcting the unsafe behaviors.

**Formal Review of Observation Data**

The data is then analyzed to determine the employee’s (or department’s) improvement in safe behaviors. It can be looked at as an overall percentage.

Example: If there were 20 items on the checklist and the worker performed 17 of them safely, then he would get a score of 85% safe.

The improvement between observations could be graphed and displayed for employees to view. When the graphs shows improvement, it provides positive reinforcing feedback to employees.

**Improvement Goals**

Setting improvement goals increases the effectiveness of feedback and the success of the behavior-based safety process. These goals can take different forms, such as:

Percent safe goals, Process goals, Implementation goals, Reinforcement for Improvement and Goal Attainment.

Management must provide immediate, positive feedback to reinforce safe behavior. Rewards can be an effective means of reinforcing goal attainment.

**Follow up on Action Plan**

A follow up interview should be conducted to assure the employee is making progress and to make sure that goals are reached in a timely fashion.

**Short Service Employee (SEE) Program**
Applies to employees with less than six months service.
Subcontractors must follow the same rules as Contract employees
An initial employee orientation is required before performing work on locations and is given on hire date.
Short Service Employees (SSE’s) shall be kept to a minimum on a work location at any given time.
Crew sizes of less than five shall have no more than one SSE

**Short Service Employee (SEE) Program Guideline**
An SSE may only work under the direct on-site supervision of a designated contractor employee who, as one of his or her duties, serves as a mentor/trainer in safety for the SSE
A SSE cannot work alone
Please Note:
1) To be eligible for an exception, the employee must have a high level of previous work experience in the same job family.
2) An exception may also be granted for a supervisor with a high level of previous work experience in the same job family. The exception request must be submitted in writing and approved by management.
The contractor person-in-charge must notify the company representative of a SSE working on Company premises and provide documentation on the Short Service Employee Notification Form’. Required approval must be received prior to the individual starting work.
SSE’s must be easily identified while on our locations. This can be accomplished by using colored hard hats (Green): reflective hat stickers or bands: vest, or any similar means.
Presence of an SSE will be communicated during morning HSE Meetings and noted on JSA.

**Roles and Responsibilities:**
SSE Mentor shall be responsible for overseeing Orientation, Training and Observation of SSE during first six months of employment. Mentor will Coach and supervise work. The SSE’s safety will be of highest priority while learning the new job and unfamiliar tasks.
2. SSE shall Consult with and listen to Mentor, and will be responsible for performing work as directed, but always has the responsibility to speak up when and if work is deemed unsafe.

**Purpose** The Short Service Employee (SSE program applies to employees who have less than six months service with the company or craft. The purpose of the program is to ensure that these contractor employees have an initial orientation of safety requirements prior to performing work under direct on-site supervision of a designated contractor employee who also serves as a mentor/trainer.

**Program Guideline** The “Short Service Employee (SSE) Program” outlines minimum requirements of contractor companies using employee with less than six months service with the contractor company or in their craft... The requirements are as follows:
• An initial employee orientation is required.
• SSE’s shall be kept to a minimum on a work location.
• SSE’s may only work under the direct on-site supervision of a designated contractor employee.
• The contractor person-in-charge must provide written notification of all SSE’s working.
• SSE’s should be easily identifiable while on work locations.

**Hazard Warnings**

**Introduction**

Every reasonable method to warn employees of hazards and dangers and to inform them of the actions required must be utilized. Signs, characteristic lights, and audible alarms as additional safeguards for built-in mechanical and physical protection must be used. To ensure uniform response by personnel, the warning signs and devices must be of the same type for similar hazards. Obtaining and installing the warning systems is the responsibility of the Responsible Safety Officer as well as group using them.

**Hazard Identification and Risk Assessment Procedure**

This procedure is for general hazards and risks assessment. To ensure that there is a formal process for hazard identification, risk assessment and control to effectively manage hazards that may occur within the workplaces.

Health and safety requires that employers in consultation with employees and/or Sub-contractors identify all potentially hazardous situations which could result in any person in the workplace being harmed. The hazard identification process requires that:

(i) Past incidents/accidents be examined to see what happened and whether the incident/accident could happen again.
(ii) Employees be consulted to find out what they consider are safety issues, eg. how could an employee be exposed to this hazard?
(iii) Work areas or work sites be examined to find out what is happening now.
(iv) Information about equipment (e.g. plant, operating instructions) and Material Safety Data Sheets be reviewed to see what is said about safety precautions.
(v) Some creative thinking about what could go wrong takes place, i.e. what hazardous event could take place here?
(vi) The Risk Rating Matrix is used to assess the likelihood and the severity or consequences of each hazard and to give it a “risk rating”.

1. **Hazard Identification: Identify Hazards & Consequences**
   Potential hazards may be identified from a number of internal and external sources. Generally, hazards are initially listed on a Preliminary Hazard List (PHL), then grouped by functional equivalence for analysis. Prior to risk analysis you must also include the consequence (undesired event) resulting from the hazard scenarios. Hazard scenarios may address the following: who, what where, when, why and how. This provides an intermediate product that expresses the condition and the consequences that will be used during risk analysis.

2. **Risk Analysis: Analyze Hazards and Identify Risks**
Risk analysis is the process whereby hazards are characterized for their likelihood and severity. Risk analysis looks at hazards to determine what can happen when. This can be either a qualitative or quantitative analysis. The inability to quantify and/or the lack of historical data on a particular hazard does not exclude the hazard from the need for analysis. Some type of a Risk Assessment Matrix is normally used to determine the level of risk. The objective process of safety or hazard assessment are to identify hazards and events which could challenge the safety of the facility, management, employees and visitors and should be used to develop plans, material changes and procedures needed to mitigate, correct or prevent these events. The choice of methods, procedures and approaches for safety and hazard analysis should be based on objective criteria and use best industry practices.

**Gas Hazards**

Resource Production Company shall assure that our employees are trained in Gas Hazards Awareness before initial assignment and annually thereafter. Gas Hazard Awareness training should include at a minimum:

a. Locations of alarm stations
b. Gas Monitoring Equipment- Portable and Fixed Detection
c. Gas Alarms
d. Gas Hazards- Characteristics of gases, to include oxygen deficiency, oxygen or nitrogen enrichment, carbon monoxide and hydrogen sulfide at a minimum. Hazard training must also include any plant or department specific gases of concern. Training must include signs and symptoms of overexposure.
e. Personnel Rescue Procedures
f. Use and care of Self-Contained Breathing Apparatus (SCBA)- includes donning and emergency procedures (if applicable)
g. Evacuation Procedures
h. Staging Areas – Primary and Secondary

Gas Hazard Awareness training should be documented and available for review. Each employee shall use a portable gas detector as required in all potential gas hazard areas. The gas monitor must be calibrated per manufacturer's recommendations and contain a current calibration sticker on the monitor providing the date of calibration. Bump test are required to be completed at the beginning of each day the monitor is in use per the requesting owner client and manufacturer's guidelines to ensure the monitor is functioning correctly.

A respiratory protection program shall be established in accordance with 29CFR 1910.134. The employer shall ensure all employees are aware of the Owners contingency plan provisions including evacuation routes and alarms. Employees should participate in emergency evacuation drills and practice rescue procedures.
Hazard & Safety Analysis
Personal Protective Equipment (PPE) Hazard Analysis
1. Do not rely solely on PPE for controlling hazards. Personal Protective equipment should only be applied to hazard control when all other hazard controls such as design, engineering, and procedures cannot be used to eliminate or control a specific hazard
2. Selection and evaluation of PPE should consider all situations that could occur during a specific task in a specific environment. A qualified person, who is thoroughly knowledgeable of both the hazards and the work environment should be assigned to conduct the evaluation and selection process. This company appointed person should also be knowledgeable of the uses and limitations of specific PPE
3. In assessing hazards that are to be controlled by PPE, the first step is to conduct a walk-through of the work areas to identify all sources of hazards. Look for hazards involving Falling Heat and Cold Impact Penetration Drowning Compression (roll-over) Chemicals Harmful dust Light and ionizing radiation Electrical Shock Cuts, Lacerations or Abrasions
When all worksite and task data has been gathered, use a selection process based on:
1. Type and level of risk
2. Apply knowledge of personal protection equipment and compare this to actual hazards for both the work site and specific task
3. Select the most proper PPE for each hazard as it applies to specific task and work area.
4. Develop PPE specific training for employees, including proper use, adjustments, limitations, application, care and maintenance.
5. Ensure PPE fits employees. Comfort and fit are important factors to ensure employees will ware and use the PPE properly

Periodic Hazard Review. Anytime there is a change in tasks or work area design, or an accident in a specific work area occurs, conduct a hazard review to ensure that existing PPE requirements still provide the expected protection.

Signs: Contents & Configuration
Signs must conform to the colors, symbols, lettering size, and proportions as specified by Resource Production Company, except that radiation signs must conform to the requirements stated in 10 CFR 20. Every warning sign must include the following components:
- An approved heading that indicates the relative hazard
- A statement of the type of hazard
- A statement of what to do or not to do in the area

**Sign Selection**

The sign portfolio maintained by the Responsible Safety Officer may be used to help in selecting suitable signs. The Responsible Safety Officer will also advise regarding the types needed and their sources of supply. The Responsible Safety Officer stocks some signs. Special signs are custom made in the Resource Production Company shops or are purchased from outside vendors.

**Danger Signs**

Danger signs are used only where injury or damage is certain to occur if approved operating instructions and procedures are not followed. Personnel must be warned of the serious consequences of ignoring the message. The top of this sign says DANGER in white letters on a red oval that is edged by a rectangular black border. The body of the sign is white with the message printed in black.

**Caution Signs**

Caution signs are used where injury or damage is possible and employees must be on their guard. The top of this sign says CAUTION in yellow letters on a black rectangle. The body of the sign is yellow with the message printed in black.

**Informational Signs**

Informational signs are used where instructions are needed. The heading says NOTICE in white letters on a green rectangle when the message relates to safety and on a blue rectangle for other messages. The body of the sign is white with the message printed in black.

**Directional Signs**

Directional signs are used to indicate exits, fire escapes, evacuation routes, stairways, location of first aid, etc. The direction symbol appears near the top in white on a green rectangle. The body of the sign must have a color contrasting with the general background.

**Warning Devices**

Warning devices such as lights and audible alarms must be installed where they are needed to warn personnel against remaining in or entering hazardous areas. Personnel must be instructed about the meaning and the response required when an alarm sounds. An explanatory sign (describing hazard and action to take) must be posted near a warning light that when ON indicates danger, caution, high explosives, or radioactivity. In a highly illuminated area, the warning light should be surrounded by a disk or wide-angled cone of a contrasting color.

**Evacuation Alarm System**

The facility supervisor and Responsible Safety Officer shall jointly decide the type of evacuation alarm system when needed.

**Evacuation Alarm**

All buildings on site are equipped with a means of notifying personnel to leave the building,
which is usually the public address system. Every dangerous operation area, indoor and outdoor, must be provided with devices to notify personnel to leave the area. The general evacuation alarm is a steady klaxon horn sound that means, “Everyone leave the building immediately and go to the prearranged assembly point or as directed by the public address system.” The extensiveness and reliability of the alarm system must be proportional to the magnitude of the credible accidents that could occur from the operations in or near the building.

**Evacuation Alarm - Automatic**

An automatic evacuation alarm must be installed that is triggered by a detector directly sensitive to the nature of the hazard for any operation in which an accident could rapidly endanger employees outside the immediate area. Such an operation must not proceed unless the alarm system is functional. Manual activation capability and a public address back-up system must be provided in the building. This alarm system must be protected by an automatic emergency power supply.

**Manual Alarm System**

A manually operated alarm system must be installed for operations in which accidents would not cause immediate danger to personnel outside the area of the incident but that could develop into dangerous situations. A public address system operable from the building and from the Fire Department and Protective Services must be provided.

**Emergencies**

**Organization**

Resource Production Company requires that during every emergency an organized effort be made to protect personnel from further injury and to minimize property damage. All of Resource Production Company's resources can be made available to respond to an emergency. Each supervisor must know what to do during an emergency in his or her area and must be certain that his or her employees understand their roles.

**Master Emergency Response Plan**

Resource Production Company's Master Emergency Response Plan delineates lines of authority and responsibility for emergency response. In this context, a major emergency may be one of the following: a potential major loss to a building or facility; an emergency that involves more than one building or facility; a situation in which a choice must be made in the assignment of relative levels of authority among emergency-response groups; a potential hazard to the surrounding community; threat; civil disturbances or alerts; natural disasters such as earthquakes, floods, and landslides; and site wide electrical power or other utility failure.

During response to such major events, if deemed necessary by management or Resource Production Company Fire or Police may be summoned, and a pre-designated succession of management personnel would determine who would take charge. The primary responsibility person designated to be in charge is to ensure that priorities are established, that the response is appropriate and adequately implemented, and that the proper notifications are made. In most cases the direct involvement of local supervision and remedial action will be necessary.
Adequate emergency response will be made at the group, department, and building levels, with support from Fire, Medical, Protective Services, and other support organizations. As a practical matter it must be recognized that management personnel are normally on site only 40 of the 168 hours per week. Thus, there may be considerable delay before management personnel can assume on-site direction of major emergencies. This highlights the importance of local initiative, at least at the onset of an emergency.

The underlying philosophy of the emergency response plan is the recognition that each employee has a vital role and a basic responsibility in the area of safety and emergency action. The only reasonable expectation is that at the onset of an emergency the initial response will be at the individual level. Immediate and knowledgeable action is vital. The emergency plans for individual buildings and facilities set forth the responses to be taken by employees following the discovery of an emergency.

Following the immediate measures taken by the individual, the responsibility for action will normally proceed upward through normal organizational lines of authority to the Building Manager and to emergency-response groups. Involvement of individuals at a higher level of responsibility will depend on the particular situation. To reiterate, levels of responsibility proceed downward from top management while action and response levels proceed upward from the first person involved.

Please have the courage to call outside assistance like the police and firefighters. Dial 9-1-1. When the police, firefighters or paramedics arrive, surrender command to a qualified emergency specialist. Notify management as soon as practical, which means after all immediate responses have been exercised. The operator at 911 will tell you who is the person in charge of the specialized personnel assigned to respond to the emergency. An orderly transfer of responsibility is then made from the local building or facility organization to this responding unit.

The examples listed below identify the most likely outside incident commander for the following types of emergencies:

- Injury: Ranking Fire Officer or Physician
- Fire: Ranking Fire Officer
- Bomb Threat: Ranking Police Officer
- Civil Disturbance: Ranking Police Officer
- Radioactive or Chemical Spills: Ranking Fire Officer Responsible Safety Officer Special Toxic Clean Up crew or alternate
- Power Outage: Pacific Gas and Electric or local Plant Power Engineer
- Mechanical Utility Failures: Construction and Maintenance Department Superintendent
- Structural Plant Failures: Engineering Department Head or alternate
- Landslide: Engineering Department Head or alternate

In most emergencies the person who should be in charge is obvious. However, an emergency might arise that requires the major involvement of more than one emergency-response group. In such a case the ultimate authority among those on the scene may not be obvious. In this event, management should be consulted for direction.

**Building Emergency Plan**

A specific emergency plan for each building or facility must be prepared under the direction of the Building Manager. A Building Manager and Deputy Manager must be appointed and
oriented for each building or complex. Generally, the Building Manager is the person in charge of a building or facility. The Building Manager has specific responsibility for the preparation, updating, and implementation of the emergency plan for this area. This responsibility includes recommending personnel to attend indoctrination and training programs. Specifically, each plan must contain the following information and procedures as appropriate for each building: The names of the Building Manager, Deputy Manager, and Assistant Manager(s).

A list of people with specific duties during an emergency and a description of their duties. For example, specific people should be assigned to supervise evacuation and to carry out a rapid search of the area (assuming this can be done safely). Floor plans showing evacuation routes, the location of shutoff switches and valves for the utility systems (water, gas, electricity), and the locations of emergency equipment and supplies (including medical). Indications on the floor plans of areas where specific hazards (i.e., toxic, flammable, and/or radioactive materials) exist. Location and description of special hazards or hazardous devices should be included in the text together with shutdown procedures if applicable.

Designation of a primary assembly point for evacuees, well away from the building. An alternate site should also be designated in case the first choice cannot be used.

Reentry procedures. No one should reenter an evacuated building or area without specific instructions from the Building Manager or other person in charge. Department Head and Supervisor responsibilities regarding emergency preparedness and action procedures.

Emergency plans for facilities or equipment requiring an Operational Safety Procedure (OSP).

Operational Safety Procedures

OSP’s for individual facilities or pieces of equipment must include emergency plans for the facilities or equipment.

Supervisors Responsibilities

During an emergency, the supervisor must: Ensure that those under his or her supervision are familiar with the plan for the building, particularly the recommended exit routes and how to report an emergency. Render assistance to the person in charge during an emergency, as required. Maintain familiarity with the shutdown procedures for all equipment used by those under his or her supervision. Know the location and use of all safety equipment on his or her floor. Keep employees from reentering an evacuated area until reentry is safe.

No Loitering Policy

Employees not involved in the emergency must stay away from the scene and follow the instructions issued over the public address system or directly from the person in charge. The sounding of a fire bell means immediate evacuation by the nearest exit. Employees must not reenter an area that they have evacuated until notified that it is safe to return.

Employee Responsibilities

Employees, other than emergency-response groups, involved in any emergency greater than a minor incident are expected to act as follows: If there is threat of further injury or further exposure to hazardous material, remove all injured persons, if possible, and leave the immediate vicinity. If there is no threat of further injury or exposure, leave seriously injured personnel where they are. Report the emergency immediately by phone. State what happened, the specific location, whether anyone was injured, and your name and phone
number. Proceed with first aid or attempt to control the incident only if you can do so safely and have been trained in first aid or the emergency response necessary to control the incident. Show the ranking emergency-response officer where the incident occurred, inform him or her of the hazards associated with the area, provide any other information that will help avoid injuries, and do as he or she requests.

**Emergency Action Plan**

At Resource Production Company, we have established specific plans of action for dealing with a variety of emergencies – please read this section carefully and commit it to memory.

**Evacuation**
Posted in each building
 Accounting for all employees after an emergency evacuation
 (505) 320-6114 Tony Aspromonte Building Safety Officer
 (505) 320-8601 Stevan Gonzales Assistant Safety Officer

**Reporting Fires & Other Emergencies**
911
(505) 334-6107 Sheriff
(505) 325-7547 State Police
Safety Department 505-486-1594

**Rescue & Medical Duties**
911

**Contacts**
Safety Department Non Emergency (505) 486-1594

**Emergency Evacuation Plan (EEP)**

**Resource Production Company’s South Tucker Ave Facility**
Building Safety Officer: Tony Aspromonte taspromonte@resourceproduction.com
Phone 320-6114
Assistant Safety Officer: Stevan Gonzales sgonvales@resourceproduction.com Phone 320-8601

The purpose of this document is to communicate the procedures for employees to follow in an emergency situation that requires evacuation of the above facilities. (Examples are fire, explosion, chemical spill or release.) Each and every occupant of these facilities needs to be familiar with these procedures.

**Section I: General Guidelines**
1. The highest priority is that all occupants get out safely.
2. Each occupant should familiarize themselves with the building evacuation floor plan.
3. Stairways are the means for evacuation. Use windows only as a last resort of a EEP.
4. No person may re-enter to the building until advised by one of the following: Farmington Police or Fire Department Command Officer or the Building Safety Officer.

**Section II: Alerting Occupants of the Need to Evacuate**
1. Upon discovering a fire, explosion, spill, etc. that requires an evacuation, the Building Safety Officer or his Assistant will sound the Alarm and Immediately dial 911 from a safe location.
2. All occupants proceed to their designated meeting site and wait for further instructions. There are two designated sites for RPC – Directly in front of main building across Tucker Ave. (rear) of the RPC Large Shop Building. Do not leave this area unless conditions warrant that you must. Try to account for those in your work area while gathered together. Report anyone that you know is missing to the Building Safety Officer or responding emergency service personnel.
3. If you have pertinent information regarding the nature or location of the hazard, report this to the Building Safety Officers or responding emergency service personnel.
4. Occupants with disabilities that make self-evacuation difficult or impossible should be transported to a staging area in the stairwells to await evacuation assistance from emergency personnel. Make sure the doors are closed. Report the presence and location of anyone needing assistance to responding personnel.

Section III: Building Safety Officers and Safety Committee
1. When a fire is discovered, the building safety officers and members of the Safety Committee (All RPC Supervisors) will instruct and / or assist occupants leaving the building as they make their way out of the building. If the situation allows, the committee members will search the rooms in their location to clear all personnel.
2. The first Safety Committee member to reach an exit will stay at or near that exit (if conditions permit) to ensure that no one re-enters the building. Subsequent Safety Committee members reaching that exit will then circle the building, checking the other exits until all exits have a committee member posted.
3. The Building Safety Officers will determine the location and hazard causing the evacuation and relay pertinent information to responding emergency personnel.

Section IV: Training and Review
1. All new employees will receive a copy of the EEP.
2. The EEP will be posted on the RPC website and with build diagrams at multiple locations throughout the Resource Production Facility for individuals to review as needed.
3. All personnel will participate in an annual fire drill.
4. The Safety Committee will review the EEP and building signage annually.

Employee Health Services

Medical Services
The objectives of the Medical Services Department are:
- To ensure that employees are assigned duties they are physically able to perform.
- To provide medical care and rehabilitation of the occupationally ill or injured.
- To provide emergency treatment of serious illnesses or injuries.
- To encourage employees to maintain their physical and mental health.
- To assist in maintaining a healthful and safe work environment.

Occupational Health Monitoring
Pre-placement, periodic, special, and termination examinations are conducted and emergency services are provided. Potential occupational exposures to hazardous situations or agents are investigated on a continuing basis in cooperation with the Responsible Safety
Officer. Diagnosis and treatment of non-occupational illness or injury are limited to minor first aid, emergencies, and special situations for which treatment is in the best interest of Resource Production Company and the patient. The Company offers confidential counseling for employees to aid in resolving work-related or personal problems.

**Medical Services Area**

The Medical Services area includes a first aid room, clerical and filing space, examination rooms, offices, x-ray and dark room, laboratories, holding ward, clinical laboratory, and an area for fitting and dispensing safety glasses, examining the eyes of laser users and performing refractions.

**On Site Medical Aid**

The On Site Medical Services Program is under the leadership of Resource Production Company physicians, who are available to respond to medical emergencies. The Medical Services Department is managed by the Physician-in-Charge assisted by the Department Administrator. The clerical staff oversees scheduling and medical data filing. Nurses are on duty from 7:30 a.m. until 5:00 p.m. on workdays. First aid is available from the Fire Department at all other times.

The clinical laboratory is staffed by licensed medical technologists. Physical examinations are done by contract physicians and Resource Production Company physicians. The contract physicians (internists, an ophthalmologist, and a radiologist) and an optometrist are all in private practice and are not employees of the Company. The EAP is conducted by a specialist in human resource management who is a certified employee assistance professional. Consultants to the EAP include psychiatrists, psychologists, and other sources of aid.

**Safety Examinations**

A complete confidential medical examination is required of all new career employees and those temporary employees hired for periods exceeding 3 months. Periodic examinations are offered at intervals and at termination of employment. Frequency and content of examinations are established by the Responsible Safety Officer based upon OSHA guidelines. The complete examination may include some or all of the following:

- Family and personal medical history (see Privacy Notice)
- Physical examination
- Vision tests
- Hearing tests
- Measurement of pulmonary function
- Electrocardiograms for employees 40 years of age or older, and for other employees when indicated.
- Tonometry (test for glaucoma) for employees 40 years of age or older
- Chest x-ray or tuberculin test upon request of the examining physician
- Complete blood count
- Blood chemistries
- Urinalysis
- Special procedures
An active program of follow-up on all positive findings is carried out by Resource Production Company physicians via letters, telephone calls, or visits with employees. Results of examinations may be forwarded to an employee or his/her personal physician upon written request by the employee. The purpose of this examination is to ascertain whether the physical and mental fitness of the prospective employee is adequate for the requirements of the specific position under consideration. The examination consists of all applicable procedures listed above.

**Physical Examinations**

Employees are offered complete physical examinations every two years through age 44. In the interim year a complete blood count and urinalysis are done. Employees 45 years of age and older are offered complete examinations yearly. Notification is initiated by an appointment card to employees, and an attempt is made to schedule a time convenient for the employee. Upon termination of employment, adjustments are made regarding the procedures to be carried out, depending upon how recently an individual may have had a periodic examination. This policy also applies to reemployment. A termination questionnaire regarding occupational injuries is provided. Upon return to work following non-occupational illness or injury as follows: An employee who has been ill and absent from work for five or more consecutive working days should report to the Responsible Safety Officer before returning to duty. The RSO will determine whether the employee is medically ready to return to work. In some instances a release to return to work from an employee's private physician may be required (e.g., following surgery).

Laser Users Employees using lasers are examined by an optometrist before starting such work, after a suspected exposure, and when laser use is discontinued.

**Bioassay Program**

All employees with significant potential for internal exposure to radioisotopes, e.g., by inhalation of ingestion, are requested to submit urine samples periodically for radiochemical analysis. Accidental releases of radioisotopes in the workplace may require employees to collect urine and/or fecal samples for analysis in order to estimate their internal radiation exposure.

**Return to Work**

Restrictions may be placed on an employee's work pursuant to physical examination, occupational or non-occupational illness, or injury.

**Pregnancy & Workplace Hazards**

As soon as an employee learns that she is pregnant, she must inform the Responsible Safety Officer of the expected date of childbirth. A physician or nurse will discuss her work environment with her and will determine whether any change in the environment should be made to ensure her good health and that of her baby.

**Employee Assistance Program**

The Company offers confidential assistance in resolving personal problems such as alcoholism, drug abuse, emotional disturbances, and legal, marital, or financial difficulties.
Employees may seek this assistance or be referred by supervisors. Classes on topics such as stress management are offered on an as-requested basis.

**Safety Glasses**

Appointments with an optometrist to fit safety glasses are available. The glasses are supplied free of charge to employees needing this protection. Employees may bring a recent prescription or have a refraction done here for a nominal cost.

**Immunizations**

Employees needing immunizations for travel may have them at Medical Services. In special instances where a communicable disease is imminent, immunization is offered to the entire Resource Production Company population. Tetanus toxoid is routinely administered to laborers and animal handlers.

**Occupational Injury/Illness**

Treatment is coordinated with outside specialists in accordance with the provisions and requirements of Workers' Compensation laws. Every injury sustained while performing Resource Production Company assigned tasks, no matter how minor, must be reported to the employee's supervisor and to the Responsible Safety Officer. If an employee goes to a private off-site doctor about a job-incurred injury or illness, the physician consulted should be informed that the injury or illness is industrial. It is the employee's responsibility to notify the RSO and his/her supervisor of the injury or illness and the treatment received. An occupational injury or illness is one which results from a work accident or from an exposure involving an incident in the work environment. In most cases, the employee will be referred to his/her private physician, a selected specialist, or a hospital emergency room. Standard procedures for ingestion of poisons, eye injuries, burns, cardiac arrest, coma, etc., are followed. In the event that a patient cannot be moved from the site of the injury, primary aid will be rendered by Resource Production Company physicians, nurses, firefighters, or ambulance personnel. A physician should be notified of any major accident that occurs at any time at the workplace. When the company physician has been notified, he/she will take the responsibility for appropriate notification of family, relatives, and the President's Office.

