CENTRAL ARIZONA PROJECT

SAFETY RESOURCE MANUAL

(CONTRACTOR VERSION)

January 1, 2020

With most recent updates as of October 13, 2021

MAIN TABLE OF CONTENTS

(Note: This version of the Safety Resource Manual contains only those sections most applicable to CAP contractors. Other sections have been removed.)

FORWARD

Ted Cooke, General Manager

Safety is an organizational value at CAP. As a result, it is something we want you to be thinking about every day. It is not just for the big or dangerous jobs but for every job, every time. This Safety Resource Manual is intended to provide you with clear direction about CAP's safety program. I hope when reviewing it that you better understand why your safety, at work and at home, is so important.

The content of this manual was developed by the CAP Safety Vision Support Team, the CAP Environmental, Health and Safety Department (EHS) and CAP Managers & Supervisors. The rules and programs are essential to maintaining a workplace free of safety-related incidents and injuries.

Our goal for you after reviewing this manual is that you will be familiar with CAP's safety procedures and able to identify unsafe conditions that could lead to an injury, damage to equipment or interruption of work activities. It is also very important you fully understand the process for alerting others before starting work in an unsafe manner.

The expectation at CAP is that every employee, no matter the job, will make safety a value. Please review this manual. Use it as a resource and if you have any questions, talk to the EHS Department or your supervisor or manager.

By following the safe work practices outlined in the manual, and by watching out for each other, we can ensure that every employee returns home safe, every day.

SECTION 2

SAFETY RULES

15.0 SAFETY NEAR, OVER AND ON THE WATER 74

1.0 GENERAL SAFETY RULES and PROGRAMS

1.1. Stop Work Authority: Any employee who witnesses an unsafe condition, act, or potential situation that poses an immediate risk to life, limb, or CAP property has the authority and the responsibility, regardless of position, to: Order all employees, visitors and contractors who are exposed to an unsafe work activity to cease the unsafe work activity and remove themselves from danger. The employee shall also:

1.1.1. Report the unsafe condition to the supervisor, or manager.

1.1.2. If the supervisor, or manager fails to take action to rectify the dangerous situation the employee must contact the Environmental, Health & Safety (EH&S) Department for resolution of the problem. The EH&S Manager or his designee has the authority to order that work be suspended until the dangerous condition is resolved.

Examples of an immediately dangerous condition include (but are not limited to): employee entry into a permit- required confined space without a permit and attendant, or an employee ignoring a clearance tag or lockout.

1.2. Employee Responsibility: Each employee has a responsibility for his/her own safety, the safety of other employees, and the safety of the public. Therefore:

1.2.1. Employees will be expected to learn the general rules, procedures, programs and departmental safety rules applicable to their job.

1.2.2. Employees will abide by the safety rules and safe work practices.

1.2.3. Employees will not take “short cuts” or experiment with the safety aspects of their job.

1.2.4. Employees will not compromise safety for production or convenience.

1.2.5. All employees will report unsafe working conditions to their supervisor.

1.2.6. Employees who abuse safety rules, programs, and procedures will be subject to corrective action under the CAP corrective action policy. Examples of abuse include but are not limited to:

- Damaging personal protective equipment and then refusing to work because of a lack of PPE.
- Lying to the EH&S Manager or his designee in a matter pertaining to health and safety at CAP.

- Falsifying reports, documents, or other materials that are related to the needs of the EH&S Department.

1.2.7. Employees must report all injuries and accidents promptly to their immediate supervisor and complete the required forms pertaining to the incident as soon as possible.

1.3. Management Responsibility: A safe workplace ensures that CAP employees' health and safety is not compromised during the performance of their job. Second, a safe working environment ensures efficiency over the long run, and protects CAP from costs of occupational injury and disease. Therefore:

1.3.1. Managers are expected to ensure that all safety rules, policies, and procedures are followed as an integral part of the performance of their job.

1.3.2. Managers must hold all supervisors to the commitment for safety as outlined in safety rules 1.3.1 through 1.3.6.

1.3.3. Managers must ensure that proper training in safety is provided to all employees in an expedited manner.

1.3.4. Managers and Supervisors must not, under any circumstances, take retaliatory action against employees for participation in the safety program.

1.3.5. Any person with supervisory responsibility who retaliates against an employee for a protected safety activity will be subject to corrective action per the CAP corrective action policy.