In the event of an occupational injury or illness that requires care by a specialist, the patient is referred to his/her personal physician or a physician selected from a panel of locally practicing specialists. Medical Services is prepared to provide definitive treatment for minor occupational injuries or illnesses and rehabilitation where appropriate. Diagnosis and treatment such as suturing, splinting, dressing, and analgesia are given routinely when appropriate by the physicians and registered nurses on site. Minor injuries and illnesses not associated with work frequently are treated by the physician or nurse on duty. Patients who present themselves with more severe or chronic health problems are consulted with and referred to their personal physician or transported, if necessary by ambulance, to nearby hospitals for emergency care. No injured or ill persons, regardless of employment status, are denied first aid or referral to medical resources in the community. Resource Production Company personnel are advised by the Responsible Safety Officer regarding known personal exposure to radiation. The procedure and urgency of notification and subsequent action by the physician vary in detail depending on the particulars of the
exposure or spill. Usually, in the event of contamination by radioactive isotopes or possible activation by high-energy beam, the employee(s) will receive a whole-body count and bioassay of excreta, if indicated. Dose estimates are the joint responsibility of Responsible Safety Officer and Medical Services Departments. Medical Services is prepared to assist in decontamination of personnel when necessary especially of contaminated wounds. Resource Production Company has written mutual aid agreements with local hospitals to admit and care for contaminated injured personnel. Employees who are injured severely or become seriously ill at work are transported to Medical Services in the ambulance operated by the Fire Department, except when other transportation is specifically approved by Medical Services. If necessary, the ambulance is used to transport patients to nearby hospitals or clinics.

Medical Records

Complete medical records are maintained for each employee from the time of the first examination. These records are protected as confidential information and remain in the custody and control of the Responsible Safety Officer. Information from an employee's health record may be disclosed only with the employee's written consent, or as required by law. These records are retained indefinitely.

Access to Medical Records 1910.1020(c)(5)

A) "Employee exposure record" means a record containing any of the following kinds of information:

1) Environmental (workplace) monitoring or measuring of a toxic substance or harmful physical agent, including personal, area, grab, wipe, or other form of sampling, as well as related collection and analytical methodologies, calculations, and other background data relevant to interpretation of the results obtained.

2) Biological monitoring results which directly assess the absorption of a toxic substance or harmful physical agent by body systems (e.g., the level of a chemical in the blood, urine, breath, hair, fingernails, etc.) but not including results which assess the biological effect of a substance or agent or which assess an employee's use of alcohol or drugs.

3) Material safety data sheets indicating that the material may pose a hazard to human health.

4) In the absence of the above, a chemical inventory or any other record which reveals where and when used and the identity (e.g., chemical, common, or trade name) of a toxic substance or harmful physical agent.

5) "Employee medical record" means a record concerning the health status of an employee which is made or maintained by a physician, nurse, or other health care personnel, or technician, including.

6) Medical and employment questionnaires or histories (including job description and occupational exposures).

Perseveration of Medical Records 29 CFR 1910 1020 (d) (1) (2) (b)

Material safety data sheets and paragraph (c) (5) (iv) records concerning the identity of a substance or agent need not be retained for any specified period as long as some record of the
identity (chemical name if known) of the substance or agent, where it was used, and when it was used is retained for at least thirty (30) years (1)

Employee exposure records 29 CFR 1910.1020 (d) (1) (11) each employee exposure record shall be preserved and maintained for at least thirty (30) years, except that

**Access to Records 29 CFR 1910.1020 (e) (1) (i) 1926.33**
Whenever an employee or designated representative requests access to a record, the employer shall assure that access is provided in a reasonable time, place, and manner. If the employer cannot reasonably provide access to the record within fifteen (15) working days, the employer shall within the fifteen (15) working days apprise the employee or designated representative requesting the record of the reason for the delay and the earliest date when the record can be made available.

**Record Copies 1910.1020 (e) (1) (111) 1926.33**
Whenever an employee or designated representative requests a copy of a record, the employer shall assure that either, a copy of the record is provided without cost to the employee or representative. The necessary mechanical copying facilities (e.g., photocopying) are made available without cost to the employee or representative for copying the record, or the record is loaned to the employee or representative for a reasonable time to enable a copy to be made.

**Personal Identifiers 1910.1020(e) (2) (iii) (B)**
Whenever access is requested to an analysis which reports the contents of employee medical records by either direct identifier (name, address, social security number, payroll number, etc.) or by information which could reasonably be used under the circumstances indirectly to identify specific employees (exact age, height, weight, race, sex, date of initial employment, job title, etc.), the employer shall assure that personal identifiers are removed before access is provided. If the employer can demonstrate that removal of personal identifiers from an analysis is not feasible, access to the personally identifiable portions of the analysis need not be provided.

**OSHA Access to Medical Records 29 CFR 1910 1020 (e) (3) (1)**
Each employer shall, upon request, and without derogation of any rights under the Constitution or the Occupational Safety and Health Act of 1970, 29 U.S.C. 651 "et seq.," that the employer chooses to exercise, assure the prompt access of representatives of the Assistant Secretary of Labor for Occupational Safety and Health to employee exposure and medical records and to analyses using exposure or medical records. Rules of agency practice and procedure governing OSHA access to employee medical records are contained in 29 CFR 1913.10.

**Trade secrets 1910.1020(f) (1)**
Except as provided in paragraph (f) (2) of this section, nothing in this section precludes an employer from deleting from records requested by a health professional, employee, or designated representative any trade secret data which disclosing manufacturing processes, or discloses the percentage of a chemical substance in mixture, as long as the health professional,
employee, or designated representative is notified that information has been deleted. Whenever deletion of trade secret information substantially impairs evaluation of the place where or the time when exposure to a toxic substance or harmful physical agent occurred, the employer shall provide alternative information which is sufficient to permit the requesting party to identify where and when exposure occurred.

**Initial assignment and annually 1919.1020(g) (1)**

Upon an employee's first entering into employment, and at least annually thereafter, each employer shall inform current employees covered by this section of the following:

a) The existence, location, and availability of any records covered by this section.

b) The person responsible for maintaining and providing access to records.

c) Each employee's rights of access to these records.

d) Each employer shall keep a copy of this section and its appendices, and make copies readily available, upon request, to employees. The employer shall also distribute to current employees any informational materials concerning this section which are made available to the employer by the Assistant Secretary of Labor for Occupational Safety and Health.

**Transfer of records 29 CFR 1910 1020 (h)**

Whenever an employer is ceasing to do business, the employer shall transfer all records subject to this section to the successor employer. The successor employer shall receive and maintain these records. Whenever an employer is ceasing to do business and there is no successor employer to receive and maintain the records subject to this standard, the employer shall notify affected current employees of their rights of access to records at least three (3) months prior to the cessation of the employer's business. Whenever an employer either is ceasing to do business and there is no successor employer to receive and maintain the records, or intends to dispose of any records required to be preserved for at least thirty (30) years, the employer shall transfer the records to the Director of the National Institute for Occupational Safety and Health (NIOSH) if so required by a specific occupational safety and health standard.

**Privacy Notice**

Resource Production Company should provide the information below to individuals who are asked to complete medical history forms or otherwise supply personal information about themselves. The information on this form is requested for purposes of maintaining a complete medical record on each Resource Production Company employee as part of the Occupational Medical Program of the Medical Services Department. Furnishing the requested information is voluntary, but failure to provide such information on pre-employment examination may delay or even prevent medical approval for employment. Providing information on subsequent examinations is in the best interest of the employee and is intended to protect the health of Resource Production Company employees.

All information in employee medical records is available only to Medical Services staff. Information from medical records cannot be disseminated outside Medical Services without the written consent of the employee except as required by law; however, the information
may be used as a basis for recommendations by the Responsible Safety Officer to various persons in miscellaneous personnel matters such as, but not limited to, consideration for employment, transfer, work assignment, and eligibility for benefits. Individuals have the right to review their own records in accordance with company policies. Information on these policies may be obtained from the Personnel Department or the Responsible Safety Officer.

**Fire Safety**

**Introduction**

Policy and planning for fire safety at Resource Production Company takes into account the special fire hazards for specific operating areas, the protection of high-value property, and the safety of employees. These ends are met by:

- Non-combustible or fire-rated materials and construction practices suitable to the assigned uses of buildings and facilities.
- Alarm systems and automatic extinguishing systems.
- Availability of suitable hand extinguishers and local hose lines for use before firefighters arrive.
- Access to professional fire department, always staffed and trained in the control of emergencies that could occur at the Company. (The Fire Department makes the initial response to all requests for emergency aid received on the emergency telephone number, 911.)

This chapter covers the fire safety responsibilities of employees and supervisors and sets forth the fire safety rules and procedures.

**Fire Safety Work Place**

Where the employer has provided portable fire extinguishers for employees use in the workplace, the employer also shall provide an educational program to familiarize employees with the general principles of fire extinguisher use and the hazards involved in incipient stage fire fighting.

Upon initial assignment and at least annually thereafter. The employer shall assure that portable fire extinguishers are subjected to monthly vision checks and an annual maintenance check. The employer shall record the annual maintenance date.

**Fire Department**

The Community Fire Department is responsible for protecting people and property from fires, explosions, and other hazards through prevention and expeditious control of such events. In addition, the Fire Department provides first-response rescue and transportation services in medical emergencies. The Fire Department's inspection staff is responsible for ensuring company-wide compliance with fire safety and protection requirements and for reviewing all plans and procedures for compliance with these requirements; for inspecting and testing automatic fire protection and alarm systems and ensuring their maintenance and repair; for conducting fire safety and protection inspections; and for providing fire prevention recommendations. Other responsibilities include training employees in fire safety equipment, practices, and procedures. All these fire protection and response functions are performed in conformance with OSHA regulations, State law, Resource Production Company policies, and
nationally recognized standards and guidelines for fire and life safety. The Fire Chief and the Fire Marshall have the authority to enforce applicable requirements of the Uniform Building Code; the Uniform Fire Code; National Fire Protection Association Codes (including the Life Safety Code), Standards, and Recommended Practices; and the fire protection provisions of OSHA Orders. All employees must immediately report fires, smoke, or potential fire hazards to the Fire Department (dial 911). All employees must conduct their operations in such a way as to minimize the possibility of fire. This means applying rules such as keeping combustibles separated from ignition sources, being careful about smoking, and avoiding needless accumulations of combustible materials. Supervisors are responsible for keeping their operating areas safe from fire.

The Responsible Safety Officer and the Fire Department will provide guidance and construction criteria with respect to fire and life safety as well as inspections. The provision and maintenance of fire detection systems and both automatic and manual fire extinguishing equipment is the responsibility of the Responsible Safety Officer. But the supervisor, who best knows the day-to-day nature of his/her operations, is responsible for notifying the Responsible Safety Officer of operations that change the degree of fire risk and will therefore require a change in the planned fire protection provisions.

**Supervisor Responsibilities**

Supervisors must ensure that their personnel are properly instructed regarding potential fire hazards involved in their work and around their workplaces, the proper precautions to minimize fires, and the procedures in case of fire. The local Fire Department and the Responsible Safety Officer also offer formal courses and training materials on fire prevention and response:

- Fire Safety
- Fire-Extinguisher Operation
- Self-Contained Breathing Apparatus

**Class A Combustibles**

Class A combustibles are common materials such as wood, paper, cloth, rubber, plastics, etc. Fires in any of these fuels can be extinguished with water as well as other agents specified for Class A fires. They are the most common fuels to be found in non-specialized operating areas of the workplace such as offices. Safe handling of Class A combustibles means: Disposing of waste daily. Keeping work area clean and free of fuel paths, which can spread a fire, once started. Keeping combustibles away from accidental ignition sources such as hot plates, soldering irons, or other heat or spark-producing devices. Keeping all rubbish, trash, or other waste in metal or metal-lined receptacles with tight-fitting covers when in or adjacent to buildings. (Exception: wastebaskets of metal or of other material and design approved for such use, which are emptied each day, need not be covered.) Using safe ash trays for disposal of smoking materials and making sure that the contents are extinguished and cold to the touch before emptying them into a safe receptacle. Planning the use of combustibles in any operation so that excessive amounts need not be stored. Storing paper stock in metal cabinets and rags in metal bins with automatically closing lids. Making frequent inspections and checks for noncompliance with these rules in order to catch fires in the potential stage.
**Class B Combustibles**

Class B combustibles are flammable and combustible liquids (including oils, greases, tars, oil-base paints, lacquers) and flammable gases. Flammable aerosols (spray cans) are treated here. Cryogenic and pressurized flammable gases are treated elsewhere in this manual. The use of water to extinguish Class B fires (by other than trained firefighters) can cause the burning liquid to spread carrying the fire with it. Flammable-liquid fires are usually best extinguished by excluding the air around the burning liquid. Generally, this is accomplished by using one of several approved types of fire-extinguishing agents, such as the following: Carbon dioxide ABC multipurpose dry chemical Halon 1301 (used in built-in, total-flood systems) Halon 1211 (used in portable extinguishers) Fires involving flammable gases are usually controlled by eliminating the source of fuel, i.e., closing a valve. Technically, flammable and combustible liquids do not burn. However, under appropriate conditions, they generate sufficient quantities of vapors to form ignitable vapor-air mixtures. As a general rule, the lower the flash point of a liquid, the greater the fire and explosion hazard. It should be noted that many flammable and combustible liquids also pose health hazards. NOTE: The flash point of a liquid is the minimum temperature at which it gives off sufficient vapor to form an ignitable mixture with the air near the surface of the liquid or within the vessel used. It is the responsibility of the user to ensure that all Class B combustibles are properly identified, labeled, handled, and stored. If assistance is required, contact the Responsible Safety Office. Safe handling of Class B combustibles means: Using only approved containers, tanks, equipment, and apparatus for the storage, handling, and use of Class B combustibles. Making sure that all containers are conspicuously and accurately labeled as to their contents. Dispensing liquids from tanks, drums, barrels, or similar containers only through approved pumps taking suction from the top or through approved self-closing valves or faucets. Storing, handling, and using Class B combustibles only in approved locations, where vapors cannot reach any source of ignition, including heating equipment, electrical equipment, oven flame, mechanical or electrical sparks, etc. Never clean with flammable liquids within a building except in a closed machine approved for that purpose. Never storing, handling, or using Class B combustibles in or near exits, stairways, or other areas normally used for egress. In rooms or buildings, storing flammable liquids in excess of 10 gallons in approved storage cabinets or special rooms approved for the purpose. Knowing the locations of the nearest portable fire extinguishers rated for Class B fires and how to use them. Never smoking, welding, cutting, grinding, using an open flame or unsafe electrical appliances or equipment, or otherwise creating heat that could ignite vapors near any Class B combustibles.

**Electrical Fires**

There are many combustible materials, including electrical equipment, oxidizing chemicals, fast-reacting or explosive compounds, and flammable metals, which present specialized fire safety and extinguishing problems. Refer to other appropriate chapters of this manual for safe handling advice. If in doubt, request advice from the Responsible Safety Officer.

**Welding & Other Permits**

As part of the local Fire Department's program to control and reduce fire hazards, a permit system is in effect to cover welding, burning, or other operations with a high fire hazard. Typically, operations that require a permit are: Welding (arc, oxyacetylene, or heliarc)
Soldering (which requires an open flame) Use of a torch (for cutting, bending, forming, etc.) Use of tar pots (for road work or roofing, etc.) Open fires for any purpose Spray painting To obtain additional information or to request a permit for these operations, call the Fire Department on its business line, not the emergency 911 number.

Portable Heaters
The use of these devices, whether privately or company owned, is allowed only where there is no chance of causing injury to personnel or of creating a fire hazard. This provision obviously requires common sense in safely locating such devices and ensuring that they do not operate when they are unattended. These devices may not be used in locations where: Flammable or explosive vapors or dusts may be present. Smoking, eating, or drinking are prohibited because toxic or radioactive materials may be present. The area has been designated as unsafe for such devices. The following practices should be carried out when operating portable heating appliances: Do not place the appliance on unstable or readily combustible materials. Maintain a clearance of at least 12 inches between the appliance and combustible materials. Ensure that the appliance is approved by either Underwriters Laboratories, Inc., or Factory Mutual Research Corporation. Connect the appliance directly to a proper electrical outlet using only the cord with which it was originally equipped. Do not use extension cords in lieu of permanent wiring. Do not operate appliances during off hours if they are unattended unless they are controlled by a timer installed by an Resource Production Company electrician. The timer will automatically de-energize the appliance during off hours and energize it not more than 30 minutes before the arrival of personnel. If 24 hour operation is desirable, the proposed operation and arrangement must be reviewed by the local Fire Department and a permit obtained. This permit must be posted near the operating appliance for the information of off-shift personnel who may be checking the area.

Fire Fighting Equipment
This section describes the fixed and portable equipment that is provided in working areas for fire protection. The fixed equipment includes automatic sprinklers, detectors and alarms, fire doors, etc. The portable equipment consists of fire extinguishers and hoses to be operated by employees before the arrival of the local Fire Department.

Fire Detectors
Several types of automatic fire detectors are used throughout Resource Production Company, according to particular needs and purposes. All of them will detect fire (by one of several means) and transmit an alarm to the fire station. In the many buildings equipped with evacuation alarm bells, the automatic detectors activate those alarms, as do the manual pull boxes. In some cases, automatic extinguishing systems are activated by automatic detectors. The Fire Department always dispatches firefighters and apparatus to the scene of any automatically actuated alarm.

Sprinkler Systems
Many buildings are provided with automatic sprinkler systems. The sprinkler heads contain a fusible element (most commonly fused at 212 degrees F) which, on melting, opens the head and starts a spray of water. The resulting flow of water in the piping activates an alarm at the
fire station, and firefighters are dispatched. Automatic sprinkler heads can be damaged if they are subjected to mechanical abuse. A protective cage should be installed where such damage is possible. Heat inadvertently applied to the sprinkler head can also activate the sprinkler when no actual fire is present. Normal heat sources should therefore be kept away from sprinkler heads. To avoid decreasing the flow or spread of water or altering the spray pattern, do not allow material or furniture to be located too near the sprinkler head. Allow at least 18 inches of clearance around sprinkler heads. Sprinkler system control valves must be kept accessible for Fire Department use. Allow at least 3 feet of clearance (enough for a man to pass through easily) around such valves.

**Alarm System**

In most buildings, evacuation alarm bells are automatically activated when fire is detected. They can also be activated manually at strategically located pull boxes. The emergency actions of personnel and the evacuation procedures for each building or operating area are usually set forth in the Operational Safety Procedures for each building and posted near the main entrance or fire exit or elevator. Never use the elevator in case of a fire.

**Fire Doors**

Automatic fire doors and dampers are provided at strategic points to close and block the spread of smoke and fire when these are sensed by automatic detectors. Automatic fire doors must never be blocked or left in disrepair so that they cannot close and latch automatically as intended in the event of a fire. Self-closing fire doors are those doors designed and installed to close each time after being opened. They too must never be blocked, wedged, or tied open. If such doors must be kept open, the self-closers must be replaced with approved automatic smoke-activated release hold-open devices.

**Fire Exits**

Exit corridors must not be used for storage. The Life Safety Code, NFPA 101, requires that buildings designed for human occupancy must have continuous and unobstructed exits to permit prompt evacuation of the occupants and allow necessary access for responding emergency personnel. The intent of the Code is to keep exits free from obstructions and clear of combustible materials. Attention to housekeeping, therefore, is very important. “Temporary” storage of furniture, equipment, supplies, or anything else is not permitted in exit ways. Combustibles, including recyclable waste paper, are not permitted in exit ways. Metal lockers with ends and tops ferried to the walls and that do not interfere with minimum exit width requirements may be installed in exit corridors when approved by the Fire Department and the Responsible Safety Officer.

The following requirements must be met for storage locker/cabinets: Cabinets will be permitted on one side of the corridor only. Cabinets must end at least 6 ft from the corridor exit door. Cabinet ends must be at least 12 in. from the edge of the doorway on the latch side and from the edge of the door leaf when fully opened into the corridor. The cabinets must not be more than 20 in. deep by 37 in. wide by 72-3/4 in. high. The cabinets must be all metal construction with positive latches to prevent spillage of contents in the event of an earthquake. All doors must return automatically to the closed position when not held open manually. A 45 degree-angle fairing must be provided from the wall to the corridor corner of
the cabinet. Fairing must be provided at both ends of cabinet or bank of cabinets.

*A 45 degree-angle fairing must be provided at the top of the cabinets from the outside
corridor edge of cabinet to the wall. All cabinets must be anchored to the wall firmly enough
to withstand 0.5g of lateral acceleration (or a lateral load equal to 1/2 the total dead weight
of the cabinet and its contents) in the event of an earthquake. Liquids and chemicals are not
to be stored in corridor lockers. All cabinets must be kept locked, with one key being retained
by the Building Manager. All cabinets must be labeled with the contents and the name,
address, and telephone number of the assigned user. Any deviation from the above
requirements must be approved by Responsible Safety Officer.

**Fire Hydrants**

Fire hydrants are maintained for emergency use by the Fire Department. They must be kept
accessible and in good working condition. Certain temporary uses may be authorized in
writing by the Chief or Assistant Chief of the Fire Department. An example of such temporary
use may be connection by construction contractors. When temporary connections are
authorized, the following practices must be observed: Use only valved outlets. Use only a
hydrant spanner provided by the Fire Department. (Other types of wrench can damage the
wrench flats on the valve stem.) Do not leave connections in place unattended, except at
construction sites. Close a hydrant valve 1/8th turn after fully opening it. (This is done so that
a person mistakenly turning the valve the wrong way will not cause damage by forcing it.)
When replacing the outlet caps after using a hydrant, screw them on only hand-tight.

**Mechanical Equipment Rooms**

Mechanical equipment rooms contain boilers, blowers, compressors, filters, electrical
equipment, etc. Such rooms must be separated from other areas of a building by fire-resistant
walls and doors. To maintain the integrity of these separations, the fire doors must never be
left open. Fan rooms house ventilation equipment which often includes automatic shut down
and dampers activated by interlocking with the building smoke and fire detectors. Fire
dampers and other automatic shut-down provisions must not be disabled without Fire
Department approval (as for temporary maintenance procedures). Mechanical equipment
rooms and fan rooms must not be used for storage of any kind.

**Construction Areas**

Construction areas under control of either Resource Production Company or outside
contractors must be maintained in a fire-safe condition and accessible to emergency response
forces.

**Life Safety Code**

The Life Safety Code of the National Fire Protection Association, NFPA 101, requires that
emergency lighting be provided for means of egress in certain areas. The Code states
emergency lighting is required in exit corridors in any office-type building where the building
is two or more stories in height above the level of exit discharge. In industrial occupancies
such as laboratories and shops, the Code requires emergency lighting in all exit aisles,
corridors, and passageways. Emergency lighting may be installed in areas where not required
by the Code when such areas present an egress hazard during a power failure. Although
elevators are not considered a means of egress within the jurisdiction of the Life Safety Code, they do require emergency lighting. (Titles 8 and 24 require that emergency lighting be maintained in an elevator for a period of at least four hours.) Several types of emergency lights that satisfy the specifications of the Life Safety Code are: Battery Type - Only rechargeable batteries may be used. The rating of the battery must be such that it provides power for illumination for one and one-half hours in the event of a failure of normal lighting. Generator Type - When emergency lighting is provided by an electric generator, a delay of not more than 10 seconds is permitted. Exit sign lights, when burned out, should be reported to Maintenance for service.

Exit Corridors
Exit corridors must not be used for storage. The Life Safety Code, NFPA 101, requires that buildings designed for human occupancy must have continuous and unobstructed exits to permit prompt evacuation of the occupants and allow necessary access for responding emergency personnel. The intent of the Code is to keep exits free from obstructions and clear of combustible materials. Attention to housekeeping, therefore, is very important. "Temporary" storage of furniture, equipment, supplies, or anything else is not permitted in exit ways. Combustibles, including recyclable waste paper, are not permitted in exit ways. Metal lockers with ends and tops ferried to the walls and that do not interfere with minimum exit width requirements may be installed in exit corridors when approved by the Fire Department and the Responsible Safety Officer. The following requirements must be met for storage locker/cabinets: Cabinets will be permitted on one side of the corridor only. Cabinets must end at least 6 ft from the corridor exit door. Cabinet ends must be at least 12 in. from the edge of the doorway on the latch side and from the edge of the door leaf when fully opened into the corridor. The cabinets must not be more than 20 in. deep by 37 in. wide by 72-3/4 in. high. The cabinets must be all metal construction with positive latches to prevent spillage of contents in the event of an earthquake. All doors must return automatically to the closed position when not held open manually. A 45 degree-angle fairing must be provided from the wall to the corridor corner of the cabinet. Fairing must be provided at both ends of cabinet or bank of cabinets.

* A 45 degree-angle fairing must be provided at the top of the cabinets from the outside corridor edge of cabinet to the wall. All cabinets must be anchored to the wall firmly enough to withstand 0.5g of lateral acceleration (or a lateral load equal to 1/2 the total dead weight of the cabinet and its contents) in the event of an earthquake. Liquids and chemicals are not to be stored in corridor lockers. All cabinets must be kept locked, with one key being retained by the Building Manager. All cabinets must be labeled with the contents and the name, address, and telephone number of the assigned user. Any deviation from the above requirements must be approved by Responsible Safety Officer.

No Smoking
Smoking is forbidden in certain areas for fire safety reasons. Such areas include the following: Where flammable gases or liquids are stored, handled, or used. Where significant quantities of combustible materials, such as paper, wood, cardboard, or plastics are stored, handled, or used. Where liquid- or gaseous-oxygen is stored, handled, or used. Within 20 ft of a smoke detector. In tape and record storage vaults and computer equipment areas. Areas that are
designated "No Smoking" areas for fire safety reasons are indicated by large rectangular signs consisting of white backgrounds with red letters stating “NO SMOKING.”

**Tools**

**Company Provided Tools**

Resource Production Company provides hand and powered portable tools that meet accepted safety standards. A damaged or malfunctioning tool must not be used; it must be turned in for servicing and a tool in good condition obtained to complete the job. Employees must use the correct tool for the work to be performed; if they are unfamiliar with the operation of the tool, they must request instruction from their supervisor before starting the job. Supervisors are responsible for ensuring that their subordinates are properly trained in the operation of any tool that they are expected to operate. An employee is not permitted to use a powder-actuated tool unless instructed and licensed by the manufacturer.

**Grounding**

Tools that are not double-insulated must be effectively grounded and tested. Testing must be accomplished before initial issue, after repairs, and after any incident that could cause damage, such as dropping or exposure to a wet environment. Grounded tools must always be used with an effectively grounded circuit. Any extension cord used with a grounded tool must be a three-wire, grounded type. Electric-powered hand tools used on construction sites, on temporary wired circuits, or in wet environments will be used in conjunction with an approved ground fault circuit interrupter (GFCI). The responsibility for implementing and maintaining this program rests with the individual supervisors involved. Tool testing equipment will be maintained by the Responsible Safety Officer. Documentation of tool testing will be maintained by the group owning powered hand tools. Tools maintained in a tool crib and tested prior to issue are exempted from this requirement. Repairs of defective tools will only be made by qualified electrical personnel.