1.3.6. Protected safety activities include:

- Reporting an unsafe working condition.
- Requesting safety training or clarification of a procedure that the employee is unsure is safe to perform.
- Participating in the safety committee
- Refusing to work in a manner that clearly poses a danger to employee safety and health.
- Refusing to violate a safety rule.

1.4. Safety Programs: Employees are required to comply with all safety and health programs adopted by CAP including, but not limited to the following:

1.4.1. Confined Space Program

1.4.2. Forklift Program

1.4.3. Respiratory Protection Program

1.4.4. Hearing Loss Prevention Program

1.4.5. Hazardous Energy Control Program

1.4.6. Blood borne Pathogens Program

1.4.7. Lead in Construction Program

1.4.8. Personal Protective Equipment Program

1.4.9. Hazard Communication Program

1.4.10. Electrical Safety Program

1.4.11. Fire Safety Program

1.4.12. Industrial Hygiene Program

1.4.13. Fall Protection Program

1.4.14. Asbestos O & M Program

1.4.15. Thermal Stress Program

(TOC)

2.0. PERSONAL PROTECTIVE EQUIPMENT

For information on personal protective equipment, see the Personal Protective Equipment Program in Content Server.

(TOC)

3.0. MOTOR VEHICLE OPERATIONS

3.1. Purpose and Scope: CAP vehicles are a familiar sight to the people of Arizona. These rules are set forth to promote considerate and courteous driving as a policy of CAP employee-drivers. The rules of this section apply whenever:

(a) The employee is operating CAWCD owned vehicles.

(b) The employee is operating a privately owned vehicle being used for CAP business.

3.2. Defensive Driving: Drivers are urged to practice "defensive driving" at all times. Defensive driving means avoiding accidents by anticipating other persons' actions (e.g. a person stepping out between parked cars, a car may pull out from a curb without warning, a driver nearby being impaired). Appropriate following distance (minimum of two seconds) must be maintained. All drivers must maintain a safe and prudent speed while driving on company business. (Note: Safe and prudent speed may be less than the authorized speed limit if adverse driving conditions exist.)

3.3. License and Testing: CAP employees whose job description requires them to drive a vehicle must have in their possession a valid operator's license or commercial driver's license (CDL), as required by the State Motor Vehicle Code.

3.4. Knowledge and Compliance with Laws: CAP employee drivers must be familiar with and obey the State Motor Vehicle Codes, local traffic rules and ordinances, and parking restrictions.

3.5. Condition of Driver: No driver must drive a CAP vehicle while his physical or mental condition is such as to impair his normal judgment and ability. Therefore:

3.5.1 No employee must drive a CAP vehicle or a privately owned vehicle on CAP business while impaired by illness.

3.5.2 No employee must drive a CAP vehicle or a privately owned vehicle on CAP business while in a state of emotional distress or distracted by such things as arguments, significant radio traffic, or passengers.

3.5.3 Under no circumstances must a CAP employee drive a CAP vehicle or a privately owned vehicle on CAP business while under the influence of alcohol, illicit drugs, or prescription/non-prescription drugs that influence a driver's ability.

3.6. Unauthorized Drivers: Only authorized CAP employees must drive CAP owned vehicles. (Reference CAP vehicle use policy)

3.7. Riders in Vehicles: Riders must not distract the vehicle operator. Passengers (including the vehicle operator) must not extend their limbs or heads outside of

the vehicle while the vehicle is in motion. Passenger(s) must comply with the instructions of the operator provided that such instruction does not constitute a safety hazard. Passenger(s) must be seated in properly secured seating as provided by the vehicle manufacturer.

3.8. **Entering Street from Company Property**: All vehicles must come to a complete stop at all exits from Company property and must remain stopped until conditions are safe to proceed into the street or roadway.

3.9. **Turning, Stopping and Signaling**: All turning, stopping, changing of lanes and other movement of vehicles in traffic must be done in accordance with the State Motor Vehicle Code, and the appropriate signals must be given as described therein.

3.10. **Right of Way**: Drivers must drive courteously at all times and must yield the right of way to all pedestrians and other drivers if there is any question as to which vehicle has the right of way.

3.11. **Vehicle Restraint Systems**: Seatbelts must be provided for all vehicle occupants. Seatbelt use is mandatory for both the vehicle operator and all passengers. The operator will not move the vehicle until all occupants have seatbelts secured.

Employees must not deactivate or otherwise defeat the use of other restraint systems on CAP vehicles. (Example: air bags).