**Shop Rules**

Any Resource Production Company facility housing shop tools is defined by OSHA as a shop. It is the responsibility of the person in charge of each shop to ensure compliance with the following practices: Shop machines and tools are to be used only by qualified personnel. It is the responsibility of the person in charge of the shop to render a judgment as to who is qualified. The person in charge will take whatever action is deemed necessary to prevent a personal injury or damage to equipment. Equipment guards and protective devices must be used and must not be compromised. Approved eye protection (visitors' glasses) must be worn by anyone entering and/or passing through shop areas. Approved industrial safety eye protection must be worn by anyone working in a posted shop area. Shoes or boots covering the whole foot must be worn in shop areas. Persons using machine tools must not wear clothing, jewelry, or long hair in such a way as to represent a safety hazard.

**Traffic & Transportation**

**Speed Limits**

The speed limit on Resource Production Company property is 10 miles per hour. However,
conditions such as road repair, wet weather, poor visibility, and pedestrian traffic may require speeds much lower than 10 mph. All traffic laws are strictly enforced. As a result of high density traffic, limited parking, and general congestion, it is recommended that shuttle buses and transportation services be used whenever possible. These services are convenient and reduce exposure to potential motor vehicle accidents.

**Vehicles on Location**
When entering a location to perform work always position and park your vehicle where your first move is forward when possible. If it is not possible to move forward, use a spotter when backing and if one is not available get out and visually inspect the area around your vehicle yourself before moving. If you doubt your distance from an object after you begin to move stop your vehicle and get out and inspect the area again to be sure of the distance. Always be sure that another vehicle or persons have not moved in close to your vehicle before moving. When entering or leaving a location make sure to use only approved roadways never drive on re-seeded or reclaimed right of ways; tire tracks in these areas is not permission to drive on them.

**Official Vehicle Use**
The Resource Production Company requires that an operator hold a valid driver's license for the class of vehicle that he/she is authorized to operate. Persons intending to operate forklifts are required to successfully complete the appropriate course as outlined in this manual.

**Responsibility**
Each Division Director and Department Head is responsible for restricting the use of Company-furnished vehicles to official Company business only. They are also responsible for limiting use of such vehicles to properly authorized personnel. Use of an official vehicle for an employee's personal convenience or benefit constitutes misuse and is prohibited. Employees who misuse Company vehicles are subject to disciplinary action and financial responsibility for any accident. All drivers of Company vehicles are responsible for reporting any damage or deficiency to the Motor Pool. Repairs, adjustments, and maintenance can only be accomplished if the driver adequately documents and reports these items. Failure to report unsafe vehicle conditions can result in an accident.

**Safety Belts**
Employees operating or riding in company-furnished vehicles, or personal vehicles on official company business, are required to wear safety belts at all times. The driver should instruct the passengers to fasten their safety belts before operating the vehicle.

**Accidents**
Any accident involving Company vehicles (included private, rented, or leased vehicles used on official Company business) must be reported to the driver's supervisor. If the driver is unable to make a report, another employee who knows the details of the accident must make the report. It is Resource Production Company's policy that employees should not admit to responsibility for vehicle accidents occurring while on official business. It is important that such admissions, when appropriate, be reserved for the company and its insurance carrier.
The law requires that each driver involved in a vehicle accident must show his/her license on request by the other party. Be sure to obtain adequate information on the drivers involved as well as on the owner of the vehicles. Names, addresses, driver's license numbers, vehicle descriptions, and registration information are essential. In addition, a description of damages is needed for completion of accident reports. If the accident is investigated by off-site police agencies, request that a copy of the police report be sent to Resource Production Company, or obtain the name and department of the investigating officer. A printed card titled “In Case of Accident” is kept in each official vehicle to assist in collecting required information. In case of collision with an unattended vehicle (or other property), the driver of the moving vehicle is required by law to notify the other party and to exchange information pertaining to the collision. If unable to locate the other party, leave a note in, or attached to, the vehicle (or other property) giving the driver's name, address, and vehicle license number. The driver of any Resource Production Company vehicle involved in an accident must also complete a Company Motor Vehicle Accident Report and submit it to his/her supervisor within one work day of the accident. The supervisor should interview the driver and complete the supervisor's portion of the report. Within two work days of the accident, the completed form and vehicle must be taken to the Administration Office so that damages may be estimated and repairs scheduled. Forms for obtaining appropriate information about an accident are carried in the vehicle or may be obtained from Administration. The Responsible Safety Officer will receive copies of all accident reports and will prepare any required OSHA reports.

**Warnings & Citations**

Any operator of a vehicle at Resource Production Company who violates the State Vehicle Code may be issued a written warning or citation. A warning will include a description of the violation and cite the relevant code section, date, time, location, and the name of the officer issuing the warning. A person who receives such a warning will be called to meet with the Responsible Safety Officer. If more than one warning is issued in a six-month period, the Responsible Safety Officer will normally suspend the offender's driving and parking privileges at the Company. The first suspension will be for a period of one month. If there is a repeat violation, the period of suspension will be for six months. Serious offenses may result in revocation of privileges and may include termination of employment.

**Safety Hazards Correction**

The Safety Committee reviews all accidents involving Company-furnished vehicles, whether on site or off site, and makes recommendations to have safety hazards corrected. The committee meets periodically to review accidents or to review and consider other issues relating to traffic safety. The committee is also the hearing board for drivers who are involved in vehicle accidents or who have received a warning notice for a moving violation, as noted above. Such drivers may appear before this committee to explain causes of accidents or violations.

**Parking**

Here are the parking designations in use at Resource Production Company:

- **General Parking:** Vehicles must be parked in designated places only and must not extend beyond the edge of road, stripes, or rear limit lines.
Violators of the above parking rules will be issued a warning notice, order-to-show cause, or citation.

**Off-Site Safety**

**Off-Site Operations**

Off-site operations are those performed away from the Company and for which Resource Production Company personnel have responsibility in one or more of the following fields: design, test, transportation, assembly, operation, maintenance, disassembly, and storage or removal of equipment.

All off-site operations must be reviewed to determine if an Operational Safety Procedure (OSP) is required. The OSP will be reviewed by the Responsible Safety Officer. Personnel contemplating off-site operations must give written notification of the nature and scope of the project to the Responsible Safety Officer. This notification must be made as soon as possible after the project is approved. The OSP will be reviewed by the Responsible Safety Officer.

The Responsible Safety Officer may visit off-site operations in order to:

- Observe local conditions.
- Inspect facilities prior to operation. Evaluate periodically operating procedures and modifications.
- Evaluate procedures for disassembly, transportation, and storage.

When Resource Production Company employees are injured or become ill during off-site operations, the following procedure should be used: Employees should obtain appropriate treatment by a nearby physician or hospital staff. Those rendering care should be informed that the injury is work related. The Responsible Safety Officer should be informed so the proper injury report can be prepared.

**Boating & Driving**

Group leaders and/or supervisors of employees planning to engage in marine boating or diving operations as part of a work assignment must contact the Responsible Safety Officer for guidelines and safety procedures relevant to their specific operation. An “Application for Vessel Use” must be filled out and reviewed by the Responsible Safety Officer for each vessel to be used for boating or diving operations.

Reference standards for safe boating and diving operations are the following:

- Rules and Regulations for Small Passenger Vessels (under 100 gross tons), U.S. Department of Transportation, Coast Guard 323, 1977.

**Carcinogens**

**Introduction**

This section of the Safety Manual describes the recommendations and requirements established to govern the use of substances that pose a carcinogenic risk. All personnel using
chemical carcinogens are expected to be familiar with these guidelines and conduct their operations accordingly.

**Categories of Carcinogens**

OSHA has divided this list of carcinogens into the following three categories: 1. Human Carcinogens: Those materials for which there is sufficient evidence of carcinogenicity from studies of humans to indicate a causal relationship between the agents and human cancer. 2. Human Suspect Carcinogens: Those materials with limited evidence of carcinogenicity in humans and generally substantiated evidence as animal carcinogens. 3. Animal Carcinogens: Those materials that have sufficient evidence of carcinogenicity from studies of experimental animals cancer in humans and/or animals. However, since many are not well studied, less hazardous than one designated as a human carcinogen. Below is a partial list of chemical carcinogens which may be found in use at Resource Production Company. A complete list is available from the Responsible Safety Officer. Chemical Name/ Reference

**Confirmed Human Carcinogens:**

ACRYLNITRILE OSHA AMINODIPHENYL; 4- IARC, NTP, ACGIH ARSENIC AND ARSENIC COMPOUNDS IARC, NTP, OSHA ASBESTOS IARC, NTP, ACGIH BENZENE IARC, NTP, ACGIH BENZIDINE IARC, NTP, ACGIH BIS(CHLOROMETHYL)ETHER IARC, NTP, ACGIH CHLORAMBUCIL IARC, NTP CHLOROMETHYL METHYL ETHER IARC, NTP CHROMIUM (VI) COMPOUNDS IARC, NTP, ACGIH DIBROMO-3-CHLOROPROPANE; 1,2- OSHA NAPHTHYLAMINE; 2- IARC, NTP, ACGIH NITRODIPHENYL; 4- ACGIH VINYL CHLORIDE IARC, NTP, ACGIH, BENZENES, PETROLEUM CRUDE OIL

**Suspected Human Carcinogens:**

ACETYLAMINOFLUORENE; 2- OSHA AFLATOXINS IARC, NTP, ACGIH BENZO(A)PYRENE ACGIH, IARC BERYLLIUM AND BERYLLIUM COMPOUNDS IARC, NTP, ACGIH BUTADIENE; 1,3- ACGIH CADMIUM AND CADMIUM COMPOUNDS NTP CARBON TETRACHLORIDE ACGIH CHLOROFORM ACGIH DICHLOROBENZIDINE; 3,3'- ACGIH, OSHA DIMETHYL SULFATE ACGIH, IARC DIMETHYLAMINOAZOBENZENE; 4- OSHA

**FACTS ABOUT BENZENES**

1. Potential locations where employees may be exposed to Benzene:
   Petroleum refining sites 2. Tank Gauging (tanks at producing, pipeline & refining operations)
3. Field maintenance
2. Characteristics of Benzenes:

3. 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.

4. Health effects of Benzene:
   Eye and skin irritations, short term: breathless, irritable, euphoric, etc.
5. Necessary PPE:
   Boots, gloves, sleeves, aprons, etc. Eye and face protection
6. Safety precautions:
Benzene liquid is highly flammable and vapors may form explosive mixtures in air. Fire extinguishers must be readily available. Smoking is prohibited in areas where benzene is used or stored.
Employees must be aware of and follow provisions of site specific contingency plans;
Employer should be aware of Owners contingency plan provisions. Employees must be informed where benzene is used in host facility and aware of additional plant safety rules.

Responsibilities
The responsibilities of various groups involved with chemical safety at Resource Production Company are described below.

Responsible Safety Officer: Determines if the use of a carcinogen creates a significant potential for occupational exposure. Evaluates operations for compliance with OSHA mandated standards. Provides technical guidance to personnel regarding the selection of appropriate laboratory practices and engineering controls. Investigates all reported incidents that result in exposure of personnel or the environment to chemical carcinogens and recommends corrective actions to reduce the potential for recurrence. Supervises cleanup operations where incidents have resulted in significant contamination of laboratory areas or personnel. Updates and transmits list of carcinogens to the Purchasing Department
Authorizes issue of carcinogens stocked at the Resource Production Company Storeroom.
Purchasing Department: Specifies special distribution procedures and purchase orders for carcinogens.

Materials Management Department: Obtains approval from the Responsible Safety Officer before issuing carcinogens.

Receiving Department: Notifies the Responsible Safety Officer of the receipt of carcinogens designated for special distribution (Distribution Category A).

Supervisor: Employs and ensures the use of appropriate practices, engineering controls, and personal protective equipment that reduce the potential for exposure as low as reasonably achievable. Informs employees under his/her supervision of the potential hazards associated with the use of carcinogens and provides proper training and instruction in the use of laboratory practices, engineering controls, and emergency procedures. Reviews operating procedures with the Responsible Safety Officer before the initiation of an operation or when significant changes occur in an ongoing operation. Reports to the Medical Services Department any incident that involves the exposure of personnel to carcinogens. Reports to the Responsible Safety Officer any incident that results in danger of environmental contamination from carcinogens. Provides any necessary assistance during accident investigations.

Other Company Personnel: Know and comply with safety practices required for the assigned task. Wear appropriate protective clothing. Report all unsafe conditions to the laboratory supervisor. Attend appropriate training in safety procedures for handling and using carcinogenic materials. Report to the Responsible Safety Officer when pregnant to review working conditions. Report to the immediate supervisor and the Responsible Safety Officer all facts pertaining to incidents resulting in exposure to carcinogens or in environmental contamination.
Practices & Controls

The practices and engineering controls included in this section provide general safeguards that are recommended for the use of chemical carcinogens. To select the appropriate safeguards, knowledge is required of the physical and chemical properties, the proposed use, the quantity needed, the carcinogenic and other toxic hazards, and the applicable health and safety standards. Careful judgment is therefore essential in planning any activity that involves chemical carcinogens. Personnel within the Responsible Safety Officer's Department are available to assist the laboratory supervisor in selecting the appropriate safeguards.

Carcinogen Safety Data Sheets provide details of chemical and physical properties, hazards, and safe operational procedures for specific carcinogens.

- Wear gloves appropriate to the task. Discard after each use and immediately after any obvious contact.
- Wear appropriate eye protection. The type of eyewear used will depend upon the hazard presented by the operation and chemical in use. Contact lenses should be removed.
- Do not eat, drink, smoke, chew gum or tobacco, apply cosmetics carcinogens are used or stored. Do not pipette by mouth -- use mechanical aids.
- Wash hands immediately after the completion of any procedure. Wash immediately after an exposure, or if appropriate, shower the affected area.
- Provide respirators for emergency use. (Personnel who will use respirators must have medical approval and be properly trained before use.)

Operational Practices: Label all primary and secondary containers and place warning signs on entrances to work or storage areas. To obtain appropriate labels and signs, call the Responsible Safety Officer. Limit entry to only personnel authorized by the supervisor for entry to work or storage areas. Women who are pregnant must consult with the Medical Services Department before the start of any activity involving chemical carcinogens.

Maintenance and Emergency Storage Areas: Cover work surfaces with stainless steel or plastic trays, absorbent paper with a moisture-proof lining, or other impervious material. Decontaminate or discard the protective covering materials after the procedure has been completed. Conduct aerosol-generating procedures or procedures involving volatile carcinogens in a chemical fume hood, a glove box, or other suitable containment equipment. Examples of aerosol-producing operations opening of closed vessels; transfer operations; preparation of mixtures; blending; sonification; open vessel centrifugation. Capture vapors or aerosols produced by analytical instruments with local exhaust ventilation or ventilation into a chemical fume hood. Decontaminate obviously contaminated equipment. Transfer carcinogens in tightly closed containers placed within a durable outer container. Maintain an inventory of all carcinogens including the quantities acquired, dates of acquisition, and disposition. Keep working quantities to a minimum; do not exceed the amounts required for use in one week. This does not include amounts stored in a designated area or a central cabinet. Dissolve finely divided powdered carcinogens, if possible, into a liquid. This reduces the possibility of generating an aerosol. Use mixtures that are as dilute as possible.

Place contaminated materials in a closed plastic bag and sealed primary container. Place the primary container in a durable box before transporting. Label each primary container with content, amount, physical state, and percentage breakdown when dealing with a mixture. Each box must have a complete list on contents or description written on an official Hazardous Material packing list. To obtain blank packing lists, contact the Responsible Safety
Chlorinated Hydrocarbons

The chlorinated hydrocarbons as a whole have many industrial as well as laboratory uses. At Resource Production Company they are commonly used as cleaners, degreasers, solvents, and extractants.

Hazards

Most of these compounds have an anesthetic (narcotic) effect, causing workers to feel "drunk," become unconscious, or even die if the amount of inhaled vapor is excessive. Individuals working around moving machinery can be subject to accidents when their judgment and coordination are impaired by the anesthetic effects of inhaled solvents. Usually it is the anesthetic effect that is responsible for sudden unconsciousness of persons exposed to solvents in tanks, pits, and other confined spaces. Trichloroethylene, ethylene dichloride, and chloroform are examples of compounds that are powerful anesthetics. Some, but not all, of the chlorinated hydrocarbons are strong poisons that damage the liver, kidneys, nervous system, and/or other parts of the body. This damage may be permanent or even cause death, although recovery from lesser exposures does occur. Single exposures to higher concentrations of vapors, as well as repeated exposure to small concentrations can produce symptoms of poisoning. These symptoms most often come on gradually, with nausea, loss of appetite, vomiting, headaches, weakness, and mental confusion most often noted. Carbon tetrachloride, tetrachloroethane, and 1,1,2-trichloroethane are examples of compounds that are strong poisons. All chlorinated hydrocarbons on repeated contact with the skin can cause rashes (dermatitis) because of their ability to remove the protective fats and oils from the skin. A few of these solvents are known to be capable of entering the body through contact with the skin.

In addition, many of these compounds are highly irritating to the membranes around the eyes and in the nose, throat, and lungs. Examples of chlorinated hydrocarbons that have irritant properties are ethylene dichloride and chloroform. Some compounds are human suspect carcinogens, such as carbon tetrachloride and chloroform. In studies on laboratory animals, several chlorinated hydrocarbons have been linked to the production of cancer. These compounds are ethylene dichloride, perchloroethylene, and trichloroethylene. At present, there is no direct evidence associating these compounds with an increased risk of cancer in humans. When heated, these compounds can decompose, forming highly toxic fumes of phosgene, hydrochloric acid, and chlorine. Most of the chlorinated hydrocarbons are nonflammable; however, there are exceptions.

The Table below lists important characteristics of some of the common chlorinated hydrocarbon solvents.

<table>
<thead>
<tr>
<th>TLV Volatility*</th>
<th>Chemical name</th>
<th>(ppm)**</th>
<th>(mm Hg)</th>
<th>Flammability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetylene chloride</td>
<td>1,2-dichloroethylene</td>
<td>200</td>
<td>200</td>
<td>Moderate</td>
</tr>
<tr>
<td>Moderate Carbon tetrachloride***</td>
<td>Tetrachloromethane</td>
<td>5</td>
<td>115</td>
<td>Nonflammable</td>
</tr>
<tr>
<td>Nonflammable Chloroform***</td>
<td>Trichloromethane</td>
<td>10</td>
<td>200</td>
<td>Nonflammable</td>
</tr>
<tr>
<td>Nonflammable Ethylene dichloride</td>
<td>1,2-dichloroethane</td>
<td>10</td>
<td>80</td>
<td>Moderate</td>
</tr>
<tr>
<td>Moderate Methyl chloroform</td>
<td>1,1,1-trichloroethane</td>
<td>350</td>
<td>132</td>
<td>Nonflammable</td>
</tr>
</tbody>
</table>
- Nonflammable Methylene chloride  Dichloromethane  100 435
- Nonflammable Perchloroethylene  Tetrachloroethylene  50 18
- Nonflammable Tetrachloroethane  1,1,2,2-tetrachloroethane  1 8
- Nonflammable Trichloroethane  1,1,2-trichloroethane  10 25
- Nonflammable Trichloroethylene  Trichloroethylene  50 76

* The threshold limit value (TLV) is expressed as parts of pure solvent vapors per million parts (ppm) of air.
** The vapor pressure at 77F (25C).
*** Designated as a carcinogen by OSHA.

Because of their inherent properties, these compounds are harmful to varying degrees. For questions concerning the hazards of a specific compound, contact the Responsible Safety Officer.

**Precautions**

The above table includes information on the TLV, the volatility, and the flammability of the compounds listed. These three characteristics always must be taken into careful consideration in selecting a compound in order to minimize the health hazards connected with its use.

1,1,1-trichloroethane (ethyl chloroform) is recommended for degreasing operations. If there is a possibility of skin or eye contact, wear the appropriate protection equipment. Gloves made of impervious material should be worn for hand protection. Barrier creams are in no instance as protective as impervious gloves. However, if finger dexterity is an absolute requirement, a solvent resistant ointment may be used in some instances. For high vapor concentrations, control by local exhaust ventilation or chemical fume hoods is necessary. Chlorinated hydrocarbons should be stored in cool, dry, and well-ventilated areas. Containers should be checked for leaks because metal corrosion can occur from hydrochloric acid produced by the decomposition of the solvent. Decomposition may occur under conditions of high temperature, exposure to moisture, and exposure to ultraviolet light. Compounds, both in the original containers and in containers used by employees, should be labeled so that the potentially injurious substances are plainly identified. Labels for perchloroethylene, trichlorethylene, 1,1,1-trichloroethane, and carbon tetrachloride can be obtained at the Resource Production Company Central Storeroom. Chlorinated hydrocarbons must be placed in an organic liquid waste can for disposal. When the waste can is full, Decontamination and Waste Disposal personnel must be called to pick it up.

**Fiberglass**

Fiberglass is found in many materials (such as flexible duct, Nema G-10, and electrical wire insulation) used at the Company.

Irritation of the exposed skin, a common complaint among persons working with this material, is the result of the mechanical irritation from small glass fibers. The sensation varies from an itch to a prickling or burning sensation. Common locations involved are the arms, face, or neck. Another cause of dermatitis is contact with fiberglass binders or coating materials. Except for skin irritation, there is no other known health hazard associated with exposure to fiberglass particles. Results of medical research, including examinations of hundreds of persons who have worked in fiberglass plants for as long as 25 to 30 years, give evidence that fiberglass is inert and noninjurious to the person's overall health. It will not
cause silicosis.

**Precautions**

Persons with skin problems should consult the Medical Services Department before working with fiberglass. Wear loose-fitting clothing and change daily. Adherent fibers on the skin should be washed off with an ample amount of lukewarm or cool water. Air hoses and brooms should not be used to clean off fibers from the body because these methods may drive the fibers deeper into the skin. Showering at the end of a work shift is advisable. Plastic binders should be fully cured before working on fiberglass laminates. Use vacuum pickup units when machining fiberglass parts. Practice good housekeeping. Some skin protective creams may be of benefit. At home, clothing should be washed separately in a tub or basin. Washing machines should not be used. Ideally, rubber gloves should be worn. The tub or basin should then be fully rinsed.

**Flammable Liquids**

Class B combustibles are flammable and combustible liquids (including oils, greases, tars, oil base paints, lacquers) and flammable gases. Flammable aerosols (spray cans) are also treated here. Water should not be applied to fire in a Class B combustible. The use of water may float burning liquids, causing the fire to spread more rapidly. Class B fires are usually extinguished by excluding the air around the burning liquid. This is accomplished by one of several approved types of fire extinguishing agents, e.g., carbon dioxide, ABC multipurpose dry chemical, and Halon 1301 (a vaporizing liquid that breaks the flame front). Technically, flammable and combustible liquids do not burn. However, under appropriate conditions, they generate sufficient quantities of vapors to form ignitable vapor-air mixtures. As a general rule, the lower the flash point of a liquid, the greater the fire and explosion hazard. (The flash point of a liquid is the minimum temperature at which it gives off sufficient vapor to form an ignitable mixture with the air near its surface or within its containment vessel.) Many flammable and combustible liquids also pose health hazards. It is the responsibility of the user to ensure that all Class B combustibles are properly identified, labeled, handled, and stored. If assistance is required, contact the Responsible Safety Officer.

**Classifications**

Flammable and combustible liquids are defined and divided into classes as shown below.

Flammable Liquids (Class I). Liquids having flash points below 100°F (37.8°C) and having vapor pressures not exceeding 40 pounds per square inch (absolute) at 100°F (37.8°C).

**Flammable Class I liquids are subdivided as follows:**
- Class IA. Liquids having flash points below 73°F (22.8°C) and boiling points below 100°F (37.8°C). Flammable aerosols (spray cans) are included in Class IA.
- Class IB. Liquids having flash points below 73°F (22.8°C) and having boiling points at or above 100°F (37.8°C).
- Class IC. Liquids having flash points at or above 73°F (37.8°C) and below 100°F (37.8°C).

Combustible Liquids (Classes II and III). Liquids having flash points at or above 100°F (37.8°C).

**Combustible liquids in Class II and Class III are subdivided as follows:**
- Class II. Liquids having flash points at or above 100°F (37.8°C) and below 140°F (60.0°C).
Class IIIA. Liquids having flash points at or above 140°F (60.0°C) and below 200°F (93.4°C).
Class IIIB. Liquids having flash points at or above 200°F (93.4°C).

**Unstable (Reactive) Liquids.**

These are liquids that in the pure state, or as commercially produced or transported, will vigorously polymerize, decompose, combine, or become self-reactive under conditions of shock, pressure, or temperature. Use of such materials must have prior approval from the Responsible Safety Officer on a case-by-case basis.

**Fire Hazards**

Fires involving Class B combustibles are especially dangerous because they release heat quickly, causing the fire to spread rapidly. The handling and use of these combustibles presents the most significant single source of fire hazard. Misuse or improper storage threatens not only the employee and the entire building, but all fellow employees. Liquids with flash points below room temperature (Class IA and IB liquids) continually emit sufficient quantities of vapors to be ignitable, except when chilled to temperatures below their flash points. Even when chilled, if spilled on a floor or work surface, they will heat rapidly and pose severe fire and explosion hazards. Liquids with flash points above room temperature (Class IC, II, IIIA, and IIIB liquids) can easily be heated to the point at which they will create flammable vapor-air mixtures. Flammable liquid vapors are heavier than air. They can travel for appreciable distances and accumulate in low places. Since it is the vapor of flammable liquids that burns, the fire hazard may not be confined to the immediate vicinity of actual use. Vapors can be ignited several hundred feet from the point of vapor generation. Flammable liquid vapors generally have low ignition-energy requirements and can often be ignited by small sparks from electrical motors, switches, relay contacts, etc.

**Precautions**

Recommended precautions are based on the properties of the liquid to be used and the intended application. The user cannot make a correct decision on necessary precautions unless the properties of the liquid are known and the intended use is reviewed from a safety standpoint. There must be sufficient ventilation to preclude the accumulation of flammable vapors. Flammable liquids should be used in a fume hood or with local exhaust ventilation. Normal room ventilation may be sufficient to permit small-scale use of flammable liquids (milliliter quantities). However, if larger quantities of liquid must be used in such facilities, it will be necessary to provide additional ventilation by opening doors and windows or providing some form of temporary exhaust ventilation. Extreme care must be exercised when using flammable liquids in closed spaces with minimal ventilation (such as glove boxes and tanks). Even milliliter quantities of flammable liquids can cause the build-up of explosive mixtures in the confined space.