Exception: If the restraint system creates a hazard to the operator and/or passengers, per the vehicle manufacturer's recommendation(s), the Safety Manager may allow a waiver of this rule. (Note: the restraint system must be returned to the active status following use by the operator and/or passenger allowed a waiver of this rule.)

3.12. **Pre-Trip Inspection:** A brief inspection of and around a vehicle or trailer can reduce the chance of an accident or other incident. Accordingly:

3.12.1 All CAP employees must walk around their vehicle prior to every departure no matter the location. The purpose of a vehicle walk around is to make a general observation to ensure there are no nearby people or obstacles that might be hit upon moving the vehicle. It also provides an opportunity to identify a flat tire or other concerns, including any vehicle damage not previously noted.

3.12.2 Further, employees must conduct an inspection of their vehicle prior to the first departure of the day. The inspection should follow the laminated vehicle inspection card located in the vehicle log book, to include checking the following:

- Motorola radio, headlights, brake lights, turn signals, and hazard lights for operability;

- Condition of tires, windshield, windows and mirrors for excessive wear or cracks;

The walk around and inspection are the responsibility of both the driver and passengers.

Note: When operating a vehicle covered under the State of Arizona Commercial Vehicle codes, other items may require inspection to ensure safe operation of the vehicle. Non-working or missing items must be repaired or replaced prior to operating the vehicle.

3.13. Loose Tools / Items: Transporting loose tools or other equipment in the passenger compartment unrestrained is prohibited. Managers and Supervisors should review the vehicle housekeeping requirements with their employees, identify vehicles that need barriers installed, and arrange with the Vehicle Shop for the installation of barriers in those vehicles where the transportation of loose tools and equipment within the passenger compartment is required.

3.14. Damage and Service Reports: Employees must report any damage to CAP vehicles promptly to their supervisors. Any indicator light or abnormal gauge reading must be reported promptly for appropriate servicing of the vehicle.

3.15. Clearing Obstructions: Vehicle drivers must not park within 15 feet of any railroad track. The driver must not park a vehicle within any traveled portion of a roadway unless the proper warning to approaching traffic is provided.

3.16. Vehicle Movement: Drivers should plan their routes to avoid U-turns and backing into traffic. In situations where the driver must make turns in limited areas, back into traffic, or make other difficult maneuvers, the passengers must assist the operator in a manner that does not present additional hazard to the passenger(s).

3.17. Remote and Primitive Road Travel: Employees who drive in remote areas should ensure that they depart their duty station with at least a gallon of potable water per passenger. Operators should plan routes that minimize travel in remote areas and on primitive roads. More developed and frequented routes should be favored where available and feasible. Caution must be taken during flash flood conditions to avoid crossing of flooded areas, streams and washes.

3.18. Vehicle Accidents: Employees must make prompt report of an accident involving a CAP vehicle to the Protective Service Department and their Manager and/or Supervisor by the quickest means available. The CAP Occurrence and Damage Report Form must be completed as soon as possible and forwarded to the Risk

Management Administrator.

3.19. Disabled Vehicles: Disabled vehicles should be reported to the Vehicle Maintenance Supervisor and the employee's manager/supervisor by the quickest means available. The operator and/or passengers should exercise all means available to protect the vehicle and its contents from theft and vandalism.

3.20. Radio/Cellular Phone Usage: Except in a life-threatening emergency, the use of cellular phones, company radios or other electronic messaging device by the operator while the vehicle or equipment is being operated is prohibited. This includes the use of the device for conversing, texting, tweeting or any other similar activity that may distract the operator.

Prior to using a cell phone or other device, the operator of a company vehicle, equipment or a private vehicle being used for company business must pull off the road and stop the vehicle in a safe location prior to initiating (dialing a number) or answering a call or electronic message.

Exception: During the operation of heavy equipment such as a crane, and where visibility is restricted, the equipment operator may use a radio or similar device to communicate with a signal person to ensure safety of operations.

3.21. Unattended Vehicles: Unattended vehicles must be locked and left in a secure location.

Exception: When leaving a vehicle running but momentarily unattended (such as when opening or closing a gate), the vehicle must be left in park with the parking brake set.