**Containers**

The maximum allowable sizes of containers and portable tanks are identified in the table below:

<table>
<thead>
<tr>
<th>Class</th>
<th>IA</th>
<th>IB</th>
<th>IC</th>
<th>II</th>
<th>IIIA</th>
<th>IIIB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass or approved plastic</td>
<td>1 pt*</td>
<td>1 qt*</td>
<td>1 gal</td>
<td>1 gal</td>
<td>1 gal</td>
<td>Metal (other than DOT drums)</td>
</tr>
<tr>
<td>Metal (other than DOT drums)</td>
<td>1 gal</td>
<td>5 gal</td>
<td>5 gal</td>
<td>5 gal</td>
<td>5 gal</td>
<td>Safety cans**</td>
</tr>
</tbody>
</table>
Glass or approved plastic containers of no more than 1 gallon capacity may be used for Class IA or IB flammable liquids if (1) such liquid either would be rendered unfit for its intended use by contact with metal or would excessively corrode a metal container so as to create a leakage hazard or (2) the user's process either would require more than 1 pint of a Class IA liquid or more than 1 quart of a Class IB liquid, of a single assay lot, to be used at one time. ** Approved safety cans of various materials and capacities are available through Resource Production Company.

**Cabinets**

Storage cabinets must be designed and approved for the anticipated usage. Approved metal storage cabinets are available in various sizes from Resource Production Company stock. Not more than 120 gallons of Class I, Class II, and Class IIIA liquids, combined, may be stored in a storage cabinet. Of this total, not more than 60 gallons may be of Class I and Class II liquids, combined, and not more than three such cabinets may be located in a single fire-separation area.

**Refrigerators**

Ordinary domestic refrigerators must not be used for the storage of flammable liquids because they contain certain built-in ignition sources (such as electrical contacts). These sources of ignition may initiate a fire or an explosion if flammable vapors are present. In special cases, ordinary refrigerators have been modified to specifications approved for storage of flammable liquids. Refrigerators are now available commercially that are specifically designed and approved for storage of flammable materials. Refrigerators must bear an appropriate label as supplied by the Responsible Safety Officer.

**Allowable Quantities**

To adequately manage the exposure hazards in each building, or fire-separation area in each building, it is necessary to consider the needs of all users, and/or of user groups in aggregate, for each building or fire-separation area. The restrictions set forth below provide guidance for lower usage levels. In general, quantities in excess of three-months usage should not be stored. If the need for larger quantities is anticipated, contact the Responsible Safety Officer for assistance. The maximum allowable quantities of Class B combustibles outside designated and approved storage rooms or facilities are listed below: Less than one gallon of Class I and Class II liquids combined, in glass or plastic containers, is the maximum allowed outside of approved storage cabinets when not actually in use. One gallon is the maximum allowable container size for general dispensing of Class I and Class II liquids unless in an approved safety can. Where more than one laboratory unit is located in a single fire-separation area, all Class I and Class II liquids must be stored in approved storage cabinets or approved safety cans. Ten gallons of Class I and Class II liquids, combined, in approved safety cans, is the maximum allowable outside of approved storage cabinets. Five gallons of Class IIIA liquids is the maximum allowable outside of approved storage cabinets or safety cans. For single fire-separation areas, 10 gallons of Class I and Class II liquids, combined, is the maximum quantity allowable outside of approved storage cabinets or approved safety cans. For single fire-separation areas, 25 gallons of Class I and Class II liquids, combined, is the maximum
allowable quantity outside of approved storage cabinets. For single fire-separation areas, 60 gallons of Class IIIA liquids is the maximum allowable outside of approved storage cabinets.

**Fluorocarbon Solvents**

Fluorocarbon solvents are organic compounds containing fluorine. Common names for some members of this family are Freon-TF, Freon-MF, and Freon-BF.

**Hazards**

The vapors are four to five times heavier than air and tend to accumulate in tanks, pits, and low places. This displaces the oxygen, which can cause suffocation, or the vapors themselves may be toxic in high concentrations. Fluorocarbon solvents will dissolve and extract the natural oils present in the skin. If contact is prolonged, the skin may become dry and perhaps cracked. The vapors have little or no effect on the eyes. If the liquid is splashed in the eyes, temporary redness may be produced. Lower boiling liquids may cause freezing if splashed on the skin or in the eyes. Fluorocarbon vapors decompose when exposed to high temperatures. Toxic fumes such as hydrofluoric acid, hydrochloric acid, and phosgene may be formed. Fluorocarbon solvents are nonflammable.

**Precautions**

Contact the Responsible Safety Officer if fluorocarbon solvents are used in enclosed areas such as tanks and pits. Forced-air ventilation and air supplied respirators may be required. Avoid contact with hot surfaces, electric heating elements, or open flames. If toxic fumes are formed, good ventilation will be required. Wear gloves made of neoprene or equivalent when there is the possibility of prolonged or repeated skin contact with the liquid. Wear protective clothing and eye goggles if the liquid may be splashed.

**Hazardous Gases**

The general precautions for compressed gas cylinders must be followed. Large cylinders of hazardous gases should not be purchased if it is possible to use small cylinders. The color coding must not be used on the cylinder to identify its contents. These colors have not been standardized by the suppliers. Read the label placed on the cylinder. The Responsible Safety Officer must be notified of all hazardous gases ordered to ensure that adequate facilities are available (e.g., fume hoods, safety showers, alarms, fire extinguishers, respirators, etc.) and that the user is aware of the hazardous properties of the material. When hazardous gases are received by Resource Production Company, the Responsible Safety Officer will pick up and deliver all cylinders of J-size and smaller. Larger cylinders will be released by the Responsible Safety Officer delivery by Resource Production Company or contractor employees. Cylinders should be returned to the vendor as soon as possible after use. It is not uncommon for gas cylinders to develop leaks during storage. Arrangements for pickup of used cylinders are made by contacting the Responsible Safety Officer. Before pickup, the cylinder valve must be closed, the regulator or needle valve must be removed, and the valve cover put back on the cylinder. Arrangements for pickup of cylinders that are leaking or have valves that are stuck open should be made by contacting the Responsible Safety Officer.
Mercury

The most widely used form of mercury at Resource Production Company is elemental mercury. Mercury also exists as a salt and as an organic compound. From the standpoint of risk to human health, the most important forms of mercury are elemental mercury vapor and short-chain organoalkylmercurials such as methylmercury and ethylmercury.

Hazards

Mercury can enter the body through the lungs, the skin, and the digestive system. Because mercury vaporizes at room temperature, inhalation of its vapors is the most likely route of entry. Short exposures to high levels of mercury vapor can cause acute poisoning characterized by tightness and pain in the chest, difficulty in breathing, inflammation of the mouth and gums, fever, and headaches. Acute poisoning, however, is rare. Much more common among workers is chronic poisoning caused by long-term exposure to lower levels of mercury. Steady exposure can cause a slow build-up of mercury in the body that can result in illness, personality changes, and eventual disability. Symptoms of chronic poisoning include inflammation of the mouth and gums, weakness, loss of appetite and weight, shaking (particularly in the hands), and irritability. During an ordinary laboratory spill of metallic mercury, clean-up effort need not be either hasty or heroic since a long duration of exposure to the vapors would be required before any adverse symptoms would occur. However, at elevated temperatures, the concentration of mercury vapor rises rapidly and poisoning can occur within a short period of time.

Precautions

Avoid skin contact. Keep mercury containers closed when not in use. Use plastic or metal catch cans under all mercury apparatus that is likely to break or spill; make transfers over a catch pan. Provide adequate ventilation, especially if mercury is heated above room temperature. Use a label similar to that below on all equipment and vessels containing mercury. Store in protected area in closed, labeled containers, preferably plastic. If a glass bottle is used, place in a secondary container. Dispose of mercury by placing in sealed, labeled containers. Send unused mercury to a licensed salvage company. If mercury is used, call the Responsible Safety Officer. Do not pour mercury down any drains. If Mercury is spilled at room temperature notify the Responsible Safety Officer as soon as possible to obtain clean-up equipment and a mercury vapor survey. If mercury is released at elevated temperatures, evacuate the area immediately and notify the emergency dispatcher at the Fire Department, call 911. Equipment being sent to the warehouse for storage must be drained of mercury, properly secured, and tagged with a mercury label.

Oxygen Pumping in Vacuum Systems

Oxygen in concentrations 25% by volume should not be introduced into a mechanical vacuum pump charged with hydrocarbon oil, which is a combustible fluid. During compression in the pump, the pressure of the oxygen may reach as high as 2-3 atmospheres, and at this pressure it may cause an explosion if combined with a hydrocarbon oil.

Required Solution

Pump manufacturers recommend the use of an inert fluid in place of hydrocarbon oil. Various
fluids are available, such as Fomblin or HaloVac (Sargent-Welch Science Company). Modification of the pump may be required because these fluids have high molecular weights and high specific gravities and may be incompatible with seals. An inquiry to the pump manufacturer is recommended. Pumps modified for oxygen service shall be permanently identified and used only with the specified fluid.

**Peroxidizable Compounds**

Isopropyl ether, ethyl ether, dioxane, tetrahydrofuran, and other alkyl ethers form peroxides on exposure to air and light. Because these chemicals are packaged in an air atmosphere, peroxides can form even though the containers have not been opened. The longer the storage period of these chemicals, the greater the amount of dangerous peroxides that may form. Experience has shown that isopropyl ether is by far the worst offender.

**Hazards**

These peroxides are highly unstable, explosive chemicals that may detonate if subjected to high temperature, shock, or friction. Concentration by evaporation or distillation of the ether increases the risk of detonation.

**Precautions**

Ethers containing an inhibitor should be purchased when possible. Ethers should be kept in cans rather than glass bottles. Ethers should be stored in as cool a location as feasible (but not stored in refrigerators unless explosion-proof). Ethers should always be tested for peroxide content before any distillation procedure and, of course, should not be used if peroxides are found to be present. Safety shields should be placed in front of reaction vessels or distillation apparatus in hoods when they involve ethers. At least 10% bottoms in distillation should be left. Any container of uncertain age or condition must not be opened, particularly when the cap or stopper is tightly stuck. Suspected containers must not be removed or disposed of. Contact the Responsible Safety Officer. Containers of isopropyl ether must have the red label shown below, indicating the date of purchase, attached to the outside surface. These labels should be applied by storeroom personnel. When the container is opened, the opening date should also be recorded on this label. These containers must be disposed of one year after purchase, or three months after opening. Call the Responsible Safety Officer for pick-up of containers for disposal.

**Polychlorinated Biphenyls (PCBs)**

PCBs are a broad class of nonflammable, synthetic, chlorinated hydrocarbon insulating fluids used mostly in capacitors and transformers at Resource Production Company. Synonyms include askarel, aroclor, inerteen, pyranol, therminol, and many others.

**Hazards**

Prolonged skin contact with PCB oils can cause skin irritation and occasionally the formation of temporary acne-like cysts. Eye contact can cause severe irritation and inflammation. Breathing the vapor or mist from heated oil can cause respiratory irritation. PCBs are listed as suspect carcinogens. Because of their inert character and stability under extreme physical stresses, PCBs do not break down in the environment. PCBs are widely dispersed in the environment and can accumulate in foods found in the human diet.
Precautions

When working with PCB-contaminated equipment or on PCB spills, the appropriate personnel must wear protective equipment, including viton gloves, coveralls, and splash goggles. Small spills can be absorbed in vermiculite or Sorb-all. Place waste material in plastic bags and call the Decontamination & Waste Disposal Unit.

All equipment containing PCBs must be disposed of through the Responsible Safety Officer. In case of large spills or explosion of a capacitor, evacuate all personnel from the area. Call the Fire Department, 911, for assistance. Provide or maintain ventilation in the affected area, if possible. If entry to the area is necessary, self-contained breathing apparatus must be worn. All large capacitors containing PCBs and all PCB transformers must be labeled. Banks of capacitors may be labeled as a unit. Capacitors and transformers within a confined area with limited access may be labeled at each point of entry. Labels may be obtained at the Central Storeroom or from the Responsible Safety Officer. A record of the quantity, type, movement, and disposal of PCB items must be maintained by each owner. A yearly update of the record is made. Calibration of Gas Detection Systems: This policy covers the calibration of systems to detect flammable, toxic, or pyrophoric gases being used at Resource Production Company. Specifications of Calibration: The specifications of the calibration technique and the frequency of calibration must be described in the Operational Safety Procedure governing the operation of apparatus with which the gas-detecting system is associated. It is recommended that calibrations of these systems be performed by an approved outside contractor or by Scientific and Technical Resources personnel. In all cases calibrations must be carried out by an independent party: calibration of these systems may not be carried out by the group operating the apparatus. When changes are required in the Operational Safety Procedure, approval of the new procedure will be coordinated by the Responsible Safety Officer.

Chemical Safety

Introduction

The objective of this chapter is to provide guidance to all Resource Production Company employees and participating guests who use hazardous materials so that they may perform their work safely. Many of these materials are specifically explosive, corrosive, flammable, or toxic; they may have properties that combine these hazards. Many chemicals are relatively non-hazardous by themselves but become dangerous when they interact with other substances, either in planned experiments or by accidental contact. To avoid injury and/or property damage, persons who handle chemicals in any area of the Company must understand the hazardous properties of the chemicals with which they will be working. Before using a specific chemical, safe handling methods must always be reviewed. Supervisors are responsible for ensuring that the equipment needed to work safely with chemicals is provided. The cost of this equipment is borne by the Company.

Hazcom Plan

(Awareness Level Training Only 1st Responder Level Trained/qualified)

On May 25, 1986 the Occupational Safety and Health Administration (OSHA) placed in effect...
the requirements of a new standard called Hazard Communication (29 CFR 1910.1200). This standard establishes requirements to ensure that chemical hazards in the workplace are identified and that this information, along with information on protective measures, is transmitted to all affected employees. This section describes how Resource Production Company employees are informed of the potential chemical hazards in their work area so they can avoid harmful exposures and safeguard their health. Components of this program include labeling, preparing a material safety data sheet (MSDS), and training.

With regard to MSDS, Resource Production Company has limited coverage under the OSHA Hazard Communication Standard. The Company is required to maintain only those sheets that are received with incoming shipments for the following reasons: the Company commonly uses small quantities of many different hazardous materials for short periods of time; that the hazards change, often unpredictably; many materials are of unknown composition and most workers are highly trained.

**Responsibilities of Supervisors/Management**

Identify hazards for respective work areas.

Ensure hazards are properly labeled. Obtain/maintain copies of material safety data sheets, as required, of each hazardous material used in the work area and make them accessible to employees during each work shift. Have the written Hazard Communication Program available to all employees. Provide hazard-specific training for employees. Identify hazardous materials in the hazard review section of the Resource Production Company purchase requisition form. Employees must: Attend safety training meetings. Perform operations in a safe manner. Notify management immediately of any safety hazards or injuries. When ordering materials, identify hazardous chemicals in the hazard review section of the Resource Production Company purchase requisition form. The Responsible Safety Officer must: Develop a written Hazard Communication Program. Maintain a central file of material safety data sheets. Review and update Resource Production Company stock safety labels. Provide generic training programs. Assist supervisors in developing hazard-specific training programs. Oversee the Hazard Communication Standard written policy and implementation plans. Alert on-site contractors to hazardous materials in work areas. Alert on-site contractors that they must provide to their employees information on hazardous materials they bring to the work site.

The number of hazardous chemicals and the number of reactions between them is so large that prior knowledge of all potential hazards cannot be assumed. Therefore, when the chemical properties of a material are not fully known, it should be assumed hazardous and used in as small quantities as possible to minimize exposure and thus reduce the magnitude of unexpected events. The following general safety precautions should be observed when working with chemicals: Keep the work area clean and orderly. Use the necessary safety equipment. Carefully label every container with the identity of its contents and appropriate hazard warnings. Upon request MSDS sheet may be provided in an alternative language.

**Store incompatible chemicals in separate areas.**

Substitute less toxic materials whenever possible. Limit the volume of volatile or flammable material to the minimum needed for short operation periods. Provide means of containing the material if equipment or containers should break or spill their contents. Follow the requirements of this manual, if systems that can generate pressure or are operated under pressure are involved. Provide a back-up method of shutting off power to a heat source if any hazard is involved. Obtain and read the Material Safety Data Sheets.
HAZCOM Overview

a. Employers shall provide employees and new hires at their initial assignment effective information & training on hazardous chemicals in their work area. b. All training shall be documented and kept on file for review. 1. Requirements of this program. 2. Any operations in their work area where hazardous chemicals are present. 3. Location of written hazard communication program, listing of hazardous chemicals present & MSDS. 1. Methods & observations that may be used to detect the presence or release of hazardous chemicals by use of monitoring devices, visual appearance or odor. 2. The physical & health hazards of chemicals in the work area. 3. Protection measures to be utilized to prevent exposure, appropriate work practices, emergency procedures & proper PPE to be used. 4. Details of the hazard communication program, explanation of the labeling system and the MSDS and how employees can obtain & use the appropriate hazard information.

Employers shall develop, implement, and maintain at each workplace a written hazard communication program that describes how labels & other forms of warning, material safety data sheets, & employee information will be met. A list of the hazardous chemicals known to be present using an identity that is referenced on the appropriate Material Safety Data Sheet.

The methods the employer will use to inform employees of the hazards of non-routine tasks (i.e., the cleaning of reactor vessels, etc.) & the hazards associated with chemicals contained in unlabeled pipes in their work areas shall be in writing and tailgate safety meetings. Program should have specific methods for providing other employer information concerning hazardous chemicals at job sites, methods of providing MSDS sheets, methods of precautionary measures to be taken & methods of providing information on labeling systems. The program shall be made available, upon request, to employees, their designated representatives, the Assistant Secretary & the Director in accordance with requirements of 29 CFR 1910.1020(e). Where employees must travel between work places during a work shift (multi job sites), the written program maybe kept at a primary job site. If there is no primary, then the program should be sent with employees.

Container labels should contain the following information: Identity of hazardous chemicals, appropriate hazard warnings and name & address of the chemical manufacturer, importer or other responsible party. Employer or employees shall not remove or deface labels on incoming containers of hazardous chemicals. Words, pictures, symbols or combinations there of can be used.

Labels shall be legible, in English. However, for non-English speaking employees, information may be presented in their language as well. Chemical manufacturers are responsible for developing MSDS. Employers shall have a MSDS for each chemical used with the exception to consumer products. MSDS shall be maintained and readily accessible in each work area. MSDS can be maintained at the primary work site. However, they should be available in case of an emergency. MSDS must be made available, upon request, to employees, their designated representatives, the Assistant Secretary & the Director in accordance with the requirements of 29 CFR 1910.1020(e).

Task Evaluation

Each task that requires the use of chemicals must be evaluated to determine the potential
hazards associated with the work. This hazard evaluation must include the chemical or combination of chemicals that will be used in the work, as well as other materials that will be used near the work. If a malfunction during the operation has the potential to cause serious injury or property damage, an Operational Safety Procedure (OSP) must be prepared and followed. Operations must be planned to minimize the generation of hazardous wastes. Additionally, unused chemicals should be recycled.

**Supervisor Responsibility**

Supervisors are responsible for establishing safe procedures and for ensuring that the protective equipment needed to work with the chemicals is available. Supervisors must instruct their workers about possible hazards, safety precautions that must be observed, possible consequences of an accident, and procedures to follow if an accident does occur. The supervisor is required to enforce the proper use of protective equipment and the established safety practices. It is the responsibility of employees and all who use Resource Production Company facilities to understand the properties of the chemicals with which they will work and to follow all precautions that apply to each specific task. When faced with an unexpected threat of malfunction, injury, or damage, employees are expected to choose a course of action that provides the most protection to themselves and to others in the area. Every employee is expected to report to the supervisor any unsafe condition seen in the area that would not permit him/her to work safely. The Responsible Safety Officer assists employees and supervisors to work safely by providing information on the hazardous properties of materials, recommending methods for controlling the hazards of specific operations, and by monitoring the work environment. Supervisors must instruct their personnel about the potential hazards involved in the work, proper safety precautions to follow, and emergency procedures to use if an accident should occur. To supplement the supervisor’s training, the Responsible Safety Officer will conduct training courses and materials on selected topics. In addition, material safety data sheets and safety information, including hazards, health effects, potential routes of exposure, proper handling precautions, and emergency procedures on specific chemicals, are available through the Responsible Safety Officer’s office.

**Effects on Reproduction**

Both men and women may be exposed to hazardous agents that can cause infertility or result in genetic damage that is passed on to offspring. These agents include ionizing radiation, alcohol, cigarette smoke, pharmaceuticals, and some of the thousands of different chemicals that are used in the home or workplace. Although many of these have been tested to determine whether they cause acute (immediate) effects on the body, few have been studied to see if they cause cancer (carcinogens), birth defects (teratogens), or genetic defects (mutagens). Even fewer have been studied to see if they can cause infertility, menstrual disorders, or other disorders relating to reproduction. The primary path for hazardous substances to reach an unborn child is through the placenta. Scientists now believe that most chemical substances or drugs can cross this barrier with varying degrees of ease and enter the system of the developing fetus. Thus, many chemicals and drugs that enter a pregnant woman's body (through breathing, swallowing, absorption through the skin, etc.) will eventually enter the mother's blood circulation and find their way into the unborn child. In general, the important questions of exactly how much of the toxic substance that enters the
mother's body will reach the fetus or what concentration the fetus can tolerate without harmful effects are not yet answered. The fetus may be most vulnerable in the early weeks of pregnancy, but it is also at risk later in pregnancy. In light of the potential harm of workplace exposures to both a pregnant woman and her developing fetus, it is very important and required by Resource Production Company policy for the woman to inform the Responsible Safety Officer of her pregnancy immediately.

**Airborne Contaminants**

Exposures by inhalation of airborne contaminants (gases, vapors, fumes, dusts, and mists) must not exceed the levels listed in the latest edition of Threshold Limit Values of Airborne Contaminants (TLV) published by the American Conference of Governmental Industrial Hygienists. These TLV levels refer to airborne concentrations of substances and represent conditions under which it is believed that workers may be repeatedly exposed without adverse effect. In all cases of potentially harmful exposure, feasible engineering or administrative controls must first be established. In cases where respiratory protective equipment, alone or with other control measures, is required to protect the employee, the protective equipment must be approved by the Responsible Safety Officer, for each specific use.

**Safety Equipment**

Eyewash fountains are required if the substance in use presents an eye hazard. The eyewash fountain must provide a soft stream or spray of aerated water. In areas where a corrosive chemical or rapid fire hazard exists, safety showers must be provided for immediate first aid treatment of chemical splashes and for extinguishing clothing fires. The shower must be capable of drenching the victim immediately in the event of an emergency. Eyewash fountains and safety showers should be located close to each other so that, if necessary, the eyes can be washed while the body is showered. Access to these facilities must always remain open. In case of accident, flush the affected part for at least 15 minutes. Report the accident to the Responsible Safety Officer immediately. A special first aid treatment kit for fluorine and hydrofluoric acid burns is prepared by the Medical Services Department. The kit is obtained by contacting the Responsible Safety Officer. Safety shields must be used for protection against possible explosions or splash hazards. Company equipment must be shielded on all sides so that there is no line-of-sight exposure of personnel. The sash on a chemical fume hood is a readily available partial shield. However, a portable shield must also be used, particularly with hoods that have vertical-rising sashes rather than horizontal-sliding sashes.

**Labels**

All containers (including glassware, safety cans, plastic squeeze bottles) must have labels that identify their chemical contents. Labels should also contain information on the hazards associated with the use of the chemical. Precautionary labels are available from Resource Production Company stock room for most of the common chemicals.

**Chemical Storage**

The separation of chemicals (solids or liquids) during storage is necessary to reduce the possibility of unwanted chemical reactions caused by accidental mixing. Explosives such as
Picric acid should be stored separately outdoors. Use either distance or barriers (e.g., trays) to isolate chemicals into the following groups: Flammable liquids (e.g., acetone, benzene, ethers, alcohols). Place in approved fire lockers. Other liquids (e.g., chloroform, trichloroethane). Acids (e.g., nitric, sulfuric, hydrochloric, perchloric). * Treat acetic acid as a flammable liquid. Bases (e.g., sodium hydroxide, ammonium hydroxide). Lips, strips, or bars should be installed across the width of reagent shelves to restrain the chemicals in case of earthquake. Chemicals must not be stored in the same refrigerator used for food storage. Refrigerators used for storing chemicals must be appropriately identified by placing a label on the door (labels may be obtained from Responsible Safety Officer).

Emergencies

In case of an emergency, consider any of the following actions if appropriate: Evacuate people from the area. Isolate the area. If the material is flammable, turn off ignition and heat sources. Call the Fire Department or 911 for assistance. Wear appropriate personal protective equipment. Pour Sorb-all or appropriate neutralizing agent on spill. Clean up; place waste in plastic bag for disposal. Chemical spill cleanup materials are available from stores as listed below: Flammable solvent spill kit Flammable solvent absorbent Acid spill kit Acid spill absorbent Caustic (base) spill kit Caustic (base) absorbent Safety equipment kit (contains scoops, sponge, safety glasses, disposal bags, etc.) Cabinet to hold kits

Disposal of Chemicals

All Resource Production Company employees, participating guests, and visitors using hazardous chemicals are responsible for disposing of these chemicals safely. Federal and state regulations mandate strict disposal procedures for chemicals. To comply with these regulations all persons using Company facilities must observe these procedures. Routine Disposal of Chemicals In general the disposal of hazardous chemicals to the sanitary sewer is not permitted. The Responsible Safety Officer will advise on the proper disposal of chemical wastes. In using chemical waste storage containers, certain procedures must be observed, as listed below: Incompatible chemicals must not be mixed in the same container (e.g., acids should not be mixed with bases; organic liquids should not be mixed with strong oxidizing agents). Waste oils must be collected in 55-gallon drums. Disposal solids, and explosive materials must be stored in separate containers. The following requirements must be met as a condition for pickup and disposal of chemicals by the Responsible Safety Officer:

- Chemicals must be separated into compatible groups.
- Leaking containers of any sort will not be accepted.
- Dry materials (gloves, wipes, pipettes, etc.) must be securely contained in plastic bags and over packed in a cardboard box.
- Packages that are wet or have sharp protruding objects will not be accepted for pick up.
- Unknown chemicals will require special handling.

The responsible department must make every effort to identify the material that is to be disposed. If all the user’s attempts to identify the waste chemicals have failed, the Responsible Safety Officer will accept the waste and analyze the material. For more information call the Responsible Safety Officer. Each breakable container must be properly...
boxed. Place all bottles in plastic bags, then place in a sturdy container and use an absorbent cushioning material that is compatible with the chemicals. Each primary container must be labeled with content, amount, physical state, and the percentage breakdown of a mixture. Each box must have a complete list of contents or description written on an official Responsible Safety Officer hazardous materials packing list. Blank packing lists are available from the Responsible Safety Officer. For safety purposes, boxes must be of a size and weight so that one person can handle them. Boxes that exceed 45 pounds or 18 inches on a side cannot be safely handled by one person and will not be acceptable for pick up. General Housekeeping Rules: Maintain the smallest possible inventory of chemicals to meet your immediate needs. Periodically review your stock of chemicals on hand. Ensure that storage areas, or equipment containing large quantities of chemicals, are secure from accidental spills. Rinse emptied bottles that contain acids or inflammable solvents before disposal. Recycle unused laboratory chemicals wherever possible.

**DO NOT:**

Place hazardous chemicals in salvage or garbage receptacles. Pour chemicals onto the ground. Dispose of chemicals through the storm drain system. Dispose of highly toxic, malodorous, or lachrymatory chemicals down sinks or sewer drains.