3.22. Backing: In order to avoid accidents, injuries and equipment damage, the utmost care and attention must be utilized when operating vehicles and equipment in reverse (backing). Accordingly, employees must comply with the following whenever safe and possible to do so:

The first choice when parking a vehicle or equipment should be to pull through the parking spot so that the vehicle/equipment is facing forward, eliminating the need to back out of the spot when leaving. If this is not possible, then one of the following options must be selected:

3.22.1 Back the vehicle/equipment into the parking spot, eliminating the need to back out of the spot when leaving, or

3.22.2 Park the vehicle/equipment head-in (facing forward) and take one of the following actions:

3.22.2.1 Prior to backing out, make a 360 walk around the vehicle or equipment and observe that all is clear, or

3.22.2.2 Place an orange cone behind the vehicle after it is parked. Prior to backing out, remove the cone and observe that the area is clear, or

3.22.2.3 Ask that a passenger or other individual act as a spotter during the backing of the vehicle/equipment.

3.23. **Dust Storms**: During a dust storm, reduce speed and turn on driving lights. If dust becomes so intense that visibility is less than 300 feet, pull off the roadway as far to the right as possible. (Do not stop on the traveled portion of the roadway.) Stop and turn off driving lights.

3.24. **Reflective Tape**: Reflective tape must be installed on the back of all CAP vehicles.

3.25. **Speed Limit on O&M Roads**: A reasonable and prudent speed, depending upon conditions (weather, visibility, road conditions, and obstructions), shall be maintained at all times, but shall not exceed 35 MPH outside of Maricopa County, and 15 MPH within Maricopa County. (The 15 MPH limit is for dust control purposes/regulations).

3.26. **Posting road obstructions**: Work activities that close a section of the O&M road require posting of the closure at both gate locations. Additional posting is required 150' upstream and downstream of a complete road obstruction.

(TOC)

4.0. CRANES and HOISTS

4.1. **Authorized Employees**: Only trained and authorized employees are permitted to operate cranes, hoists, and mechanical lifting/pulling devices. Before authority is granted, employees must be trained in the rules and procedures regarding the equipment's operation and use, including instructions and rules supplied by the manufacturer. All operators will successfully complete a training program as outlined in CAP's *"Overhead Crane/Hoist Inspection and Training Procedure Overview"* memo.

4.2. **Inspection**: All cranes, hoisting equipment and rigging must be inspected before use by the operator/user, and at intervals required by the *"Overhead Crane/Hoist Inspection and Training Procedure Overview* memo. If defects are found, they must be corrected or the equipment must be removed from service. All crane and equipment inspection records must be maintained in the location(s) and for the period(s) specified in the above memo.

4.3. **Safe Load**: The proper loading and handling of a load is critical to the operation of a crane. To ensure that the load is handled in the correct manner the following rules will apply:

4.3.1. Do not overload hoisting and rigging equipment. The operator is responsible to ensure that the weight of the lift including the load and rigging does not exceed the capacity of the hoisting equipment.

4.3.2. Do not side-load or drag a load with hoisting equipment. Center the load under the lifting equipment. In those circumstances where the load is not directly under the lifting equipment a method must be used that will not place side load pressure against the crane rope spool and guides. (E.g. fixed point blocking.)

4.3.3. Raise and lower the load steadily and gradually and do not drop or jerk the load or tackle.

4.3.4. On all capacity or near capacity loads, the hoist brakes should be tested by returning the master switch or push-button to the OFF position after raising the load a few inches off the floor. If the brakes do not hold, set the load on the floor and do not operate the crane. Report the defect to the supervisor in charge of the crane.

4.4. **Groundman**: When a crane or similar unit is in use, a groundman will be assigned to assist the operator in situations where vision is obscured or other hazards are present. The groundman is responsible for directing and safeguarding all machine movements. Before signaling boom or machine movement, the groundman must see that the load, cab or boom will not come into contact with nearby wires, structures, or other objects or persons.

4.5. **Crane Operator**: The crane operator is responsible for the safety of the crane and for the safety of employees working in the vicinity. The operator shall have the authority to refuse to move loads until the safety of all personnel and equipment has been assured. All crane operators will be trained in accordance with CAP's *"Overhead Crane/Hoist Inspection and Training Procedure Overview"* memo.

4.5.1. The operator will only take signals given by the groundman, unless the signal is the stop signal.

4.5.2. At no time must loads be left suspended without an authorized crane operator at the controls.

4.5.3. The operator must not operate a crane while impaired or distracted. No operator must be permitted to operate a crane for more than 12 hours in any 24-hour period.

4.6. **Hand Signals**: Hand signals must be in accordance with American National Standards Institute (ANSI) B-30.2 for overhead and gantry cranes and (ANSI) B-30.5a for crawler and truck boom cranes. A copy of these signals must be posted in a location readily available to the operator during the lifting operation.

4.6.1. The person giving signals must:

- ✓ Make sure signals can be plainly seen,
- ✓ Give signals clearly so they can be understood.

4.6.2. The operator receiving signals must:

- ✓ Stop the movement of the load if he does not understand the signal received.
- ✓ Stop the movement of the load if the person giving signals disappears from view.

4.7. **Emergency Stop Signals**: Anyone can give emergency stop signals. The crane operator must immediately recognize and act upon any stop signal or any other motions or movements that might indicate such action is necessary.

4.8. **Positioning**: Those persons working in the vicinity when cranes or other hoisting devices are in use must:

- ✓ Positions themselves where they cannot be caught between the load being handled and any obstructions,

- ✓ Stay clear from a load being suspended,

- ✓ Not be under the crane boom or similar machine when it is lifting or suspending the load,

- ✓ Not stand near or in line with a cable, rope or chain under tension or one that might be tightened at any moment,

- ✓ Not walk in the path of the load being handled by the crane or hoist.

4.9. Raising Personnel: Use of a crane to hoist employees is ***prohibited*** except where the erection, use, and dismantling of other means of reaching the work area (i.e., scaffolding, aerial lift, etc.) would be more hazardous or is not possible. Consult with the EH&S Department prior to such operations.

4.9.1 All personnel lifts using a crane must comply with the requirements of the OSHA standards found at 29 CFR 1926.1431, including requirements for fall protection.

4.9.2 Employees occupying the personnel platform must utilize a personal fall arrest system. The system must be attached to a structural member within the personnel platform. Exception: when working over water, a personal fall arrest system is not required. However, the requirements of 29 CFR 1926.106 must be followed.

4.10 Load Control: The crane operator must control the movement of the load in a manner as to ensure the safety of other personnel in the vicinity of the load. The load must not be handled in a manner that will damage the load or adjacent structures or material.

4.10.1 Loads must not be moved if swaying and turning excessively. A load that is suspended or being lifted should be pushed instead of pulled. Where necessary, use tag lines or push sticks to prevent uncontrolled movement.

4.10.2 Hands must not contact wire rope or sheaves on hoisting equipment with a load attached unless absolutely necessary, and then only after notifying the operator. (Note: Gloves must be worn.)

4.10.3 Outdoor operations involving cranes must be suspended when wind speeds exceed 25 mph, unless the manufacturer rates the crane for higher wind speeds.

4.10.4 Suspended loads must not pass over any individual or come into contact with equipment or objects along the path.

4.10.5 Check to make sure that the load is lifted high enough to clear all obstructions and personnel when moving the bridge or trolley.

4.10.6 Never rely on the load limit devices, if installed, to ensure that maximum loads are not exceeded. These devices are not intended to be used as a production control.

4.10.7 During inspection, repairing, cleaning or lubricating, a warning sign or signal should be displayed and the main switch should be locked in the OFF position. This should be done whether the crane operator or others are doing the work. The crane operator should remain at the controls for the duration of the task unless instructed by the supervisor.

4.11 Power Loss: In the event of loss of power, return all controls of the crane to the OFF position.

4.12 Emergency: EMERGENCY SHUT DOWN PROCEDURES FOR OVERHEAD CRANES: If possible, lower and secure the load. Switches must be placed in the neutral position, and the operator must carefully evacuate the cab according to plant Emergency Evacuation Procedures.

4.12.1 Never attempt to close a switch that has a DO NOT OPERATE TAG or has been locked out.

4.12.2 Do not attempt repairs on the crane unless authorization from the supervisor has been obtained.

4.12.3 When traveling, sound the alarm frequently if not automatically actuated.

4.12.4 A fire extinguisher (6ABC or higher) must be accessible to the crane operator.

4.12.5 Prior to performing a critical lift a safety hazard analysis must be prepared and all personnel involved instructed as to the specifics of the lift.

4.12.6 Non-purchased (shop built) lifting devices must be approved as to compliance with applicable standards, by the CAP Engineering Department, prior to use.

4.13 Mobile Cranes: The following rules are specific to the operation of the mobile cranes and must be complied with during their operation:

4.13.1 The rear-swing radius area of the rotating superstructure of a mobile crane must be barricaded in a manner that physically prevents a person from entering the danger zone.