**Beryllium**

Beryllium is used predominantly in three forms: beryllium metal, beryllium oxide, and beryllium-copper alloys. Beryllium-copper alloys may consist of 0.5 to 4% beryllium, although the most common alloy has about 2% beryllium. Beryllium may also be alloyed with other metals, such as nickel and cobalt, or be found as a salt, e.g., beryllium fluoride, chloride, nitrate, or sulfate, and as beryllium hydroxide. Exposure to beryllium and its compounds can damage the skin, eyes, and respiratory system. The soluble beryllium salts, especially the fluoride and sulfate, are skin sensitizers and in high concentrations are also primary skin irritants. If beryllium gets into broken skin, the cut may abscess and not heal properly until the substance is removed. Eye irritations are also common, and splash-burns can cause damage to the cornea. Breathing dust and fumes, however, is the most common cause of beryllium poisoning. The effects of inhaling high levels of beryllium can range from mild inflammation of the nose and throat, a condition that resembles a cold, to a severe pneumonia-like reaction characterized by coughing, difficulty in breathing, pain and tightness in the chest, loss of appetite, and general fatigue. The effects of inhaling low levels of beryllium over an extended period of time may be delayed from a few months to years after the last exposure.

Chronic beryllium poisoning in most cases affects the respiratory tract. The onset may be manifested by weakness, loss of weight, shortness of breath, and coughing. Beryllium dusts or powders constitute a moderate fire hazard. However, any fire involving beryllium is a serious threat to the health of nearby personnel. Avoid skin contact with beryllium salts or salt solutions, and do not allow metallic beryllium to come in contact with open wounds or abrasions. Wear gloves when handling beryllium or beryllium compounds when loose contamination (dust or chips) is present. There is no danger in ordinary skin contact with beryllium metal, alloys, or fused-ceramic material.

All operations involving the generation of airborne beryllium must be done under controlled conditions for which concurrence must be obtained from the Responsible Safety Officer.
Operations such as machining, grinding, welding, cutting, drilling, sawing, and milling must be enclosed and the exhaust ventilated through high-efficiency filters. A hazardous concentration of beryllium fumes may be generated when the metal is heated above 650°C (1200°F), or when the oxide is heated above 1540°C (2800°F). Scrupulous adherence to good housekeeping practices and plant and personal cleanliness is an obvious necessity. All beryllium parts must be stored and transported in labeled containers. One of the following labels may be used. "Beryllium (Beryllium oxides)" "Contains Beryllium" All beryllium and beryllium-contaminated waste must be placed in properly marked containers and picked up by the Decontamination and Waste Disposal Section. The following work on beryllium-copper alloys may be performed without special controls: lathe cutting using a coolant, shearing, forming, hand sawing, hand filing, hand sanding, and soft soldering in a hood.

**Cadmium**

The greatest exposure potential is probably from welding or burning cadmium-plated parts and brazing or silver soldering with cadmium-containing rods and wires. These brazing alloys contain 15 to 19% cadmium. Finely divided cadmium metal and cadmium oxide fumes are highly toxic and must not be inhaled or ingested. A single exposure to high levels of cadmium in the air can cause severe lung irritation, which may be fatal. Symptoms usually appear 4 to 10 hours after exposure when cough, labored breathing, and commonly a feeling of constriction or a burning sensation in the chest develop. Generalized flu-like symptoms characterized by shaky chills, sweating, aching in the extremities and back, headache, and dizziness may also develop. Continued exposure to low levels of cadmium in the air can result in chronic poisoning characterized by irreversible lung injury and kidney damage. Cadmium is suspected of causing cancer in humans. Symptoms of the cumulative effects of cadmium may appear after exposure has terminated. Cadmium metal dust will burn with the evolution of a very hazardous brownish-yellow fume. Remove all cadmium from plated parts before welding or burning. Substitute cadmium-free silver solder whenever possible. When cadmium is melted, temperatures should be kept as low as possible, consistent with the requirement of the operation, to prevent excessive fume generation. Indoor work or continuous outdoor work that involves the generation of airborne cadmium must be enclosed to the maximum extent practical and be provided with a good exhaust system that collects and removes the fumes as they are formed. If the work is outdoor and intermittent, a properly fitted fume respirator must be used. In confined spaces where an exhaust system is not practical, a supplied-air respirator must be worn. Evaluation of exhaust systems and work situations and supply of respiratory protective equipment are available from the Responsible Safety Officer. Cadmium-containing and cadmium-plated parts should be kept separate from parts not containing cadmium and marked appropriately so that accidental exposures resulting from cutting and welding will not occur. When there is cadmium dust, cleaning must be performed by vacuum pickup or wet mopping. No dry sweeping or blowing is permitted.

**Confined Spaces**

**Definitions**

A confined space is defined as any structure that must be entered and that has or may contain dangerous concentrations of hazardous gases or vapors or an oxygen deficient atmosphere. Entry to these spaces must be rigorously controlled to prevent serious injury or
Hazardous Conditions

Hazardous conditions include, but are not limited, to the following: An atmosphere containing less than 19.5% oxygen (normal air contains 20.9% oxygen). This is usually the result of oxygen displacement by inert gases such as nitrogen, argon, helium, or sulfur hexafluoride. Flammable gases and vapors (e.g., methane, ethane, propane, gasoline, methyl-ethyl ketone, alcohol). Toxic gases and vapors (e.g., hydrogen sulfide, nitrogen dioxide, 1,1,1-trichloroethane, perchloroethane, methylene chloride).

Hazard Prevention

The primary objective is to prevent oxygen deficiency or other hazardous condition. This must be accomplished by accepted engineering control measures, such as general and local ventilation and substitution of materials. Only when such controls are not possible should respiratory protection be used. Written operating procedures governing the identification, testing, and entry into a confined space with a potential for oxygen deficiency must be established by the operating personnel and approved by the Responsible Safety Officer. Monitoring devices, audible alarms, warning lights, and instructional signs should be installed where there is a potentially oxygen-deficient atmosphere. These installations must be approved by the Responsible Safety Officer.

Before entering a confined space, the steps below must be followed:

- An entry permit must be issued to the worker by the responsible supervisor and reviewed by the Responsible Safety Officer.
- Air quality must be tested to determine the level of oxygen and toxic or flammable air contaminants.
- Air purging and ventilation must be provided whenever possible.
- The confined space must be isolated from supply lines capable of creating hazardous conditions.
- Lock-out procedures must be used to secure electrical systems, pressure systems, piping, machinery, or moving equipment.
- If a person must enter a confined space containing hazardous gases, the procedures below must be followed:
  - Protective equipment must be worn, including air supply respirator plus harness and lifeline.
  - At least one person must be stationed outside the confined space, with suitable respirator.
  - Communication with personnel in the confined space must always be maintained.
  - If more than one confined space is to be monitored by a single attendant, the program must include the means & 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 without distraction from all responsibilities.
  - 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.
  - 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.
The employer shall provide training so that all employees whose work is regulated by this section.

Each affected employee must be trained prior to initial assignment, prior to a change in assigned duties, if a new hazard has been created or special deviations have occurred.
The employer must certify that the required training has been accomplished.
The certification shall include employee name, trainer signature/initials, dates of training. Certification must be made available to employees & their authorized representative.

Program must include provisions & procedures for pedestrian, vehicle & other barriers as necessary to protect entrants from external hazards & a method for verifying that conditions in the permit space are acceptable for entry during its duration.

An attendant must be on duty outside the confined space for the duration of entry operations.

If more than one confined space is to be monitored by a single attendant, the program must include the means & 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 without distraction from all responsibilities.

Program must identify the duties of each "entrants", "attendants" and "entry supervisors"?

Duties of authorized entrants. The employer shall ensure that all authorized entrants:

1910.146(h)(1) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;
1910.146(h)(2) Properly use equipment as required by paragraph (d)(4) of this section;
1910.146(h)(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;
1910.146(h)(4) Alert the attendant whenever:
1910.146(h)(4)(i) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or
1910.146(h)(4)(ii) The entrant detects a prohibited condition; and
1910.146(h)(5) Exit from the permit space as quickly as possible whenever:
1910.146(h)(5)(i) An order to evacuate is given by the attendant or the entry supervisor,
1910.146(h)(5)(ii) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation,
1910.146(h)(5)(iii)
The entrant detects a prohibited condition, or
1910.146(h)(5)(iv)
An evacuation alarm is activated.

1910.146(i)
Duties of attendants. The employer shall ensure that each attendant:

1910.146(i)(1)
Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

1910.146(i)(2)
Is aware of possible behavioral effects of hazard exposure in authorized entrants;

1910.146(i)(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;

1910.146(i)(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.

1910.146(i)(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;

1910.146(i)(6)

1910.146(i)(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;

1910.146(i)(6)(i)
If the attendant detects a prohibited condition;

1910.146(i)(6)(ii)
If the attendant detects the behavioral effects of hazard exposure in an authorized entrant;

1910.146(i)(6)(iii)
If the attendant detects a situation outside the space that could endanger the authorized entrants; or

1910.146(i)(6)(iv)
If the attendant cannot effectively and safely perform all the duties required under paragraph (i) of this section;

1910.146(i)(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;

1910.146(i)(8)
Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway:

1910.146(i)(8)(i)
Warn the unauthorized persons that they must stay away from the permit space;

1910.146(i)(8)(ii)
Advise the unauthorized persons that they must exit immediately if they have entered the permit space; and

1910.146(i)(8)(iii)
Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;

1910.146(i)(9)
Performs non-entry rescues as specified by the employer’s rescue procedure; and

1910.146(i)(10)
Performs no duties that might interfere with the attendant’s primary duty to monitor and protect the authorized entrants.

1910.146(j)
Duties of entry supervisors. The employer shall ensure that each entry supervisor:

1910.146(j)(1)
Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure;

1910.146(j)(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;

1910.146(j)(3)
Terminates the entry and cancels the permit as required by paragraph (e)(5) of this section;

1910.146(j)(4)
Verifies that rescue services are available and that the means for summoning them are operable;

1910.146(j)(5)
Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and

1910.146(j)(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.

- Definitions.

A. “Acceptable entry conditions” means the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.
B. "Attendant" means an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

C. "Authorized entrant" means an employee who is authorized by the employer to enter a permit space.

D. "Blanking or blinding" means the absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

- Program must address procedures for summoning rescue and emergency services, for rescuing entrants, providing first aid and for preventing unauthorized personnel from attempting a rescue.

- Entry permit means the written or printed document that controls entry into a confined space.

- Program must include procedures for coordinating entry operations for multi employer's so that employees of one employer do not endanger the employees of any other employer.

- Program must include procedures for conclusion of the entry permit after entry operations have been completed.

- Program must include procedures for reviewing the entry operations that may not provide enough protection for employees & for revising the program prior to subsequent entries are authorized. These could include and are not limited to unauthorized entry of a confined space, a hazard not covered by the permit, the occurrence of an injury or near miss & employee complaints.

- A review of the permit space program, using the canceled permits retrained under paragraph (e)(6) of section 1910.146(d)(14) within 1 year after each entry and revise the program as necessary, to ensure that employees are protected. 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.

- Monitoring of the space must inform the entrants of the potential hazards and results; they must participate in the permit review and signing. Ventilation must be used & testing must be conducted before entry & during work.

- Employees or their representatives are entitled to request additional monitoring at any time.

- Outside services must be given an opportunity to examine the entry site, practice rescue, and decline as appropriate. If there is reliance on the client Host rescue services for use, this MUST be stated and agreed to in contract language. Employees must have PPE at no cost, training, practice rescues at least every 12 months.
- Trenching Shoring & Excavations
- For those employers not initiating trenching, you should have a basic awareness program that addresses all items.
- The location of underground installations shall be determined before excavation. When utility companies or owners cannot respond to a request to locate underground utility installations within 24 hours, or cannot establish 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.
- Trench excavations shall have ramps, ladders, stairs, etc.; the ladder must be within 25 feet of the workers.
- For exposure to public traffic, the employees shall be provided reflective vests, etc.
- Employees should not work under loads of digging equipment were loads may fall.
- Tests should be conducted for air contaminants (oxygen, flammable gases, etc.) and provide ventilation where necessary.
- Employees must be protected from water accumulation, including the use of shields, and must be inspected by a competent person before work begins.
- They should examine the possibility of cave-ins, failures or protective systems, etc. If problems are found, provisions should be made for immediate personnel removal.
- The competent person should be specified and his duties described.
- There should be some means to protect against falls.
- The determination of soil types & special considerations must be done in specific measures. Shoring, sloping, shield & excavation as needed. Timber shoring, aluminum hydraulic shoring must be determined according to the appendixes A & C of the standard. The devices should be used while in good repair & maintenance; if damaged, they must be inspected. The employees should be protected from hazards of falling, rolling, or sliding materials or equipment. They should not be subjected to excessive forces and be installed to protect employees from lateral loads, employees must be restricted from being in the shield when installing or removing; the shield must be designed to resist calculated trench forces.

Ladders & Scaffolds

Ladders
Ladders must be in good condition, made of suitable material, of proper length, and of the correct type for the use intended. Damaged ladders must never be used; they should be repaired or destroyed. Ladders used near electrical equipment must be made of a non-conducting material. Stored ladders must be easily accessible for inspection and service, kept out of the weather and away from excessive heat, and well supported when stored horizontally. A portable ladder must not be used in a horizontal position as a platform or runway or by more than one person at a time. A portable ladder must not be placed in front of doors that open toward the ladder or on boxes, barrels, or other unstable bases. Ladders must not be used as guys, braces, or skids. The height of a stepladder should be sufficient to reach the work station without using the top or next to the top steps. Bracing on the back legs of stepladders must not be used for climbing. The proper angle (75-1/2 degrees) for a portable straight ladder can be obtained by placing the base of the ladder a distance from the vertical wall equal to one quarter of the vertical distance from base to top of ladder's resting
point. Ladders must be ascended or descended facing the ladder with both hands free to grasp the ladder. Tools must be carried in a tool belt or raised with a hand line attached to the top of the ladder. Extension ladders should be tied in place to prevent side slip.

Ladder Safety
Ladder rungs, cleats, and steps shall be parallel, level, and uniformly spaced, when the ladder is in position for use.
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.
Ladders should be placed on stable, level surface. Employees should not to stand on top two rungs, or top of step ladders. Employees not carry anything in hands that could cause injury in case of fall, to face the ladder when ascending or descending?
The ladder side rails shall extend at least 3 feet (.9m) above the upper landing surface. When ladders are not able to be extended then the ladder shall be secured at its top to a rigid support that will not deflect.
Ladders shall not be loaded beyond the maximum intended load for which they were built, nor beyond the manufacturer's rated capacity.
Ladders shall be used only for the purpose for which they were designed.

Scaffolds
All scaffolds, whether fabricated on site, purchased, or rented must conform with the specifications found in ANSI A10.8, Safety Requirements for Scaffolding. Rolling scaffolds must maintain a 3:1 height to base ratio (use smaller dimension of base). The footing or anchorage for a scaffold must be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose brick, or concrete blocks must not be used to support scaffolds or planks. No scaffold may be erected, moved, dismantled, or altered unless supervised by competent persons. Scaffolds and their components must be capable of supporting at least four times the maximum intended load without failure. Guard rails and toe boards must be installed on all open sides and ends of scaffolds and platforms more than 10 ft above the ground or floor. Scaffolds 4 feet to 10 feet in height having a minimum horizontal dimension in either direction of less than 45 inches must have standard installed on all open sides and ends of the platform. Wire, synthetic, or fiber rope used for suspended scaffolds must be capable of supporting at least 6 times the rated load. No riveting, welding, burning, or open flame work may be performed on any staging suspended by means of fiber or synthetic rope. Treated fiber or approved synthetic ropes must be used for or near any work involving the use of corrosive substances. All scaffolds, bosun’s chairs, and other work access platforms must conform with the requirements set forth in the Federal Occupational Safety and Health Regulations for Construction, 29 CFR 1926.451, except where the specifications in ANSI A10.8 are more rigorous.
Employer is required to train all employees regarding hazards by "qualified" persons. Basic safety information must be provided prior to use. When conditions change, must re-train.
Competent person must insure scaffolds are safe prior to and during use.
Unsafe equipment or conditions must be tagged out by Competent Person, and must be complied with.
1. 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.

2. The nature of any electrical hazards, fall hazards and falling object hazards in the work area.

3. 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.

4. The proper use of the scaffold, and the proper handling of materials on the scaffold.

5. The maximum intended load and the load-carrying capacities of the scaffolds used.

6. Any other pertinent requirements of this subpart.

7. 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.

8. 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:

**Floors**

Workroom floors must be in a clean and, as much as possible, dry condition. Drainage mats, platforms, or false floors should be used where wet processes are performed. Floors must be free from protruding nails, splinters, holes, and loose boards or tiles. Permanent aisles or passageways must be marked. Floor holes must be protected by covers that leave no openings more than one inch wide. Floor openings into which persons can accidentally walk must be guarded by standard railings and toe boards. Open-sided floors, platforms, and runways higher than four feet must be guarded by standard railings. Toe boards must be used wherever people can pass below or hazardous equipment or materials are below.

**Fall Arrester Systems Required**

When workers are required to work from surfaces that are in excess of 7-1/2 ft above an
adjacent safe work place and are unprotected by railings, the following procedures and guidelines must be applied: Before selecting personnel for work at elevated work stations, supervisors must consider the workers' physical condition, such as medical problems, fear of heights, and coordination. The Medical Services Department should be contacted for information in this regard. Approved fall-arrester systems are required for all work at heights of 10 or more feet. A recommended fall-arrester system consists of a full body-harness, a lanyard consisting of 1/2inch nylon rope or equivalent with a breaking strength of 5400 lb and a maximum length to provide for a fall no greater than 6 feet, Sala-type fall-arrester block (optional), and an anchored hook-up location Alternate equipment must be approved by the Responsible Safety Officer. Fall-arrester systems are recommended for light work at heights between 7-1/2 and 10 feet. Fall-arrester systems are not required when work is being done while standing on a ladder. Ladders should be tied off. Use of a controlled descent device is not necessary unless it is impossible to reach a stranded person by another means. The Responsible Safety Officer will advise, on request, regarding usage and procedures. It is the responsibility of the supervisor to plan the intended work sufficiently to ensure that job planning and proper precautions have been taken. The Responsible Safety Officer is available for consultation.

Fall Protection

1. The employer shall provide a training program for each employee who might be exposed to fall hazards. Training shall enable each employee to recognize the hazards of falling & shall train each employee in the procedures to follow to minimize these hazards. Employers are to have written certification records showing the following: 1) Who was trained, when, dates of training 2) Signature of person providing training & date employer determined training was deemed adequate. Employer shall provide re-training when the following are noted: 1) Deficiencies in training. 2) Work place changes. 3) Fall protection systems or equipment changes that render previous training obsolete.

2. Fall protection is required whenever employees are potentially exposed to falls from heights of six feet or greater to lower levels. This includes work near and around excavations. Use of guard rails, safety net, or personal or fall arrest systems should be used. When the standard methods of protection

3. The fall protection plan shall be prepared by a qualified person for the specified work site.

4. When conventional fall protection is not used these locations must be identified and classified as controlled access zones.

5. Where no other alternate methods have been implemented, a safety monitoring system shall be implemented (1926.502(h).

6. A competent person will be assigned to: 1. Recognize fall hazards. 2. Warn employees if they are unaware of a fall hazard or is acting in an unsafe manner. 3. Be on same working surface and in visual sight. 4. Stay close enough for verbal communication. 5. Not have other assignments that would take monitors attention from the monitoring function.

7. All accidents and serious incidents (near accidents) must be investigated, implementing changes to the fall protection plan as necessary.

8. When purchasing equipment and raw materials for use in fall protection systems applicable ANSI & ASTM requirements should be met.

9. The employer shall provide for prompt rescue of employees in the event of a fall or shall assure the employees are able to rescue themselves.
**Personnel Platforms**

Work may be performed from a crane-suspended platform where another procedure is not possible because of structure design or work site conditions. Personnel platforms must be designed by a qualified engineer and reviewed by the Responsible Safety Officer. The suspension system must minimize tipping. The platform must be designed with a minimum safety factor of 5 based on the ultimate strength of the members, and the design must conform to 29 CFR 1926.550(g).

**Materials Handling**

**Introduction**

Resource Production Company requires that safety planning and practices for commonplace tasks be as thorough as for operations with unusual hazards. Commonplace tasks make up the greater part of the daily activities of most employees and, not unexpectedly, offer more potential sources of accidents with injuries and property damage. Every operation or work assignment begins and ends with handling of materials. Whether the material is a sheet of paper (paper cuts are painful) or a cylinder of toxic gas, accident risks can be reduced with thorough planning. Identifying obvious and hidden hazards should be the first step in planning work methods and job practices. Thorough planning should include all the steps associated with good management from job conception through crew and equipment decommissioning. Most of the material presented in this chapter is related to the commonplace and obvious. Nevertheless, a majority of the incidents leading to injury, occupational illness, and property damage stem from failure to observe the principles associated with safe materials handling and storage. A less obvious hazard is potential failure of used or excessive motorized handling or lifting equipment. The Responsible Safety Officer must be notified whenever it is desired to acquire a crane, forklift, truck, or other motorized handling or lifting equipment from outside sources.

**Lifting & Moving**

Lifting and moving of objects must be done by mechanical devices rather than by manual effort whenever this is practical. The equipment used must be appropriate for the lifting or moving task. Lifting and moving devices must be operated only by personnel trained and authorized to operate them. Employees must not be required to lift heavy or bulky objects that overtax their physical condition or capability.

**Rigging**

Planning for safe rigging and lifting must begin at the design stage, and lifting procedures must be developed for assembly and installation. The lifting procedure should be developed and discussed with the rigging crew fore person. Responsibility for all rigging jobs is shared between the rigging crew and the customer. The customer is responsible for defining and requesting the move, for providing technical information on relevant characteristics of the apparatus, including special lifting fixtures when required, for providing suggestions on rigging and moving, and for assigning someone to represent them both in planning and while the job is being carried out. The riggers are responsible for final rigging and for carrying out whatever moves have been designated. Before any movement takes place, however, each representative must approve the rigging
and other procedures associated with the intended move. Each must respect the responsibility and authority of the other to prevent or terminate any action he or she judges to be unsafe or otherwise improper. The supervisor must make certain that personnel know how to move objects safely by hand or with mechanical devices in the operations normal to the area and must permit only those employees who are formally qualified by training and certification to operate a fork truck, crane, or hoist. The supervisor must enforce the use of safe lifting techniques and maintain lifting equipment in good mechanical condition. Employees are required to observe all established safety regulations relating to safe lifting techniques. The Responsible Safety Officer provides training programs followed by certification for employees who have demonstrated the ability to operate fork trucks of up to 4-ton capacity and for incidental crane operations that require no special rigging.

Rigging equipment shall be inspected to ensure it is safe. Defective equipment shall not be used and removed from service immediately.

Rigging equipment shall not be loaded beyond its recommended safe working load and load identification shall be attached to the rigging.

Rigging equipment not in use shall be removed from the immediate work area so as not to present a hazard to employees.

Tag lines shall be used unless their use creates an unsafe condition.

Hooks on overhaul ball assemblies, lower load blocks, or other attachment assemblies shall 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.

All employees shall be kept clear of loads about to be lifted and of suspended loads.

**Manual Lifting Rules**

Manual lifting and handling of material must be done by methods that ensure the safety of both the employee and the material. It is Resource Production Company policy that employees whose work assignments require heavy lifting be properly trained and physically qualified, by medical examination if deemed necessary. The following are rules for manual lifting: Inspect the load to be lifted for sharp edges, slivers, and wet or greasy spots. Wear gloves when lifting or handling objects with sharp or splintered edges. These gloves must be free of oil, grease, or other agents that may cause a poor grip. Inspect the route over which the load is to be carried. It should be in plain view and free of obstructions or spillage that could cause tripping or slipping. Consider the distance the load is to be carried. Recognize the fact your gripping power may weaken over long distances. Size up the load and make a preliminary “heft” to be sure the load is easily within your lifting capacity. If it is not, get help. If team lifting is required, personnel should be similar in size and physique. One person should act as leader and give the commands to lift, lower, etc. Two persons carrying a long piece of pipe or lumber should carry it on the same shoulder and walk in step. Shoulder pads should be used to prevent cutting shoulders and help reduce fatigue.

**To lift an object off the ground, the following are manual lifting steps:**

Make sure of good footing and set your feet about 10 to 15 inches apart. It may help to set one foot forward of the other. Assume a knee-bend or squatting position, keeping your back straight and upright. Get a firm grip and lift the object by straightening your knees - not your back. Carry the load close to your body (not on extended arms). To turn or change your position, shift your feet – do not twist your back. The steps for setting an object on the
ground are the same as above, but in reverse.

**Mechanical Lifting**

Mechanical devices must be used for lifting and moving objects that are too heavy or bulky for safe manual handling by employees. Employees who have not been trained must not operate power-driven mechanical devices to lift or move objects of any weight. Heavy objects that require special handling or rigging must be moved only by riggers or under the guidance of employees specifically trained and certified to move heavy objects.

**Inspections**

Each mechanical lifting or moving device must be inspected periodically. Each lifting device must also be inspected before lifting a load near its rated capacity. Defective equipment must be repaired before it is used. The rated load capacity of lifting equipment must not be exceeded. Material moving equipment must be driven forward going up a ramp and driven backward going down a ramp. Traffic must not be allowed to pass under a raised load. The floor-loading limit must be checked before mobile lifting equipment enters an area. Passengers must not be carried on lifting equipment unless it is specifically equipped to carry passengers.

**Load Path Safety**

Loads moved with any material handling equipment must not pass over any personnel. The load path must be selected and controlled to eliminate the possibility of injury to employees should the material handling equipment fail. Equipment worked on while supported by material handling equipment must have a redundant supporting system capable of supporting all loads that could be imposed by failure of the mechanical handling equipment. A suspended load must never be left unattended but must be lowered to the working surface and the material handling equipment secured before leaving the load unattended.

**Off Site Shipping**

Material being shipped off site must be packed or crated by competent shipping personnel. Boxes, wooden crates, and other packing materials must be safely consigned to waste or salvage as soon as practicable following unpacking.

**Truck Loading**

All objects loaded on trucks must be secured to the truck to prevent any shifting of the load in transit. The wheels of trucks being loaded or unloaded at a loading dock must be chocked to prevent movement.