4.13.2 Mobile cranes, hoists, or other similar lifting devices used near energized lines or equipment must not operate within the approach distances as specified by OSHA Standard 29CFR1910.333.

- ✓ Voltages to ground 50kV or below- 10 Feet
- ✓ Voltages to ground over 50kV- 10 Feet plus 4 inches for every 10kV over 50kV

Note: If the potential exists for the boom to contact energized electrical parts a positive means, as approved by the Electrical Safety Department, must be used to prevent entering the approach distance or the line(s) must be de-energized and grounded.

Consideration must be given to the following: The lifting device should be properly grounded, insulated, isolated, or considered as energized.

Equipment in transit: Clearances under energized overhead high voltage lines –

- ✓ Up to 50KV: 4'
- ✓ 50 KV up to & including 345KV: 10'

4.13.3 Trucks on which the boom is elevated must not be moved except under the immediate direction of a person designated to guide the move. This individual will give his/her undivided attention to the movement. Under no circumstances may a mobile truck crane be moved with the boom under load.

4.13.4 The outriggers or other stabilizing devices must be in the proper position prior to commencing a lift. Wooden pads must be used under the outrigger floats as required.

4.13.5 Crane travel on public highways will be in accordance with all applicable motor vehicle rules and regulations.

4.13.6 Inspection, servicing, and housekeeping are critical to the proper performance of a mobile crane. Therefore it is the responsibility of the operator to ensure that the inspections, and servicing are current per the manufacturer's guidelines and that the crane is kept free of all debris and fluids that may be a hazard to the operator and other personnel.

4.13.7 Loads in excess of 75% of the rated capacity of the crane (critical lift) require a lift plan approved by Maintenance Engineering prior to commencing the lift.

4.14 Overhead Cranes: The following rules are specific to the operation of overhead cranes and must be complied with during their operation.

4.14.1 In accordance with ASME B30.2, new, reinstalled, altered, repaired and modified cranes must be load tested prior to initial use by a qualified person. Load testing of altered, repaired, and modified cranes may be limited to the functions affected by the alteration, repair, or modification as determined by a qualified person. The replacement of load chain and rope is specifically excluded from this load test; however, an operational test of the hoist must be made, in accordance with ASME B30.2, prior to putting the crane back in service.

4.14.2 In accordance with ASME B30.2, the load test must not be less than 100% of the rated load of the crane or hoist whichever governs; or not more than 125% of the rated load of the crane or hoist.

4.14.3 Pendant operated cranes must have the directions of travel clearly marked on the pendant controller and the under frame of the crane.

4.14.4 The pendant control must be inspected to ensure that the support cable is in place and carrying the weight of the pendant.

4.14.5 The controller must be checked for proper response prior to using the crane for material lifting.

4.14.6 The operator of a cab operated crane must not allow the crane to free wheel and must not use the wheel stops as the means of stopping the crane movement except in an emergency.

4.14.7 The operator of a cab controlled overhead crane must ensure that the exit pathway is unobstructed prior to operating the crane.

4.15 Wire Rope: Wire rope used during a lift is a critical part of the ability of the crane to safely handle the load. The following rules must be strictly complied with:

4.15.1 Different sizes of wire ropes are used as suspension cables, boom cables, guy wires, hoisting and other devices.

4.15.2 Determine the safe working load for each size of wire rope by comparing the current manufacturer's specifications of working load strengths to the wire rope's diameter and the design and materials used in the rope's

construction. All wire rope will be of a domestic make and classification.

4.15.3 Visually inspect all running ropes in use once every working day. Thoroughly inspect all ropes in use at least quarterly. Note any defects, such as those described below to determine whether using the wire rope would be unsafe.

- ✓ Rope diameter below nominal diameter because of:
  1. Loss of core support
  2. Internal or external corrosion
  3. Stretch or wear of outside wires,

- ✓ A number of broken outside wires, or inside valley wires, with large concentrations of broken wires distributed throughout,
- ✓ Worn outside wires,
- ✓ Corroded or broken wires at end connections, Corroded, cracked, bent, worn or improperly applied end connections,
- ✓ Severe kinking, crushing, cutting, or un-stranding.

4.15.4 If any of the following conditions exist, replace the wire rope:

- ✓ In running ropes, six or more randomly distributed broken wires in one lay or three or more broken wires in one strand in one lay,
- ✓ Wear of one-third of the original diameter of outside individual wires,
- ✓ Kinks, crushing, bird caging, or any other damage that distorts the wire rope structure,
- ✓ Evidence of any heat damage,
- ✓ Nominal diameter reduced by more than:
  1. 3/64 inch for diameters up to and including 3/4 inch.
  2. 1/16 inch for diameters 7/8 inch to 1-1/8 inches
  3. 3/32 inch for diameters 1-1/4 inches to 1-1/2 inches,

- ✓ In standing ropes, more than two broken wires in one lay in each section beyond end connections,

- ✓ For any wire rope, one or more broken wires at an end connection. For this type of break, if the wire rope is long enough, cut off 6 to 8

feet of rope from the end to make a new connection,

- ✓ One or more broken wires in a running rope, with breaks in the valleys between strands.

4.15.5 Torch cutting of wire rope used for material lifting is prohibited.

4.15.6 Wire ropes must be stored and utilized in a manner that prevents deterioration or damage from rust, twisting, and cutting. Wire rope must be maintained in a well- lubricated state.

4.15.7 Securely fasten one end of the wire rope to the drum or reel. Do not allow the wire rope to fully unwind, at least two full turns must always remain on the drum or reel. Securely fasten the lifting or dead end of the wire rope to the block, device, or reel with a tapered socket or an oval thimble.

4.15.8 Use wire rope sockets on all hoisting lines at the bucket or hoist end, where facilities permit proper application. Otherwise, use the proper size of thimbles and apply:

- ✓ Three properly sized clamps on 5/8 inch wire ropes and under,
- ✓ Four clamps on 3/4 & 7/8 inch wire ropes, inclusive,
- ✓ Five clamps on 1 inch wire ropes, inclusive,
- ✓ Six clamps on 1-1/8 inch and larger wire ropes.

4.15.9 Make sure clamp spacing is no less than six times the diameter of the wire rope. Apply U-bolt over dead end of the wire rope. Live end of the wire rope rests in the saddle. Clamps must be re-torqued a second time after lifting first load.

4.16 Rigging: Rigging used during a lift is a critical part of the ability of the crane to safely handle the load. The following rules must be strictly complied with:

4.16.1 Use slings, wire rope, chain, or synthetic fibers that are certified to handle the load.

4.16.2 Rigging must be inspected daily prior to use. Sling identification tags must be in place and legible as to the capacity of the sling.

4.16.3 Shackles used for hoisting must be of forged alloy steel and must be of the screw type or bolt type without wear or damage.

4.16.4 Remove shackles from service if they are bent, distorted, worn in the crown or pin by more than 10 percent of their original diameter.

4.17 Wire Rope Slings: Wire rope slings used during a lift are a critical part of the ability of the crane to safely handle the load. The following rules must be strictly complied with:

4.17.1 Wire rope slings must be checked for the following prior to use:

- ✓ Distortions of the wire rope such as kinks, crushing, un- stranding, birdcages, main strand displacement or core protrusion,
- ✓ General corrosion,
- ✓ Broken or cut strands,
- ✓ Number, distribution, and type of visible broken wires,
- ✓ Loss of wire rope diameter in short rope lengths or unevenness of outer strands.

4.17.2 Wire rope slings must be replaced if:

- ✓ Ten randomly distributed broken wires in one wire rope lay for strand laid and single part slings, or five broken wires in one rope strand in one rope lay
- ✓ Severe localized abrasion or scraping is observed
- ✓ Kinks, crushing, birdcages, or any damage resulting in distortion of the rope structure is noted
- ✓ There is evidence of heat damage
- ✓ The end attachments are cracked, deformed, or worn to the extent that the strength of the sling is substantially affected
- ✓ There is severe corrosion of the wire rope or end attachments
- ✓ Missing or unreadable sling I.D. tags. (With Manufacturer's permission, the rated capacity can be stamped on the socket.)
- ✓ All wire rope slings will have tags and the rated capacity will be on the eye of the sling.

4.18 Chain Slings and Chain: Chain slings and chain used during a lift are a critical part of the ability of the crane to safely handle the load. The following rules must be strictly complied with:

4.18.1 Check chain and attachments prior to each use. Conditions such as the following are reasons for replacement:

- ✓ Wear, nicks, cracks, breaks, gouges, bends and weld spatter damage to the chain links,
- ✓ Elongation exceeding 15% of original dimensions,
- ✓ Discoloration from excessive temperature,
- ✓ Chain links and attachments that do not hinge freely to adjacent links,
- ✓ Missing or unreadable sling identification.