**Clean Work Areas**

All areas controlled by Resource Production Company must be kept in orderly and clean condition and used only for activities or operations for which they have been approved. The following specific rules must also be followed: Keep stairs, corridors, and aisles clear. Traffic lanes and loading areas must be kept clear and marked appropriately. Store materials in work rooms or designated storage areas only. Do not use hallways, fan lofts, or boiler and equipment rooms as storage areas. Do not allow exits, passageways, or access to equipment
to become obstructed by either stored materials or materials and equipment that is being used. Arrange stored materials safely to prevent tipping, falling, collapsing, rolling, or spreading - that is, any undesired and unsafe motion. Do not exceed the rated floor capacity of stored material for the area. The load limit and the maximum height to which material may be stacked must be posted. Place materials such as cartons, boxes, drums, lumber, pipe, and bar stock in racks or in stable piles as appropriate for the type of material. Store materials that are radioactive, fissile, flammable, explosive, oxidizing, corrosive, or pyrophoric only under conditions approved for the specific use by the Responsible Safety Officer. Segregate and store incompatible materials in separate locations. Remove items that will not be required for extended periods from work areas and put them in warehouse storage. Call for assistance. Temporary equipment required for special projects or support activities must be installed so that it will not constitute a hazard. A minimum clearance of 36 inches must be maintained around electrical power panels. Wiring and cables must be installed in a safe and orderly manner, preferably in cable trays. Machinery and possible contact points with electrical power must have appropriate guarding. The controls for temporary equipment must be located to prevent inadvertent actuation or awkward manipulation. When heat-producing equipment must be installed, avoid accidental ignition of combustible materials or touching of surfaces above 60 degrees C (140 F). Every work location must be provided with illumination that meets OSHA requirements. Evaluation of illumination quality and requirements is made by the Responsible Safety Officer, but the supervisor of an area is responsible for obtaining and maintaining suitable illumination. Areas without natural lighting and areas where hazardous operations are conducted must be provided with enough automatically activated emergency lighting to permit exit or entry of personnel if the primary lighting fails.

Cranes

There are two types of heavy duty cranes at Resource Production Company. Bridge cranes are classified as cab-operated or pendant-operated. Mobile cranes consist of a boom and controls mounted on a truck chassis. Bridge and mobile cranes must be operated only by trained operators designated by the supervisor in charge of the facility. The supervisor is also responsible for ensuring that operators are trained, carrying out the inspections and following the safe operating rules explained in the Operator/Rigger Training Program. The Operator/Rigger Training Program is administered by the Responsible Safety Officer. The training staff consists of a qualified crane consultant, professional riggers, and the Responsible Safety Officer. There are two levels of required training and performance: Professional Operator/Rigger: Person whose principal assignment includes crane operation and rigging functions. The chief operator/rigger must ensure that those professional operator/riggers under his/her supervision maintain the necessary qualifications. Incidental Operator/Rigger: Person who performs operating/rigging functions as an incidental part of his/her normal work assignment. Persons in this category are restricted to lower load limits and rigging of specific types of hardware. Incidental operator/riggers must be reexamined at least once every three years. Designated operator/riggers must have Government identification cards (Federal Form 46), endorsed appropriately. Before an employee may operate any of these cranes, the supervisor must arrange for the employee to receive incidental crane-operator training on the appropriate crane. Successful completion of the
training must include an oral or written examination on the safety aspects of crane operation and a satisfactory demonstration of operational skills. The supervisor must determine that the applicant does not have any disqualifying medical or physical disabilities based on established requirements.

**Loading the Crane**

The crane must not be loaded beyond its rated load except for test purposes. Hoist chain or hoist rope must be free of kinks or twists and must not be wrapped around the load. Crane operators and floor persons must follow the OSHA requirements relating to moving the load.

**Design Parameters**

The Engineering Department is responsible for establishing design parameters relating to general requirements, cabs, foot walks and ladders, stops, bumpers and rail sweeps, brakes, electric equipment, hoisting equipment, warning devices, and other appurtenances to cranes as required in Occupational Safety and Health Standards, 29 CFR 1910.179. In addition the Responsible Safety Officer shall establish design parameters for bridge cranes and to incorporate provisions for maintenance work stations (platforms, railings, ladders, tie-off points, etc.) that permit maintenance personnel to safely perform their operations. Cranes must have the load capacity marked on each side of the bridge or on the rail in the case of a monorail and jib crane. Mobile cranes must have the load capacity marked in a convenient location. The Responsible Safety Officer must review specifications developed by the Engineering Department.

**Crane Inspections Required**

All crane functional operating mechanisms for maladjustment interfering with proper operation and for excessive wear of components. On days used inspection is required by a crane operator. Deterioration or leakage in lines, tanks, valves, drain pumps, and other parts of air or hydraulic systems. On days used inspection is required by a crane operator. Hooks. On days used visual inspection by a crane operator is required. Annual inspections must have signed reports by Resource Production Company or an outside Engineer. Hooks with cracks or having deformation more than 15% in excess of normal throat opening or more than 10 degrees twist from the plane of the unbent hook must be discarded. Wire-rope slings, including end connections, for excessive wear, broken wires, stretch, kinking, or twisting. Visual inspection by crane operator on days used. The Responsible Safety Officer, the primary user or the Building Manager must ensure that an annual inspection with a signed report is made. Resource Production Company or an outside Engineer must inspect rope reeving for non-compliance with manufacturer's recommendations before first use and annually thereafter.

**Six Month Crane Inspections**

According to OSHA requirements a crane that has been idle for a period of over six months must be inspected before being placed in service.

**Crane Maintenance**

All crane hooks and lifting fixtures must be magnafluxed at least every four years. This will normally coincide with the certification load testing and inspection. The person in charge of a
crane may request testing of hooks and/or lifting fixtures more frequently than every four years. The person in charge must give the Responsible Safety Officer a schedule of the desired frequency for testing the hook so that disassembly of the hook block can be included in their schedule for preventive maintenance of a particular crane.

**Running Ropes Inspections**
Running ropes must be thoroughly inspected at least once a year during the structural inspection of the crane, and a full, written, dated, and signed report of rope conditions must be kept on file.

**OSHA Crane Standards**
Routine maintenance, adjustments, and repairs must be performed by a qualified mechanic and reported to the Responsible Safety Officer according to each machine's established schedule and according to OSHA requirements.

**Forklift Operators**
The Responsible Safety Officer must be notified whenever it is desired to acquire a crane from excess sources.

**OSHA Standards for Forklifts**
Forklift users must familiarize themselves with and comply with OSHA Standard 29 CFR 1910.178 and ANSI B56.1. Modifications and additions must not be performed by the customer or user without manufacturer’s prior authorization or qualified engineering analysis. Where such authorization is granted, capacity, operation and maintenance instruction plates, tags, or decals must be changed accordingly. If the forklift truck is equipped with front end attachments other than factory installed attachments, the user must ensure that the truck is marked with a card or plate that identifies the current attachments, shows the approximate weight of the truck with current attachments and shows the lifting capacity of the truck with current attachments at maximum lift elevation with load laterally centered. The user must see that all nameplates and caution and instruction markings are in place and legible. The user must consider that changes in load dimension may affect truck capacities.

**Forklift Maintenance**
Because forklift trucks may become hazardous if maintenance is neglected or incomplete, procedures for maintenance must comply with ANSI B56.1 Section 7 and OSHA Standard 29 CFR 1919.178 g.

**Forklift Extension**
Maximum efficiency, reliability, and safety require that the use of fork extensions be guided by principles of proper application, design, fabrication, use, inspection, and maintenance. The user must notify the Responsible Safety Officer before purchasing extensions or having them fabricated. Fork extensions are only appropriate for occasional use. When longer forks are needed on a regular basis, the truck should be equipped with standard forks of a longer length. Routine on-the-job inspections of the fork extension must be made by the forklift operator before each use unless, in the judgment of the supervisor, less frequent inspections...
are reasonable because of his or her knowledge of its use since the last inspection. Extensions must be inspected for evidence of bending, overload, excess corrosion, cracks, and any other deterioration likely to affect their safe use.

All fork extensions must be proof load tested to establish or verify their rated capacities, whether they were supplied commercially or fabricated at Resource Production Company. A load equal to the rated capacity of the pair at a particular load center multiplied by 1.15, must be placed on each fork extension pair and fork assembly and supported for a period of five minutes without any significant deformation. Rated capacity must be determined at significant load centers, including the midpoint of the extension and at the tip. Once determined, the rated capacity and load center information must be shown by stamping or tagging the extensions in a protected location of low stress. The proof load test must be witnessed by a mechanical engineer or designer. Whenever evidence of deterioration is detected or whenever the extensions have been overloaded, magnetic particle inspection must be performed.

**Safety Inspection, Responsibility**

Each operator is responsible for the safety and safety inspection of his or her lifting devices (such as screw pin shackles, hoist rings, commercial equipment, etc.) and for its lifting fixtures (such as spreader bars, special slings, Resource Production Company-designed equipment, etc.). All lifting fixtures designed at Resource Production Company must be proof tested to twice their maximum rated loads before they are placed in service. A magnetic particle inspection or other appropriate crack detection inspection is required after the proof test. The capacity must be marked on the lifting fixture so that it is clearly visible to the equipment operator. All lifting device pins of 2-inch diameter or larger must have a magnetic particle inspection before they are placed in service. All lifting fixtures must be inspected at least once every four years (or upon request), using magnetic particle detection or other appropriate methods. The Responsible Safety Officer must ensure that proof testing is performed on all lifting fixtures designed at Resource Production Company before they are placed in service; that adequate test records are kept; and that the lifting devices and fixtures are used and maintained correctly. Upon request, the Responsible Safety Officer will provide a current test report to the user. For equipment designed at Resource Production Company, the Responsible Safety Officer must provide the user with the information required to operate the lifting device or fixture safely.

**Design Stress**

The Responsible Safety Officer is responsible for the design, fabrication, and testing of lifting fixtures. The design stress for lifting fixtures must not exceed one-fifth (1/5) the ultimate strength of the material at the operating temperature. If welded fabrication is used, the design stress must take into consideration any weakening effects of welding, such as those that occur in aluminum alloys. If practical, avoid welding in the fabrication of lifting fixtures; however, if welding is used, design and fabrication must conform to the latest standards of the American Welding Society (AWS). Careful, thoughtful design and follow-up are required. The following rules apply when designing welded units: There must be no possibility of subjecting welds to tearing loads. Stresses in welds must be substantially uniform. Where possible, design lifting fixtures so that the main loads are carried only by structural
members, plates, or shear pins rather than by welds. Examine this possibility carefully.

Welded fabrications must be proof tested to twice the maximum rated load followed by a magnetic particle inspection or other appropriate crack inspection method. Primary load carrying welds and welds in tension must be x-rayed. The screw-thread engagement required for conservative development of the full strength of a screw fastener depends upon the screw fastener material and the material of the threaded member. If the fastener is made of the same material as the female threaded member, e.g., a low-carbon steel bolt and a hole threaded into low-carbon steel, an engagement of at least 1-1/2 diameters is required. A hardened steel screw (Allen screw) in mild steel requires at least 2-diameters engagement. A low-carbon screw fastener, threaded into a tapped hole in aluminum alloy, copper, or cast iron must have a threaded engagement of 1-1/2 diameters. Other material combinations must be approved by the Responsible Safety Officer.

Safety hoist rings may be used to make lifts up to their rated load when screwed 2 hoist ring bolt diameters into materials such as aluminum alloy, copper, or cast iron. When special high strength bolts are required, consider the use of nonstandard pitch threads to avoid the possibility of using the wrong bolt in the lifting device. Any bolt used as part of Resource Production Company-designed lifting fixtures or pickup devices must be tested to two (2) times its rated load. A crack detection inspection must be performed after the load test to ensure soundness. It is desirable to maintain a supply of tested bolts in the event that one is lost. Once a lifting device or fixture is in the hands of the user, it is the user’s responsibility to ensure that the proper bolt is inserted to the proper depth and correctly torqued.

**Crane Loads**

When equipment is designed to be crane lifted at a single point with a single-bolt pickup device, the vertical lifting load through the screw thread of the bolt must be in line with the axis of the bolt so that the load will remain level when it is lifted. With this bolt alignment the lift will be through the center of gravity and will be safer since the load will not tilt or kick out when it is lifted. A single-bolt pickup device, such as a Safety Hoist Ring or equivalent carefully designed and maintained in-house device, must be used. When a load is to be crane-lifted by slings from a crane hook through 2, 3, or 4 single-load pickup points located at the corners of the load, and without the use of a spreader bar, the forces at the lift points will be non-vertical. In this case a single bolt pickup device, such as a safety hoist ring or equivalent carefully designed and maintained in-house device, must be used at each pickup point. The use of eye bolts with shoulders is permitted for lifting light incidental loads after receiving approval from the crane certified operator or supervisor and when the following conditions are met: The load is in line with the axis of the eye bolt and side loads are minimal (a spreader bar may be required). The average stress at the root area of the thread does not exceed 5000 psi. The thread engagement is at least two bolt diameters.

**Mechanical Guarding**

**Introduction & Standards**

Mechanical guarding must encompass both the power transmission parts of all mechanical equipment and the points of operation on production machines. Guards must be provided where rotational motion, nip points, and cutting, shearing, punching, and forming mechanisms can cause injury to personnel or damage to tools and equipment. Mechanical
guards must be designed or otherwise procured to meet the following specifications: The
guard must provide positive protection equal to that specified in ANSI B15.1. The guard must
be considered a permanent part of the machine or equipment, capable of being easily or
quickly removed or replaced. The guard must not interfere with efficient operation or
maintenance of the machine or give discomfort to the operator. The guard must not weaken
the machine structure. The guard must be designed for a specific job and a specific machine.
The guard must be durable, resistant to fire and corrosion, and easily repaired. The guard
must not present hazards, such as rough edges, splinters, pinch points, shear points, or sharp
corners. Methods of guarding that must be considered include the following: Enclosing the
operation (preferred) Interlocking devices Moving barriers Removal devices Remote control
Two-handed tripping devices Electronic safety devices Machines designed for fixed locations
must be securely anchored to the floor or bench to prevent walking or tipping. Employees
may operate machinery only when properly trained and authorized to do so. Proper clothing
and protective devices must be worn when specified by the supervisor or shop foreman.

Electrical Tag Out Procedure
When you have to do maintenance work on a machine, take these four steps to protect
yourself and your co-workers from injury:
De-energize the machine if possible. Positively disconnect the machine from the power source.
If there is more than one source of power, then disconnect them all.
If possible, lock out all disconnect switches. You must be given a lock and a key for each
disconnect before you begin working on the machine.
Tag all disconnect switches. Use the yellow or Red safety tags which state in large letters –
“Danger... Do No Operate,” or “Danger--Do Not Energize” and gives the name of the individual
who locked out the equipment, date and time. The tag must also state "DO NOT REMOVE THIS
TAG" (except the person who placed the tag may remove it only after the machinery
maintenance has been completed.
Test the equipment to insure it is de-energized before working on it. First, attempt to operate
the equipment by turning on normally. Next check all electrical lines and exposed areas with test
equipment or a "lamp". Finally, short to ground any exposed connections using insulated
grounding sticks. This test must be done even if the electrical connection is physically broken,
such as pulling out a plug, because of the chance of discharging components.

A TAG OUT ONLY PROCEDURE MAY BE USED IF THE MACHINE CAN NOT BE LOCKED OUT. IF
THE MACHINE IS SUPPLIED ELECTRICAL POWER FROM A SINGLE SOURCE, WHICH IS UNDER
THE EXCLUSIVE CONTROL OF A TRAINED AND QUALIFIED REPAIR PERSON AT ALL TIMES AND
THERE ARE NOT ANY OTHER PERSONS IN THE REPAIR AREA WHO COULD BE HARMED BY THE
ACCIDENTAL ENERGIZING OF THE MACHINERY, THEN TAG OUT MAY BE USED INSTEAD OF
LOCK OUT/TAG OUT.

Re-Energizing
Many accidents occur at the moment of re-energizing. If the machinery is to be re-energized,
all persons must be kept at a safe distance away from the machinery. The re-energization can
be performed only by a person who either performed the lock-out/tag out, a person acting under the immediate and direct commands of the original lock-out/tag out person, or, in the event of a shift change, or other unavailability of the original person, then the original shall, before leaving, appoint a surrogate original person and show him or her all steps taken to lock-out/tag out the equipment.

**Noise**

**Introduction**

This chapter contains information on the effects, evaluation, and control of noise. For assistance in evaluating a noise problem, contact the Responsible Safety Officer.

**Danger of Noise**

Exposing the ear to high levels of noise may cause hearing loss. This loss can be temporary or permanent. Temporary hearing loss or auditory fatigue occurs after a few minutes exposure to an intense noise but is recoverable following a period of time away from the noise. If the noise exposure is repeated, there may be only a partial hearing recovery and the loss becomes permanent. Typically, significant hearing losses occur first in the frequency range of 3,000 to 6,000 hertz (Hz). Losses in this frequency range are not critical to speech perception, and the individual usually is completely unaware of this initial symptom. With longer exposures, the hearing loss spreads to lower frequencies, which will affect speech perception. Workers' Compensation laws regard hearing losses in the speech frequency range of 500 to 3,000 Hz as being compensable. The evaluation of hearing loss due to noise is complicated by the fact that hearing acuity normally decreases with increasing age. Further, the losses associated with age are quite similar to those caused by excessive noise since the hearing for high frequency sounds is most affected in both instances. Hearing impairment may also result from infections, tumors, and degenerative diseases.

**ACGIH Standards**

OSHA has prescribed the limits established by the American Conference of Governmental Industrial Hygienists as a standard for occupational noise exposure. Both the sound pressure level of the noise and the total duration of the noise exposure are considered to determine if these limits are exceeded. The sound pressure levels are expressed as dBA or decibels A-weighted. A-weighting filters are used when measuring sound levels to more accurately predict the response of the human ear to different frequencies. When the daily noise exposure is composed of two or more periods of noise of different levels, their combined effect must be considered rather than the individual effect of each. Exposure to continuous noise above 115 dBA is not permitted without ear protection. Personnel must not be exposed to impact noises exceeding 140 dBA. Impact noises occur at intervals of greater than one per second. For example, the noise made by a metal shear.

**Reducing Noise Exposure**

Noise exposure can be reduced by using engineering controls, administrative procedures, or personal protective devices. Engineering Controls Reduction of noise production at the source: Proper design of new machines Modification of present machines Proper repair and upkeep of equipment Use of appropriate mufflers Use of vibration dampeners on machines
Reduction of noise transmission: Increase distance between noise and personnel exposed
Construction of barriers between noise source and personnel Sound treatment of ceilings and
walls Administrative Procedures: Job schedule changes Personnel rotation Personnel
Protective Devices: Ear plugs Earmuffs Federal and state occupational safety and health
regulations require that whenever employees are exposed to excessive noise levels, feasible
engineering or administrative controls must be used to reduce these levels. When these
control measures cannot be completely accomplished and/or while such controls are being
initiated, personnel must be protected from the effects of excessive noise levels. Such
protection can, in most cases, be provided by wearing suitable protective hearing devices. The
appropriate Medical Services provider and/or the supervisor of the Department will supply
ear plugs for employees upon request or before going into a high noise area. There is a need
for medical supervision when ear plugs are used because their effectiveness depends on
proper fitting. Only approved plugs should be used. Ear plugs should be cleaned daily to
prevent ear infections. Protection greater than that provided by a single device can be
obtained by wearing ear plugs under an earmuff. While the reduction provided by wearing
both devices simultaneously is considerably less than the sum of the individual attenuations,
it is still greater than when either device is worn separately.

Measurement
The measurement of hearing is called audiometry. Audiometric tests are used to determine
whether or not the hearing of workers is adversely affected by noise. The appropriate Medical
Services provider will give a pre-employment audiometric test to every employee who will
regularly work in a high noise area. Thereafter, an audiometric test is given to all such
employees at the time of their periodic physical examination. In addition, all employees
whose noise exposures equal or exceed an eight-hour, time-weighted average of 85 dBA will
be given an initial baseline audiometric test that must be preceded by at least 14 hours
without exposure to workplace noise. Thereafter, the test will be repeated annually. To
reduce unwanted noise, the audiometric test is administered by placing each individual in a
sound insulated booth. Earphones are placed on the individual's head and a microprocessor
audiometer presents a series of fixed frequency pure tones between 500 and 8000 Hz in each
ear. These frequencies include the most useful range of hearing, as well as those frequencies
most likely to show changes as a result of exposure to damaging levels of noise. By comparing
tests taken at successive intervals, it can be determined how an employee's hearing ability is
affected by a noisy environment.

Noise Exposure
The employer shall institute a training program for all employees who are exposed to action
level noise. The training shall be repeated annually for each employee. Training shall be
updated consistent to changes in PPE and work processes. The employer shall make available
to affected employees copies of the noise exposure procedures and shall also post a copy in
the workplace. The employer shall also allow the Assistant Secretary and the Director access
to records.
The employer shall administer a continuing effective hearing conservation program when
employees are exposed to sound levels greater than 85 dba 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, the employer shall implement a monitoring program to identify employees to be included in the hearing conservation program. The employer shall establish & 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.

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 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 shall be preceded by at least 14 hours without exposure to workplace noise. Hearing protection may be used to meet the requirement. Employees shall also be notified to avoid high levels of noise.

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. 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.

Use of hearing protection shall be re-evaluated and/or refitted and if necessary a medical evaluation may be required. This is done at no cost to employee(s). Hearing protection shall be replaced as necessary.

Employer's shall ensure that hearing protectors are worn. Employees shall be properly trained in the use, care & fitting of protectors. The employer shall evaluate hearing protection for the specific noise environments in which the protector will be used. The employer shall maintain accurate record of all employee exposure measurements and that all records are maintained as required by the regulation.

### Other Noises

Nuisance noises are noises that are not intense enough to cause hearing loss but that do disturb or interfere with normal activities, such as: Speech communication Telephone communication Listening to TV or radio broadcasts Concentration during mental activities Relaxation Sleep The amount of interference is dependent upon the intensity of the noise and its characteristics, such as steady versus intermittent noise, high or low pitch. The amount of interference may also depend upon the person's personality, attitude toward the source, familiarity with the noise, and the intrusiveness of the noise. What is music to one ear may be noise to another!

### Protective Equipment

**Introduction**

Resource Production Company will provide suitable equipment to protect employees from hazards in the workplace. The Responsible Safety Officer will advise on what protective equipment is required for the task, but the supervisor of the operation must obtain this equipment and see that it is used. Protective clothing is not a substitute for adequate
engineering controls.

**Protection Issued**
Protective clothing will be issued to employees who work with hazardous material for the purpose of protecting their health and safety. The Responsible Safety Officer is available for consultation as needed.

**Radiation Monitoring**
Protective clothing must be monitored for radioactive contamination before being sent to the laundry.

**Protective Shoes**
Resource Production Company encourages the wearing of safety shoes by making them available to any employee at cost from a manufacturer. For certain types of work the wearing of safety shoes is required by Company policy or by federal regulations. Examples are when employees are exposed to foot injuries from hot, corrosive, or poisonous substances; in shops, in equipment handling, or in construction jobs where there is a danger of falling objects; or in abnormally wet locations.

**Protective Gloves**
Resource Production Company provides proper hand protection to employees exposed to known hand hazards. The supervisor must obtain the suitable hand protection and ensure that it is used. The individual department must maintain a supply of special or infrequently used hand protection. Assistance in selecting the proper hand protection may be obtained by consulting the Responsible Safety Officer.

**Head Protection**
Resource Production Company provides appropriate head protection devices for employees to protect them from head or other injuries that could result from their working environment. Some head protection devices are available from stock. The supervisor must also maintain sufficient supply of head protection devices for visitors in the area.

**Eye Protection**
Resource Production Company provides appropriate eye protection devices for employees assigned to tasks in which an eye-injury hazard exists. The supervisor of the operation is responsible for determining the need for suitable eye-protection devices and for ensuring that the employees use them. The Responsible Safety Officer and appropriate Medical Services agency will assist the supervisor in defining eye-hazard operations and in selecting appropriate eye protection. An optometrist is available to issue, repair, adjust, and fit personal safety glasses and also for consultation regarding occupational eye protection. The standard sign: CAUTION, EYE HAZARD AREA, DO NOT ENTER WITHOUT EYE PROTECTION, must be posted in every area where eye protection is mandatory. All employees who work in such an area must wear the eye protection issued to them. Every visitor to the area must also be provided with suitable eye protection.
Eye Protection Devices

Eye-protection devices are classified in four categories: Personal safety glasses. Goggles, face shields, etc. Temporary safety glasses provided to visitors in eye-hazard areas Laser safety eye wear.

Respiratory Protection

1. Any operation that generates harmful airborne levels of dusts, fumes, sprays, mists, fogs, smokes, vapors, or gases or that may involve oxygen-deficient atmospheres requires the use of effective safety controls. This must be accomplished, as much 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 respiratory protection must be used in accordance with Resource Production Company requirements as prescribed by OSHA in ANSI 288.2-1980, Standard Practices for Respiratory Protection.

2. The program must address employee knowledge of respirators, fit, use, limitations, emergency situations, wearing, fit checks, maintenance & storage, medical signs & symptoms of effective use, and general requirements of the OSHA standard. The training must be provided before requiring the employee to use the respirator. The program must address retaining.

3. To be used when engineering control measures are not feasible or during emergency situations with high exposure. Respirators shall be provided which are applicable and suitable for purpose intended.

4. Administrator must be knowledgeable of the complexity of the program, conduct evaluations, and be properly trained.

5. Medical, respirators, and training are required to be provided free to the employee.

6. Also applicable when required by employer. How is the program updated?

7. The employer is required to identify hazards, select and provide respirators based on those hazards and factors affecting performance. Brands and models must be listed. The employer is required to estimate exposures and contaminant information. If this is not done, then exposures must be addressed as immediately Dangerous to Life & Health (IDLH). Section (d)(2) only applies to IDLH atmospheres.

8. Must be confidential, during normal working hours, convenient, understandable, employee given chance to discuss results with PLHCP.

9. Employer is required to ensure employees pass qualitative fit test (QLFT) or quantitative fit test (QNFT) before initial use, if a different respirator I used, and annually. SARs are required to be fit tested as well. (Refer to the Appendices).

10. Things that can affect the seal must be prohibited and include facial hair, glasses, etc. The program must address checking of the seal each time the unit is put on. The program administrator must address appropriate surveillance, and ensure employees leave the area to wash, change cartridges, or if they detect break-through or resistance.

11. Program must address outside standby persons, maintaining communication, proper training and equipment, notification procedures, and necessary action. Mandatory equipment must include SCBA or SAR with auxiliary air supply & appropriate retrieval equipment or equivalent rescue means.
12. Respirators are required to be provided in a clean and sanitary manner using procedures in Appendix B or equally effective manufacturer's procedures.

13. Protection from damage, contamination, etc. For emergency use, stored accessible, clearly marked. Inspections: Routine use - before use and during cleaning; emergency - monthly, and before and after each use; escape-only - before being carried into workplace.

14. This section only applies to SARs and SCBAs. Air must be Grade D or better. Compressor located in a "clean" atmosphere, with in-line purification and tagged to indicate date or changeout. Carbon monoxide monitor in place & set to alarm at 10 PPM or monitored frequently. Fittings are incompatible for non-respirable gases and containers.

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

16. The employer is required to establish and retain written information regarding medical evaluations, fit testing, and the respirator program. Records of medical evaluations required by this section must be retained and made available in accordance with 29 CFR 1910.1020. Where and by whom are the records kept?

17. 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. A. Procedures for selecting respirators for use in the workplace; B. Medical evaluations of employees required to use respirators; C. Fit testing procedures for tight-fitting respirators; Procedures for proper use of respirators in routine and reasonably foreseeable emergency situations; D. Procedures and schedules for cleaning, disinfecting, storing, inspecting, repairing, discarding, and otherwise maintaining respirators; E. Procedures to ensure adequate air quality, quantity, and flow of breathing air for atmosphere-supplying respirators; F. Training of employees in the respiratory hazards to which they are potentially exposed during routine and emergency situations; G. Training of employees in the proper use of respirators, including putting on and removing them, any limitations on their use, and their maintenance; H. Procedures for regularly evaluating the effectiveness of the program.

18. **Procedures for IDLH atmospheres.** For all IDLH atmospheres, the employer shall ensure that:

A. One employee or, when needed, more than one employee is located outside the IDLH atmosphere; B. 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; C. The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue; D. The employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue; E. The employer or designee authorized to do so by the employer, once notified, provides necessary assistance appropriate to the situation; F. Employee(s) located outside the IDLH atmospheres are equipped with: G. Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; H. 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; I. Equivalent means for rescue where retrieval equipment is not required under paragraph.

**Responsibilities**

To ensure that the respiratory protection program is conducted in accordance with ANSI 288.2-1980, certain responsibilities are required of each employee, supervisor, Responsible Safety Officer, and the Medical Services Department.

A. **Employees are responsible for:**

- Wearing the respirator in accordance with the instructions and training received.
- Maintaining and storing the respirator in good condition.
- Returning the respirator at the end of the required use for overhaul, cleaning, and disinfection.

B. **Supervisors are responsible for:**

- Identifying those employees who may need to use respiratory protection (Responsible Safety Officer will provide assistance upon request in this determination).
- Ensuring that their employees have been properly trained and fitted.
- Ensuring that their employees use the respirators as required.

C. **The Responsible Safety Officer is responsible for:**

- Providing respiratory equipment.
- Maintaining the equipment in good condition.
- Fitting employees with proper respirators and providing training for their use.
- Evaluating employee exposures and work conditions, including inspection of respirator use.

D. **The Medical Services Department is responsible for:**

- Granting medical approval for each respirator user.

**Respiratory Equipment**

The Responsible Safety Officer has selected the types of respiratory protective equipment to be used at Resource Production Company. Any changes to protective equipment, its application, or the substitution of alternative protective equipment must be approved by the Responsible Safety Officer before its use. Resource Production Company has a wide variety of respiratory protective equipment available. Each respirator has certain capabilities and limitations that are taken into account when issued. The types of respiratory protective devices provided by Resource Production Company are described below. Disposable dust masks are approved for protection against low (non-hazardous) levels of nuisance dusts. They provide no protection against vapors or gases, and they cannot be used in oxygen-deficient areas.

There are no applicable training or fitting restrictions. Air-purifying, half- and full-face masks are approved for protection against low concentration of toxic particulates, organic vapors, acid gases, and ammonia. Specific cartridges must be selected for protection against each material. They must never be used in atmospheres deficient in oxygen, when carbon monoxide or oxides of nitrogen are suspected, or when conditions prevent a good face seal. Such conditions may be a growth of beard, sideburns, a skullcap that projects under the face-
piece or temple pieces on eyeglasses. Users must be trained, fitted, and medically approved before they can be issued a respirator. Supplied-air, half- and full-face masks may be used in atmospheres unsuitable for air-purifying respirators but cannot be used in areas which are immediately dangerous to life or health. Compressors are normally used to supply breathing air, but compressed air cylinders may also be used. The user must be medically approved, trained, and fitted before using this equipment. Personnel will not be fitted or issued a respirator if there is any condition that may prevent a good face seal, such as a beard, sideburns, skullcap, or temple pieces on eyeglasses. Supplied-air hoods are approved for respiratory protection in any atmosphere not immediately dangerous to life or health, and from which the wearer can escape without the aid of a respirator. The user must be medically approved and trained in its proper use. The presence of a beard, sideburns, skullcap, or eyeglasses will not affect the performance of this type of respirator.

PPE Assessments/ Personal Protective Equipment
Proper training includes at least, when PPE is necessary, what PPE is necessary; how to properly don, doff, adjust & wear PPE; the limitations of PPE; the proper care, maintenance, useful life & disposal of PPE. Retraining of the employee is required when the workplace changes, making the earlier training obsolete; the type of PPE changes; or when the employee demonstrates lack of use, improper use, or insufficient skill or understanding. The certification must include the employee name, the dates of training, and the certification subject. Required by reasons of hazards of processes or environment to protect body parts from inhalation, absorption or physical contact.
If employee-owned equipment is permitted, the employer must be responsible for the assurances of its adequacy, maintenance & sanitation.
The hazard assessment must indicate a determination if hazards are present or are likely to be present, which necessitate the use of PPE. Certifier's name, signature, date(s) & identification of assessment documents.
Selection, and reasons for selection should be given to the employee.
Fitting, including proper donning, doffing, cleaning, and maintenance.
Defective or damaged PPE shall NOT be used.

Pressure Safety

Definitions
The following definitions apply in this chapter:

Low Pressure:
Gas pressure less than 1 MPa gauge (150 psig) or liquid pressure less than 10 MPa (1500 psig).

Intermediate Pressure:
Gas pressure from 1 to 20 MPa gauge (150 to 3000 psig) and liquid pressure from 10 to 35 MPa gauge (1,500 to 5,000 psig).

High Pressure:
Gas pressure greater than 20 MPa gauge (3,000 psig) and liquid pressure greater than 35 MPa gauge (5000 psig).
Pressure Equipment:
Any equipment, e.g., vessels, manifolds, piping, or other components, that operates above or below (in the case of vacuum equipment) atmospheric pressure.

Pressure System:
Any mechanical system comprising pressure equipment.

Pressure Vessel:
A relatively high-volume pressure component (such as a spherical or cylindrical container) with a cross section larger than the associated piping.

Ductile Vessel:
A pressure vessel fabricated from materials that yield extensively before failure when overstressed at any temperature within the vessel's operating range (generally, materials that exhibit greater than 5% plastic strain to rupture).

Brittle Vessel:
A pressure vessel fabricated from materials that do not yield extensively before failure when overstressed at any temperature within the vessel's operating range (generally, materials that exhibit less than 5% plastic strain to rupture).

Research Pressure Equipment:
Pressure equipment used for research, development, or for some other unique activity (such as special test equipment for shop use).

Plant-Facility Pressure Equipment:
Pressure vessels and pressurized utility equipment that is part of Resource Production Company buildings or physical-plant facilities.

Operational Safety Procedure:
The OSP is the document used to describe the controls necessary to ensure that the risks associated with a potentially hazardous research project or unique activity are at an acceptable level.

Safety Note (SN):
A Safety Note is generally used to document engineering calculations or tests of specific equipment or activities when there is a safety concern but the potential hazard is not high enough to require an OSP.

Maximum Allowable Working Pressure (MAWP):
The maximum differential pressure (at the specified operating temperature) at which equipment is designed to operate safely. The relief device must not be set higher than the MAWP.

Operating Pressure (OP):
The pressure at which equipment is normally operated - always less than the MAWP (also called working pressure).
Pressure Test:
A test to ensure than equipment will not fail or permanently deform - i.e., will operate reliably at the MAWP.

Proof Test:
A test in which equipment prototypes are pressurized to determine the actual yield or failure (burst) pressure (used to calculate the MAWP).

Safety Factor (SF):
The ratio of the ultimate (i.e., burst or failure) pressure (measured or calculated) to the MAWP. A SF related to something other than the failure pressure should be identified with an appropriate subscript, e.g., SF sub y (based on yield pressure) or SF sub u (based on ultimate strength).

Leak Test:
A pressure or vacuum test to determine the existence, rate, and/or location of a leak.

Standard Operating Procedures
Any Resource Production Company division involved in the construction and/or use of pressure equipment must ensure that such equipment is designed, installed, tested, and operated in accordance with the requirements of this chapter. The Responsible Safety Officer must make an evaluation to determine whether the potential hazard of the pressure equipment is high enough to require an OPS.

Pressure Installer
The Pressure Installer is a technician or mechanic certified to fabricate, assemble, install, and operate pressure equipment within a specified pressure range. Upon being assigned by his or her supervisor, the Pressure Installer is authorized to work directly for a supervisor or the Responsible Safety Officer.

Low & High Hazards
For convenience in describing the required controls, pressure equipment has been divided into two hazard categories: Low-Hazard pressure equipment - equipment with a low hazard level involving routine risks that are accepted without question by most users or equipment that is covered by existing industrial standards. High-Hazard pressure equipment - equipment for which operational risk is high enough to require a SN and may be high enough to require an OSP. Review and approval are required.

Low Hazards
The following systems are low hazard and do not normally require an SN or OSP. Air and inert-gas systems for working pressures up to 1 MPa gauge (150 psig) and inert-liquid systems for working pressures up to 10 MPa gauge (1500 psig), provided that the stored energy does not exceed 100 kJ(75,000 ft-lb). Utility systems for MAWPs up to 2.0 MPa gauge (300 psig), including cold-water, hot-water, low-conductivity-water, compressed-gas, natural-gas, butane and propane (LPG), and steam systems that strictly comply with applicable Engineering standards. Compressed-gas-cylinder manifolds assembled with compound-thread fittings in compliance with the chapter on GASES of this Manual. Manifolds on tubebanks and
tubetraillers that consist of components rated at 20.7 MPa gauge (3000 psig) or higher and that are periodically retested. Unmodified pressure vessels designed in accordance with Refs. 1-3, ASME Boiler and Pressure Vessel Codes and ASME-code stamped. Refrigeration systems that comply with the ASME Boiler and Pressure Vessel Codes (Refs. 1 and 2) and applicable Air-Conditioning and Refrigeration Institute (ARI) standards (Ref. 4).

Pressure vessels, stamped with a Department of Transportation (DOT) rating, used to supply and transport fluids. These vessels are subject to the retesting requirements of Ref. 5, Code of Federal Regulations, CFR 49, Transportation, Parts 100-199 (current issue).

Air-pressure tanks, liquefied-petroleum-gas tanks, anhydrous-ammonia tanks, and fired-steam boilers inspected periodically in accordance with Ref. 6, "Unfired Pressure Vessel Safety Orders," or Ref. 7, "Boiler and Fired Pressure Vessel Safety Orders" of the State of California or other similar state requirements.

The Responsible Designer must notify the Technicians Supervisor whenever such a vessel is to be installed. Unmodified, commercially manufactured hydraulic systems with a safety factor of 4 or higher for working pressures to 35 MPa (5075 psi) on hydraulic presses, motorized vehicles, and machine tools that are periodically inspected and maintained by the using organization.

**High Hazards**

The systems listed below are high-hazard (containing hazardous materials or employing pressures that involve high hazard) and must be evaluated by the Responsible Safety Officer to determine if an OSP is required. A Safety Note is required, and the vessel must be approved by a Certified Pressure Inspector or by outside safety engineer. Responsible Safety Officer approval is required for systems containing flammable, irritant, toxic, infectious, and/or radioactive fluids. Fire Department approval is also required for systems containing oxygen or flammable and/or toxic fluids. All vessels and systems that contain irritant, toxic, infectious, and/or radioactive fluids at any pressure. All oxygen or flammable-fluid vessels and systems.

All pressurized equipment and ASME-coded vessels that have been structurally modified and that operate at gas pressures over 1 MPa gauge (150 psig) or liquid pressures over 10 MPa gauge (1500 psig) or that contain over 100 kJ (75,000 ft-lb) of stored energy.

**ASME**

Pressure equipment must be designed, or specified, and reviewed by the Responsible Safety Officer. Pressure vessels within the scope of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section VIII, Pressure Vessels (over 6 in. in diameter and 15 to 3000 psi for unfired pressure vessels), must comply with this Code except for Pressure Vessels controlled- and low-use ancillary vessels, such as: Vacuum vessels subject to over pressure only during an emergency, Vessels designed for specific one-time or low-activity use, such as an external pressure test of a vacuum vessel, or Vessels used for vacuum impregnating magnet coils. Pressure vessels and systems made of commercial pipe or pipe fittings, or both, must not be used above their rated American National Standards Institute (ANSI) working pressures and must comply with all the rules of this Manual.

**Protective Containments**

This section covers protective containment designed, specified, or used by Resource
Production Company personnel to enclose gas-pressurized vessels (including those that contain toxic, radioactive, and/or flammable materials) to protect personnel from the pressure-vessel-failure hazards of blast pressure and flying fragments and to prevent release to the atmosphere of any hazardous materials leaked from the pressure vessel. Containment vessels may be required to enclose research equipment during its development or to enclose vessels used to transport highly toxic and/or radioactive substances.

**Transportation**

Only containers approved by the Department of Transportation (DOT) or by OSHA may be used for off-site shipment of pressure vessels containing radioactive materials. Contact the Responsible Safety Officer for approval for transporting radioactive material on or off site.

**Ductile Vessels**

When the contained vessel is made of ductile material, the containment vessel must be designed with an ultimate (burst) safety factor of at least 4. When the contained vessel is made of brittle material, the containment vessel must be designed with an ultimate (burst) safety factor of at least 8.

**Design Curtain**

The following requirements apply to all gas-pressure containment vessels. Design the containment vessel using the appropriate safety factor specified in the above paragraph. Base the design upon the maximum equilibration pressure expected if the contained vessel fails and its contents enter the containment vessel heated to the highest temperature expected within the containment vessel or to 55 degrees C (130 degrees F), whichever is higher. Containment-vessel materials must have satisfactory fracture toughness at an operating temperature of -40 degrees C (-40 degrees F), unless a lower temperature is required and specified. If off-site transportation is to be permitted, design the containment vessel to withstand the normal conditions of transport, including heat, cold, pressure, vibration, water spray, free drop, corner drop, penetration, and compression. The contained vessel must be mounted securely inside the containment vessel. Include a compound pressure/vacuum gauge to allow monitoring of the internal pressure of the containment vessel. This gauge must be graduated to at least 120%, but not over 200%, of the highest credible equilibration pressure. Include two separate valves and gas lines for safely introducing, exhausting, and monitoring flushing gases. Include suitable covers and shields to protect all valves and gauges from damage. Cap or plug all terminal valve ports. Provide accommodations for locking or wiring valve handles closed, or have valve handles removed during shipment to prevent unauthorized operation or tampering.

**Pressure Testing**

Pressure test the containment vessel to at least 1.5 times the maximum possible equilibration pressure as defined above. No detectable plastic strain is permitted, as determined before and after testing by measurements made to within 0.025 mm (0.001 in.). After successful pressure testing, leak check the containment vessel at its maximum possible equilibration pressure with a leak detector capable of detecting leakage of $1 \times 10^{-8}$ atm cm$^3$/sec. No detectable leakage is permitted. The Responsible Safety Officer should specify contained-vessel rupture testing of the containment vessel if she or he deems it advisable. After a
successful test, label the containment vessel with the working pressure that was the basis for the design calculations and for an operating-temperature range of -29 to +55 degrees C (-20 to +131 degrees F), unless a wider temperature range is required and specified.

**MAWP Statements**

The MAWP must be stated on all pressure-system (and pressure-vessel) assembly drawings.

**Relief Valves Required**

The following requirements (Relief Devices) apply in addition to all other sections of this manual. When evacuated vacuum vessels are raised to atmospheric pressure with a pressurized-gas source, a relief device must be installed between the gas source and vacuum vessel. Use ASME code-approved or Resource Production Company-stocked relief devices whenever possible. The use of any other non-ASME pressure-relief device on high-hazard pressure equipment must be specifically approved by the Responsible Safety Officer. Resource Production Company personnel are not permitted to set, seal, or stamp relief devices on utility water boilers, steam boilers, and compressed-air receivers that are under the jurisdiction of the State. Only authorized Plant Maintenance Technicians, and other specifically authorized persons, are permitted to set and seal relief devices on non-coded pressure vessels and systems.

**Piping Standards**

The following requirements apply in addition to other sections of this manual on Pressurized Flammable-Fluid Piping, and Instruments. Use flexible nonmetallic hose only when it is impractical to use metal pipe or tubing. Any use of nonmetallic hose in pressure systems must be approved by the Responsible Safety Officer. Keep hose lengths as short as possible, protect them from mechanical damage, and anchor the ends to prevent whipping in case of a hose or hose-fitting failure. Avoid sharp hose bends, and do not bend hoses more sharply than recommended by the manufacturer. Replace or repair any hose showing leaks, burns, wear, or other defects. Do not use nonmetallic hose on flammable, toxic, and/or radioactive gas systems. (Gases tend to permeate nonmetallic hose.) On liquefied-gas systems, ensure that all terminal-block (liquid-withdrawal) valves are rated above the vapor pressure of the liquefied gas at 38 degrees C (100 degrees F) or that a properly set relief valve is permanently installed on the outlet side of each terminal-block valve. All work on pressure equipment requiring an SN must be performed by trained personnel under the direction of an engineer or the Responsible Safety Officer. All systems must be securely fastened to resist seismic forces as specified in the chapter on Seismic Safety. For gas systems use gauges graduated to about twice the MAWP of the system; for liquid systems use gauges graduated to at least the test pressure. Calibrate pressure gauges, switches, and other devices through 120% of their maximum operating points. These devices must be capable of withstanding the operational, and emergency, temperatures of the system, and their material must be compatible with the system fluid. Use safety-type gauges (with shatterproof faces, solid fronts, and blow-out backs) or protect operators with a tested, Resource Production Company-approved gauge-safety shield. This applies to all gas-pressure gauges over 100 mm in diameter graduated to over 1.4 MPa (200 psi) and to all liquid-pressure gauges over 100 mm in diameter graduated to over 140 MPa (20,000 psi).
Safety-type gauges may be required for other combinations of diameter and pressure. Protect a gauge subject to pressure surges or cyclic pulses by installing a throttling device. Ensure that there is no oil in gauges used on gas systems. This is important on oxygen systems since hydrocarbons and oxygen can combine explosively. Clean all gauges to be used on high-purity gas systems. Equip every flammable-gas drop or regulator/hose connection with a flash arrester or a check valve, a pressure gauge, and a shut-off valve. If the flammable gas is to be (or could be) cross connected with oxygen or compressed air, a flash arrester must be installed in the flammable-gas line and a check valve in the oxygen or compressed air line. Equip all oxygen drops with a check valve. This applies to all single- and multiple-station installations and portable equipment.

**Designer Responsibilities**

The person who designs a pressure vessel for use by Resource Production Company must review the inspection report for all completed pressure vessels to ensure that they are free from manufacturing defects that might affect their use.

**Signs**

All pressurized gas equipment operating at pressures greater than 500 psig must be painted yellow, must have the operating pressure clearly marked thereon, and must bear a sign, "DANGER, HIGH-PRESSURE EQUIPMENT."

**Operator Qualifications**

Resource Production Company will authorize only trained persons to operate pressure equipment. Use of personnel or equipment shields may be required when there is a probability of damage from blast and to protect personnel or equipment from blast.

The User must ensure that the following safety precautions are taken:

- Flammable, radioactive, irritant, and/or toxic gases or liquids or oxygen must not be used in systems that are not specifically designed for their use.
- Flammable gas must not be used in combination with oxygen or compressed air unless there is a flash arrester in the flammable-gas line and a check valve in the oxygen or air line.
- Oxygen and air, because of its oxygen content, can combine explosively with organic materials and flammable gases.
- Acetylene-gas pressure must not exceed 15 psig since acetylene is unstable and will explode spontaneously around 30 psig at room temperature.
- Work may not be performed on pressurized components unless the method has been approved by means of an SN or is specifically authorized by the User or designee.

**Depressurized Vessels**

Whenever practical, a system or vessel not in use must be depressurized. When a vessel or system is stored under pressure, the pressure, fluid, and date pressurized must be clearly indicated on the vessel. The Shutdown Procedures apply.
Safety Orders
State and federal Safety Orders establish minimum standards for the following: The design and construction of all unfired pressure vessels for Plant-Facility Pressure Systems. The installation, operation (including issuance of permits), inspection, and repair of air-pressure tanks and liquefied-petroleum-gas (LPG) tanks. The design, construction, repair, or alteration of storage tanks for liquefied-natural gas (LNG) at 15 psi or less. The installation, use, and repair of anhydrous ammonia tanks. The design and construction of pressure vessels for storing and dispensing natural gas for motor fuel and of motor-fuel tanks installed on vehicles not licensed to travel on highways. The installation, use, and repair of natural-gas vessels and systems that are not a part of hazardous research equipment.

State Safety Orders are not applicable to the following:
Pressure vessels that are under the jurisdiction and inspection of the United States Government and that are specifically exempted by the State. Pressure vessels, except for LNG tanks, subject to an internal or external pressure of not more than 15 psi, with no limitation on size, and vessels having an inside diameter less than 6 in., with no limitation on pressure. (However, such vessels must be designed and constructed in accordance with recognized standards, when applicable, or in accordance with good engineering practices concerning pressure-vessel design, with a factor of safety of at least 4, and must be fitted with controls and safety devices necessary for safe operation.) Natural-gas vessels and installations subject to the jurisdiction and inspection of the State Public Utilities Commission, Department of Transportation, or Highway Patrol; air-brake tanks installed on units of transportation, including trucks, buses, trains, and streetcars, that are operated by any person, firm, or corporation subject to the jurisdiction and inspection of the Public Utilities Commission, the Department of Transportation, or the Highway Patrol.

The following vessels must be constructed, inspected, and stamped in accordance with the appropriate ASME Boiler and Pressure Vessel Code:
1. Air-pressure tanks LPG tanks Anhydrous-ammonia tanks
2. All Plant-Facility pressure vessels LNG tanks for low-temperature storage at 15 psi or less must be designed, constructed, inspected, and certified in accordance with API (American Petroleum Institute) Standard 620.
3. LPG vaporizers having a volume greater than one U.S. gallon must be constructed in accordance with the California State Boiler and Fired Pressure Vessel Safety Orders, Title 8, Subchapter 2.
4. Permits to Operate are required for LPG tanks and air tanks larger than 1.5 ft sup 3 with relief valves set to open above 150 psi.

OSHA Standards
State Safety Orders establish minimum standards for the design, construction, installation, inspection, operation, and repair of all (1) power boilers, including nuclear, (2) all low-pressure boilers and high-temperature-water boilers, and (3) any other fired pressure vessels in California not specifically exempted from these Orders. State Safety Orders are not
applicable to (1) boilers and fired pressure vessels under the jurisdiction of, and inspected by, the United States Government, (2) boilers and fired pressure vessels used in household service, and (3) boilers used exclusively to operate highway vehicles, including automobiles.

Power Boilers

All new power boilers, high-temperature water boilers, and low-pressure boilers must be constructed, inspected, and stamped in full compliance with the ASME Boiler and Pressure Vessel Codes (Refs. 11 and 12) unless the design and construction of the boiler are accepted by the Resource Production Company Engineering Division as equivalent to Code. Vessels not included in the scope of the ASME Codes must be designed and constructed in accordance with good engineering practice regarding pressure-vessel design for the pressure and temperature to be expected in service, with a factor of safety of at least 4. Good engineering practice (as used in this Manual) must be construed to require details of design and construction at least as safe as required by the rules in the ASME Codes, including shop inspection. State Permits to Operate are required on all boilers and fired pressure vessels except for: Low-pressure boilers Miniature boilers High-temperature water boilers Boilers, including forced-circulation boilers, in which none of the following is exceeded: 100 ft sup 2 of heating surface, 16-in. steam-drum inside diameter, 100-psi MAWP, 35-gal. normal water capacity, and 400,000-Btu/hr burner power input.

ASME Standards

Code: The ASME Boiler and Pressure Vessel Codes and the ANSI Standards. Low-pressure boiler - a boiler that does not operate at steam pressure or with steam-safety valve settings exceeding 15 psi (low-pressure boiler) or (2) operate at water pressures exceeding 160 psi or water temperatures exceeding 250 degrees F (hot-water-heating boiler). [This definition is not intended to include domestic-type water heaters, provided the heater does not have a water capacity of more than 120 gal and is used only for heating service water.] Miniature boiler - a boiler that has (1) an inside shell diameter of 16 in. or less and (2) a gross volume of 5 ft sup 3 or less, exclusive of casing and insulation. (This volume includes the total volume of the steam- and water-containing parts of the boiler plus the volume of the combustion space and gas passages up to the point of attachment of the smokestack or chimney breaching.) High-Temperature Water Boiler - a fired or unfired pressure vessel used to heat water to temperatures above 212 degrees F at pressures exceeding 160 psi or to temperatures exceeding 250 degrees F regardless of pressure. Power boiler - a steam boiler operated at pressures exceeding 15 psi.

Pressure Testing Standards

Whenever practical, pressure vessels and systems should be sent to an Assembly Shop or the Plant Maintenance Technician Shops for pressure testing. When this is not practical, the vessel or system must be tested in accordance with the In-Place Pressure Testing procedures described in this manual. Pressure tests performed at Resource Production Company must be conducted by a Plant Maintenance Technician, a Physical Plant Mechanic, or an Assembly Shop Machinist and must be observed (or conducted) and certified by the Responsible Safety Officer (or designee) or an outside independent Pressure Inspector. Pressure-test and pressure-inspection records must be maintained for the life of the vessel by the organization that certifies the test or inspection.
**Pressure Testing**

Pressure vessels must be tested in accordance with the rules in this Section, using an inert fluid. Pressure vessels for low-hazard inert systems for operation with nonflammable, nontoxic, and non-radioactive fluids must be hydrostatically tested to at least 1.5 times the MAWP or pneumatically tested to at least 1.25 times the MAWP (only when safety considerations or research requirements do not permit a hydrostatic test). Any special temperature conditions or temperature cycles to which the vessel will be subjected in use must be reproduced as closely as possible during the test. Pressure vessels for high-hazard reactive systems for operation with oxygen or flammable, toxic, and/or radioactive fluids must be tested to at least 2.0 times the MAWP with an inert liquid (preferred) or gas. Any special temperature conditions or temperature cycles to which the vessel will be subjected in use must be reproduced as closely as possible during the test. In addition, consider the need to inspect any vessel ultrasonically or to check the vessel surface for cracks using the magnetic-particle test or (for nonmagnetic vessels) the fluorescent-penetrant test. During tests of pressure vessels in which the yield strengths of their construction materials is approached, strain-gauge measurements must be made at high-stress locations. Diameter measurements accurate to within plus or minus 0.025 mm (0.001 in.) must also be taken both before and after testing to determine whether detectable plastic yielding has occurred during pressurization. When the strength of the vessel is questionable (old or unknown design), strain-gauge measurements must be made during testing, and diameter measurements must be taken before and after testing. The MAWP for ASME Code pressure vessels made of the acceptable ductile materials listed in the code, must not exceed 0.4 times the test pressure and must comply with a Proof Test to establish MAWP.

**Pressure Testing Procedures**

Inert-substance (low-hazard) pressure systems that will operate with non-hazardous liquids, inert gases, or compressed air must be tested hydrostatically (preferred) at least 1.5 times the MAWP or pneumatically to at least 1.25 times the MAWP using an inert fluid. Reactive-substance (high-hazard) pressure systems that will operate with oxygen or with flammable, toxic, and/or radioactive fluids must be tested to at least 2.0 times the MAWP using an inert liquid (preferred) or gas.

**Standards for Low Pressure Vessels**

Pressure vessels and systems must be leak tested at their MAWP after successful pressure testing: Open flames must not be used for leak-testing Leak testing of non pressure-tested or undocumented pressure vessels or systems must be limited to a maximum of 20% of the test pressure (or proposed test pressure).

**Leak Testing Required**

If a leak is detected during pressure testing of a vessel or system, and it is decided to locate the leak before completing the test, the pressure must be reduced to not over one-half the immediately preceding test pressure while the leak is being located. A system or vessel must not be repaired while it is pressurized unless this is specifically authorized.
### Leak Repairs

Any modification to a pressure vessel or system, other than repair or replacement (with an exact duplicate) of existing components, must be approved by the Responsible Safety Officer and recorded in a revision to the applicable engineering drawing, to the SN, and to the OSP (if applicable). The initial pressure test must be repeated before any further use of the modified vessel or system. If an ASME-Code vessel is modified, the Code stamping must be obliterated, and the Responsible Safety Officer must be so notified. When pressure equipment has been modified for use at a pressure below the original design pressure, all modifications (e.g., use of fewer bolts in flanged joints) must be approved by the Responsible Designer. All safety requirements for the lower pressure must be met, and the reduced working pressure and the number of bolts or other supports required must be clearly marked on the equipment. If high-strength or other special bolts are required, this must also be clearly marked on the equipment near the bolt holes. Instructions on the precautions to be taken when the modified equipment is operated must be sent to all personnel concerned, and one copy must be filed in the SN file.

### Inspections & Re-Testing

All high-hazard equipment that is not a part of Plant Facilities and/or under the jurisdiction of the State must be re-inspected at least every three years and retested at the MAWP at least every six years, unless otherwise specified in the SN or OSP. Low-hazard pressure equipment that is not a part of Plant Facilities and/or under the jurisdiction of the State need not be periodically re-inspected and retested, unless otherwise specified in an SN or OSP. Pressure re-inspection is performed by a Pressure Inspector or by the Responsible Safety Officer and is recorded on a "Pressure Inspection Record" form. The completed form must be signed by the User and sent to Responsible Safety Officer to be kept for the life of the vessel. The result of the retest must be certified and a label must be fixed on the vessel or system as described earlier.

### Inspections & Testing

If it is impractical to pressure test a vessel or system at the Mechanical Shop or some other approved location, pressure test it in place, in accordance with the provisions of this Section. The supervisor or user must ensure that in-place retesting of pressure equipment for which he or she is responsible is performed. Although other individuals may be designated to observe and direct testing or retesting, responsibility for safe conduct of the test and safe functioning of tested pressure equipment cannot be delegated. The user and the Responsible Safety Officer must prepare the required test procedure, direct the test personnel, and witness in-place pressure testing of vessels and systems for which he or she is responsible.

### Pressure Testing On Site

A written test procedure must be prepared for every high-hazard pressure test conducted in the field. When testing will be conducted in place, the test procedure must be included in (or appended to) the SN or OSP (if applicable). Procedures for in-place testing of high-hazard vessels and systems must be approved. The Building Manager or Area Supervisor must be advised of pressure tests planned to occur in his or her facility, and Responsible Safety Officer must be notified if toxic and/or radioactive material is involved. All pressure tests must be
conducted by a person designated by the Responsible Safety Officer or conducted by a Plant Maintenance Technician, a Physical Plant Mechanic, or a Machinist in the Assembly Shop and must be observed (or conducted) and certified by a member of the Responsible Safety Officer (or designee) or a Pressure Inspector.

**Pressure Testing with Liquids**

Pressure testing with a gas is more dangerous than testing with a liquid. Therefore, tests must be conducted with liquids, whenever practical. Barricade the equipment being tested, shield the controls and operators, and evacuate all unauthorized personnel from the test area. Signs reading "**Danger - High-Pressure Test in Progress - Keep Out**" must be posted at all approaches to the test area. For in-place testing with liquids, all air must be removed from both the testing system and the equipment to be tested. Compressed air will expand violently in case of vessel failure. Spongy action of pumping equipment usually indicates the presence of trapped air.

**Pressure Testing with Gas**


**Sanitation**

**Drinking Water**

The Responsible Safety Officer periodically takes samples from the potable water system throughout the Company and has them checked for biological contaminants. This is a check to ensure a high-quality water supply for drinking purposes. The drinking water supply must not contain impurities in concentrations that may be hazardous to the health of the employees or that would be offensive to the senses of sight, taste, or smell. The drinking water supply system must be installed according to the National Plumbing Code and must be maintained in
good condition. The drinking water system must be protected against backflow with approved connections and plumbing devices.

New Water Sources
New additions or alterations to existing domestic water lines must be disinfected with chlorine solution and biologically tested prior to being put into service. Procedures must be those spelled out in the American Water Works Association publication AWWA C601, latest edition.

Anti-Vermin Policy
Every enclosed work place and personal service room must be constructed, equipped, and maintained in such a manner as to prevent the entrance or harborage of rodents, insects, and vermin.

Food Preparation
All readily perishable foods or beverages, capable of supporting rapid and progressive growth of micro-organisms, must be stored below 7 degrees C (45 degrees F). Food that is served hot must be heated over 60 degrees C (140 degrees F) and kept that hot during the serving period to prevent growth of bacteria. Food served cold should be maintained below 10 degrees C (50 degrees F). All food and beverages must be prepared, stored, displayed, dispensed, placed, or served so they are protected from dust, flies, vermin, pollution by rodents, unnecessary handling, airborne droplets, infection, overhead leakage, or other contamination. Food that is transported from a cafeteria where it has been prepared to another cafeteria must be protected from contamination in transit. All suspected or alleged cases of food poisoning must be reported to the Responsible Safety Officer for immediate investigation. Food must not be stored or eaten in areas where toxic materials are handled.

Sanitary Facilities
Adequate toilets, washrooms, lockers, and other essential sanitary facilities must be readily accessible for employees near their work areas. These facilities must be maintained in a clean and sanitary condition. Soap in a dispenser and apparatus for drying of hands must be provided at each wash place.

Potable Water Standards
This standard is intended to safeguard Resource Production Company drinking water supplies by:

- Protecting potable water supplies against actual or potential cross connection.
- Eliminating any existing cross-connection hazards between potable water systems and non-potable water systems. Preventing the making of cross-connections in the future.
- Requiring the exclusive use of potable water for drinking, personal, eyewash, safety shower, and culinary purposed.

Quality Control:
No piping shall be installed so that used, unclean, polluted, or contaminated substances can enter any portion of the potable water supplies by back siphonage, suction, back pressure, or
any other cause. Protection shall be guaranteed during normal use and operation and when any tank, receptacle, equipment, or plumbing fixture is flooded, or subject to pressure in excess of the operating pressure in the water piping. Unless an approved air gap or backflow prevention device is provided, no plumbing fixture, device, or equipment shall be connected to any potable water supply when such connection may pollute water supplies or may provide a cross-connection with non-potable water. Appropriate corrective action shall be taken immediately where any cross-connection hazard exists and is not properly protected. All water lines and outlets shall be appropriately marked to indicate whether the water is safe or unsafe for drinking. All backflow preventers shall be listed by the University of Southern California Foundation of Cross-Connection Control or similar agency. All fire protection backflow preventers shall be listed by Factory Mutual and the University of Southern California Foundation of Cross-Connection Control or comparable agency.

**Approvals:**

Before any device is installed for the prevention of backflow or back siphonage, removed from use, relocated or substituted, or an existing potable water line extended, work shall be approved by the Resource Production Company Engineering Department. All issues of this Standard shall first be reviewed by the Responsible Safety Officer. Compliance with this Standard shall be monitored by the Health and Safety Department.

**TESTING & MAINTENANCE:** All devices installed in the potable water supply system for protection against backflow shall be tested annually and maintained in good working condition by designated maintenance personnel, in accordance with the procedures outlines in the latest edition of “Cross-Connection Manual” by the University of Southern California Foundation of Control and Hydraulic Research, or comparable publication. Defective or inoperative devices shall be repaired or immediately. Records of such tests, repairs, and overhauling shall be the Construction and Maintenance Department and made available to Engineering Department and Responsible Safety Officers upon request.

**Revisions to This Standard:**

The Engineering Department shall be responsible for maintaining this Standard. The approved devices shall be reviewed periodically to ensure that all approvals are current, and to delete or add to the approved devices as deemed necessary.

**General**

The Responsible Safety Officer and Engineering Department shall be kept informed of the identity of the Resource Production Company representative responsible for the water piping concerned with this Standard. In the event of contamination or pollution of the drinking water system due to a cross-connection, the Responsible Safety Officer and Engineering Department shall be promptly advised by the Resource Production Company representative responsible for the water system so that appropriate measures may be taken to overcome the contamination.

**Definitions:**

**Atmospheric Vacuum Breaker (Also known as the non-pressure type vacuum breaker):**

A device containing a shut-off valve followed by a valve body containing a float-check, a check seat and an air inlet port. When the shut-off valve is open the flow of water causes the float...
to inlet port. When the shut-off valve is closed, the float falls check valve against back-siphonage and at the same time, opens inlet port.

**Backflow:**

The undesirable reversal of the flow of water or mixtures of water and other liquids, gases, or other substances into the pipes of the potable supply of water from any source or sources.

**Backflow Preventer (approved):**

A device that has been approved by Resource Production Company for the prevention of backflow into potable water systems.

**Back Pressure:**

A pressure increase in the downstream piping system (by pump, elevation of piping, or steam and/or air pressure) above pressure at the point of consideration which allows reversal of direction of flow through the backflow prevention assembly.

**Back Siphonage:**

A form of backflow due to a reduction in system which causes a reverse flow to exist in the water system.

**Contamination:**

Any change in water quality which creates a threat to the public health through poisoning or through the spread of disease by sewage, industrial fluids or waste.

**Cross-connection:**

Any unprotected, actual, or potential connection or structural arrangement between a potable water system and any other source or system through which it is possible to introduce into any potable water system any used water, industrial fluid, gas, or liquid other than the intended potable water. This includes bypass arrangements, jumper connections, removable sections, changeover devices and other temporary or permanent devices because of which can cause "backflow."

**Double Check:**

An assembly composed of two single, independently acting, approved check valves, including tight-closing shut-off valves at each end of the assembly and fitted with properly located test cocks.

**Industrial Water:**

Non-potable water intended for industrial use.

**Non-Toxic Substances:**

Any substance of a non-poisonous nature that may create a moderate or minor hazard to the potable water system.

**Potable Water:**

Water from any source which has been approved for human consumption.

**Pressure Vacuum Breaker:**

A device containing one or two independently operating loaded check valves and an independently operating air inlet valve located on the discharge side of the check or device;
to be equipped with properly located test cocks and closing shut-off valves located at each end of the assembly.

**Reduced Pressure Principle Device:**
A device containing two independently acting approved check valves together with a hydraulically and mechanically independent pressure relief valve located between the check valves and at the same time below the first check valve. The device includes properly located test cocks and tightly closing shut-off valve at each end of the assembly.

**Toxic Substance:**
Any substance (liquid, solid, or gaseous), such as sewage and lethal substances which, when introduced into the system, creates or may create a danger to the health and well consumer. (Defined as a contaminant or health hazard).

**REFERENCES:**

**AIR GAP SEPARATION:**
An air gap is the only absolute means of eliminating a physical link or cross-connection, and positively preventing backflow. Air gaps used wherever practicable and where used must not be bypassed. The supply inlet to a tank or fixture must be terminated above level rim of the tank or fixture by a distance equal to at least the effective opening of the supply inlet pipe. There should be provision for extending the supply pipe beyond the flood level Minimum 2D or 1 inch, whichever is greater; D = nominal diameter of fill pipe.

**Atmospheric (Non-Pressure) Vacuum Installation:**
Devices shall be:
- a. Accessible for maintenance, repair, and testing.
- b. Located outside any enclosure or hooded areas containing toxic or poisonous fumes.
- c. Installed with the air inlet in the level position.
- d. Installed a minimum of six inches above the flood level rim of the fixture, tank, highest outlet, highest sprinkler, highest downstream piping, or similar device.
- e. Installed downstream of the last shut-off valve. (example: 160F hot water).

**TYPICAL APPLICATIONS**
- Lawn sprinklers.
- Laboratory and janitors sinks.
- Low inlets to tanks, vats, sumps, and other receptors.
- Hose-bibs or outlets with hose attachment means.
- Aspirators.
- Water closet or urinal flushometer valves.
- Cooling towers.
Pressure Vacuum Breaker (PVB) Installation:

Devices shall be:

a. Accessible for maintenance, repair, and testing.
b. Installed 12 inches above the floor level rim of the highest outlet, highest sprinkler, highest downstream piping, or similar device.
c. Installed with the air inlet in the level position.
d. Approved to operate at the temperature of the water being used (example: 160°F Hot Water).

2. Devices shall not be:

a. Installed in pits or similar potentially submerged locations.
b. Installed where, if slight spillage should occur, it would be objectionable.

TYPICAL APPLICATIONS:

- 1. Lawn sprinklers.
- 2. Cooling towers.
- 3. Laboratories.
- 4. Low inlets to tanks, vats, sumps, and other receptors.
- 5. Floor drains with trap primers or flushing connections.
- 6. Chlorinators on the suction side of the pump.
- 7. Water cooled equipment.
- 8. Industrial water systems.

DOUBLE CHECK VALVE ASSEMBLY (DC) INSTALLATION:

Devices shall be:

1. Accessible for maintenance, repair, and testing.
2. Installed level to the horizontal position.
3. Approved to operate at the temperature of the water being used (example: 160°F Hot Water).
4. Installed in pits or similar potentially submerged locations.

TYPICAL APPLICATIONS:

- Steam boilers.
- Closed heat water systems.
- Heat exchangers.
- Vending machines.
- Fire sprinkler systems.
- Chilled water systems.

REDUCED PRESSURE PRINCIPLE DEVICE INSTALLATION:

Devices shall be:

1. Accessible for maintenance, repair, and testing.
2. Installed in an open area to protect against flooding around the discharge from the differential relief valve assembly.
3. Installed in the horizontal position.
4. Be provided with funneled discharge piping and required air gap when installed indoors.
5. Installed at least 12 inches above the floor or grade. Devices shall not be installed in pits or similar potentially submerged locations.

TYPICAL INSTALLATIONS:
- 1. Company building water service.
- 2. Steam boilers.
- 3. Closed heating water systems.
- 4. Closed chilled water systems.
- 5. Heat exchangers.
- 6. Autoclave, sterilizer, and steam tables.
- 7. Degreasing equipment.
- 10. Processing tanks.
- 11. Fire sprinkler systems.
- 12. Priming water to pumps moving toxic fluids.

Oil & Gas Wells

Blowout Equipment
Blowout prevention equipment (hereinafter referred to as "BOP") in all drilling operations shall be in accordance with recognized safe practices, reasonably adequate to keep the well under control at all times, as well as inclusive of blowout preventers, choke and kill lines, as necessary, and maintained in good working condition at all times. All blowout preventers, choke lines and manifold shall be installed above ground level. Casing heads and optional spools may be installed below ground level provided they are visible and accessible. All pipe fittings and valves placed on, or connected with a blowout preventer, well casing, casing head, or the drill pipe or tubing, shall be of a type suitable for the purpose for which they are to be used and adequate to withstand the pressure which may be encountered. All ram type blowout preventers and related equipment, including casing, shall be tested to the full working pressure rating of said equipment upon installation, provided that components need not be tested to levels higher than the lowest working pressure rated component. Annular type blowout preventers shall be tested in conformance with the manufacturer's published recommendations.

If, for any reason, a pressure seal in the assembly is disassembled, a test to a full working pressure rating of that seal shall be conducted prior to the resumption of any drilling operation. In addition to the initial pressure tests, ram type preventers shall be checked for physical operation each trip and all components, again with exception of the annular type blowout preventer, tested monthly to at least fifty percent (50%) of the rated pressure of the blowout preventer equipment and/or to the maximum anticipated pressure of the blowout preventer equipment and/or to the maximum anticipated pressure to be contained at the surface, whichever is greater. The working pressure rating of all blowout preventers and related equipment shall equal or exceed the maximum anticipated pressure to be contained.
at the surface. Studs on all well head and blowout preventer flanges shall be checked weekly for tightness. Where locking screws are provided on blowout preventers, hand wheels shall be kept installed and operational, and readily accessible.
The entire blowout preventer and well head assembly shall be kept reasonably clean of mud and ice. A drill stem safety valve shall be available on the rig floor at all times. While a well is being drilled, tested, completed or reconditioned, the appropriate blowout equipment shall be mechanically tested periodically, and the blind rams shall be mechanically tested daily (provided that this requirement does not necessitate a special trip of the tools from the hole). If found defective, any such equipment or rams shall be made serviceable before operations are resumed.
All tests shall be reported with full particulars on the daily drilling log book, and in the case of a pressure test, the pressure applied and the duration shall be recorded. One or more employees employed on the rig shall have an adequate understanding of, and be able to operate, the blowout preventer system. At least one person who is trained in blowout prevention and well control procedures shall be on the well site. Blowout preventer controls shall be readily accessible on the floor and/or at least twenty feet (20') from the well bore and outside the substructure. BOP equipment installed on wells in which formation pressures to be encountered are abnormal or unknown shall consist of a double-gate, hydraulically operated preventer with pipe and blind rams or two single-ram type preventers, one equipped with pipe rams, the other with blind rams and an annular type preventer. In addition, upper and lower kelly cocks, pit level indicators with alarms and/or flow sensors with alarms, and surface facilities to handle pressure kicks shall be installed prior to drilling any formation with known abnormal pressure. Accumulators shall maintain a pressure capacity reserve at all times to provide for operation of the hydraulic preventer and valves with no outside source.
Areas in which abnormal pressures are likely to be encountered are those as defined by the Oil and Gas Conservation Commission’s staff and posted on a map to be available in the State Oil and Gas Supervisor’s office. This map, to be updated as information becomes available, will also segregate, vertically, formations where abnormal pressures are likely to be encountered. In all other drilling operations, BOP equipment shall consist of at least one double-gate preventer with pipe and blind rams or two single-ram type preventers, one equipped with pipe rams, the other with blind rams, and sufficient valving to permit fluid circulation at the surface, or shall be as approved by the State Oil and Gas Supervisor’s Office and/or the U.S. Geological Survey District Engineer’s office, as filed on the drilling permit. Blowout preventer equipment and related casing heads and spools shall have a vertical bore no smaller than the inside diameter of the casing to which they are attached.

**H2S Hydrogen Sulfide**

Health effects of Hydrogen Sulfide are Eye irritations, effects nerve centers of the brain which control breathing.
Detection methods are Personal or area monitors that alarm when PEL exceeds the preset level of 20 PPM.
When monitor alarms sound Personal should vacate the area and do not re-enter without proper respiratory protection.
NIOSH-certified self-contained breathing apparatus or airline respirator with escape SCBA should be used.
Employer should be aware of owners contingency plan provisions.

**Operational Specifics**

Spudding shall not commence until all guards are in place on all equipment to be operated; all platforms, stairways and handrails are secured in position; the escape line with buggy is installed; and A-leg pins are instead in their proper A-leg holes and secured by safety pins to prevent their displacement. An escape line shall be a wire rope of suitable diameter and type. It shall be kept free of obstructions. An approved safety buggy with an adequate braking device shall be installed on the escape line and kept at the derrickman’s working platform. The safety buggy and escape (geronimo) line shall be checked by the derrickman each trip.

Tension on the escape line shall be such that a 180 pound worker sitting in the safety buggy will touch the ground at least twenty feet (20’) from the anchor. The minimum length of the escape line, which shall be securely anchored both at the ground and to the rig, shall be adequate to assure no less than 45 degree descent from the vertical plane.

Every person, when engaged in work at ten feet (10’) or more above the derrick floor or other working surfaces, shall wear a safety belt with an attached safety line secured to the derrick except during rig up and rig down. Where these regulations prescribe the use of safety belts, the employee shall use an approved safety belt suitable for the particular job and in good condition, which safety belt and life line is to be provided by the employer. The safety belt shall be attached by means of a tail rope or lanyard to a fixed anchor and adjusted to allow the minimum of drop in case of fall. A separate life line shall be provided for each employee requiring a life line, and safety belts and life lines shall be checked before each use and maintained in good condition. Every automatic cat head shall have a separate control. Where dual-purpose controls are used, a positive locking device shall be installed to prevent one automatic cat head from accidentally engaging while the other is in operation.

Wherever practical, every draw works master control shall be effectively locked out when not in use. Guards shall be installed so that controls may not be accidentally engaged through contract by cat lines or other equipment. The engine room, pump house, derrick floor and fourble board shall be enclosed to a sufficient height to provide protection against inclement weather. Exits shall be provided to the outside on at least three sides of the derrick floor. The pump house shall have two doors leading in different directions to the outside. No exit door of a derrick, including all doors of the dog house, shall be held closed with a lock or outside latch while anyone is on the derrick floor. The suction pit or tanks used for the circulation of flammable materials shall not be located inside the pump house. No employee shall handle a traveling hoisting line unless he uses a suitable hand guard, which shall be secured to the derrick. No employee shall slide down any pipe, kelly hose, cable or rope line except in the event of an extreme emergency. No employee shall ride a traveling block with which pipe is being moved at any time. When riding a traveling block or elevators, a safety belt with lanyard shall be worn and the lanyard shall be attached to the block above the hook.
No employee shall use the cat line as a means of ascending to or descending from any point in the derrick except in an emergency. Even then the rotary table shall be locked out and qualified employees shall operate the cat head and controls. When working on hydraulic tong heads, the input pressure line shall be disconnected. High pressure lines (hydraulic or air) shall have a safety pressure relief valve which shall never be set higher than manufacturer's specifications for the working pressure of the lines or valve. Hydraulic tongs shall be backed up with a safety device able to withstand the full torque of the power tool. Auxiliary power tong units which employ internal combustion engines shall have the power unit placed seventy-five feet (75') upwind of the well bore, considering the normal prevailing wind at the rig location, where location and terrain permit. The rotary table shall not be used for the final making up or initial breaking out of a pipe connection. All pipe and drill collars racked in a derrick shall be secured with rope or otherwise adequately secured to prevent them from falling across the derrick. Safety clamps, used on drill collars, flush joint pipe, or similar equipment for the purpose of preventing its falling in the well when not held by the elevator, shall be removed from the drill collars, pipe, or similar equipment before being hoisted up into the derrick. Racking foundations shall be designed to withstand the load or racked pipe and drill collars and be secured to prevent turnover.

Mud Pits & Tanks
Portable tanks shall be located where it is not possible for employees or equipment to come into contact with overhead power lines. All discharge lines shall be properly secured. No employee shall jump from one tank top to another. All fixed mud guns used for jetting shall be pinned or hobbled when unattended. Hoses used for jetting operations shall be manned and an employee stationed at the pump control to shut down the pressure in the event of an emergency. Standard railings shall be provided on the inside of all mud tank walkways. Where such walkways are four feet or more above ground level, both sides shall be provided with standard railings.

General Drilling Rules
Surface casing shall be run to reach a depth to prevent blowouts or uncontrolled wells. In areas where pressures and formations are unknown, surface casing shall be of sufficient size to permit the use of an intermediate string or strings of casing. Surface casing shall be set in or through an impervious formation and shall be cemented by the pump and plug or displacement or other approved method with sufficient cement to fill annulus to the top of the hole. If cement is not circulated to the surface during the primary operation, supplemental cemented operations shall be performed to assure that the annular space form the casing shoe to the surface is filled with cement. The cemented casing string shall stand under pressure until the cement has reached a compressive strength of 300 pounds per square inch; providing, however, that no further operation shall be commenced until the cement has been in place for at least eight (8) hours. The term "under pressure" as used herein shall be complied with if one float valve is used or if pressure is otherwise held. Setting depths of all casing strings shall be determined by taking into account formation fracture gradients and the maximum anticipated pressure to be maintained within the well bore. If and when it becomes necessary to run a production string, such string shall be cemented by the pump and plug method and shall be properly tested by the pressure method before
cement plugs are drilled. Natural gas which may be encountered in a substantial quantity in any section of a cable tool drilled hole above the ultimate objective shall be shut off with reasonable diligence either by mudding or casing, or other approved method and confined to its original source.

Any gas escaping from the well during drilling operations shall be, as far as practicable, conducted to a safe distance from the well site and burned. An approved safety belt suitable for the particular job or hazard exposure, which shall be attached by means of a tail-rope or lanyard to a fixed anchor and adjusted to allow the minimum of drop in case of a fall, shall be provided and worn. Every person, when engaged in work at ten feet (10') or more above the derrick floor or other working surfaces, shall wear a safety belt with an attached safety line secured to a fixed point, or be supported from the tugger line by a safety harness or tree trimmer-type belt. The tugger line shall not be free wheeling. Special protective wearing apparel shall be provided and worn as deemed necessary because of unusually hazardous situations not normal to the job.

**Emergency Equipment**

The well operator shall advise the special services organization of any area which has or may contain insufficient oxygen or has been or may be contaminated by flammable or toxic gases, vapors or dusts. The employer shall insure that servicing is not permitted until sufficient tests have been made with appropriate instruments or equipment to determine the extent of the hazard. If a hazard exists the area must be purged to reduce the hazard to an allowable concentration, or all employees shall be provided with proper protective equipment. In the event of the presence of Hydrogen Sulfide (H2S), the following limits of exposure shall apply [in parts per million (ppm): A. Ceiling value = 20 ppm B. Time weighted average (TWA) = 10 ppm C. Acceptable maximum peak above the acceptable ceiling concentration for an 8-hour shift = 50 ppm (10 minutes once only if no other measurable exposure occurs.) Where two (2) or more special services employees are on site, a minimum of two (2) approved positive-pressure or pressure-demand-type breathing equipment for use in H2S shall be available on location when working in a known or suspected H2S zone or area. An approved escape breathing apparatus shall be provided for each special services person on the work site. Blowers used for emergency purging or ventilation shall be of a non-sparking type. All employees shall have been fit tested and trained in the use and operation of the employer-provided breathing equipment available on the job site within the past 12 months, and shall be retained at least annually thereafter. Employees with facial contours, physical impairments, or hair or beard styles that would interfere with the face-to-mask seal necessary for proper respiratory protection shall not enter into areas in which such protection may be necessary. Each special services crew of two or more employees shall have one or more employees with a valid certificate in first aid who will always be present at the work site. C.P.R. (Cardio Pulmonary Resuscitation) training should be received by first aid trained employees at least every three (3) years. Natural or liquefied petroleum gas (LPG) shall not be used to operate spray guns or other pneumatic equipment. No smoking shall be allowed within twenty-five feet (25') of any flammable material storage area, or within twenty-five feet (25') of the handling of flammable liquids. Any engine being refueled with flammable fuels shall be shut off during refueling. No open flames or smoking shall be permitted within 120 feet of the well bore or well if flammable substances are in the
well. Each Special Services Derrick (hereinafter "SSD") shall display the name of the manufacturer, safe load capacity, wind load capacity of miles per hour and capacity rating of the derrick or mast. No SSD shall be subjected to a compression load greater than the safe load limit shown on the manufacturer's plate. SSD shall be set up and guyed according to the manufacturer's recommendations and chocked or otherwise immobilized. SSD shall be equipped with guards which shall prevent the rig-up lines from being displaced from the sheaves during operations or when being raised to, or lowered from, the operating position. A visual inspection of the SSD shall be made by a qualified person before the SSD is raised or lowered.