4.18.2 Grade 80 high strength alloy is the only chain to be used for lifting, hoisting, pulling or any other load bearing application. (Exception: if the chain is supplied and certified by a manufacturer as part of a manufactured device, i.e., a lifting sling, chain hoist, etc.).

4.18.3 Determine the safe working load for all lift chains by referring to the current manufacturer's specifications of working load strengths versus chain size. If the manufacturer's information is not available, follow the limits in the following table.

GRADE 80 ALLOY CHAIN

SIZE (inches)	MAXIMUM (lbs.)
9/32	3,500
3/8	7,100
1/2	2,000
5/8	18,100
3/4	28,300
7/8	34,200
1	47,700
1 1/4	72,300

Grade 70 chain will not be used for any applications

4.18.4 All lifting devices, such as hooks, links, pins, etc., must be made of alloy steel. Do not use lifting devices made of mild steel or rolled steel under any circumstances.

4.18.5 To avoid personal injury or chain damage:

- ✓ Keep chains free of twists, kinks, knots and make sure grab hooks fit the chain and are placed on the hitch so that no side strain occurs during the lift.
- ✓ Do not impact load or jerk chain. Apply the load slowly.

- ✓ Protect the chain from sharp corners and objects. Protect the chain from corrosion and high temperature
- ✓ Do not use “patent links,” “repair links,” or “figure eight” links when repairing lifting chain.

4.18.6 Lubricate chains as required when operating them over sheaves or pulleys. Use an approved lubricant to ensure maximum chain life. Minimize excess dripping of lubricant.

4.19 Synthetic Slings: Synthetic slings used during lift are a critical part of the ability of the crane to safely handle the load. The following rules must be strictly complied with:

4.19.1 Synthetic Sling Inspection: Inspect synthetic slings prior to each use. In addition, a periodic inspection must be performed by a person designated by the manager/supervisor and a record of the inspection maintained at the facility until a subsequent inspection is performed.

4.19.2 Synthetic Sling Replacement: Synthetic slings must be replaced if any of the following conditions exist:

- ✓ The sling has acid or caustic burns,
- ✓ Melting or charring of any part of the sling,
- ✓ Tears, cuts, or snags to the sling,
- ✓ Broken or worn stitching in the load bearing splices,
- ✓ Excessive abrasive wear,
- ✓ Knots in any part of the sling or if two or more slings are tied together,
- ✓ Permanently attached fittings are excessive pitted, corroded, cracked, distorted or broken,
- ✓ Other visible damage that causes doubt as to the strength of the sling,
- ✓ Missing or unreadable sling identification.

4.20 Webbing and Round Slings: Webbing and round slings used during a lift are a critical part of the ability of the crane to safely handle the load. The following rules must be strictly complied with:

4.20.1 All the fibers in a webbing sling are load bearing. In a round sling, the load bearing fibers are “wound” within a protective jacket. The protective jackets are not load bearing and protect the load bearing fibers. Do not bunch or pinch the sling in a fitting.

4.20.2 The following conditions are reasons for replacement:

- ✓ Melting, charring, or weld splatter of any part of a round sling,
- ✓ Holes, tears, cuts, embedded particles, abrasive wear, or snags that expose the core fiber,
- ✓ Broken or worn stitching in the cover which exposes the core fibers,
- ✓ Missing or unreadable tags.

4.21 **Ropes**: Rope used during a lift is a critical part of the ability of the crane to safely handle the load. The following rules must be strictly complied with:

4.21.1 Inspect all manila, hemp, or synthetic fiber ropes before they are used for lifting.

4.21.2 Remove any frayed, cut, or defective rope from service immediately. The capacity rating for the rope must not be exceeded.

4.22 **Fittings**: Fittings used during a lift are a critical part of the ability of the crane to safely handle the load. The following rules must be strictly complied with:

4.22.1 Fittings must be inspected:

- ✓ When purchased,
- ✓ Prior to each use.

4.22.2 Conditions for fitting replacement:

- ✓ Any significant permanent deformation, or change in shape, indicating the fitting has been overloaded,
- ✓ More than 10% wear of any sectional dimension as measured by comparing the fitting to a fitting with no wear, or a catalog dimension for the fitting,
- ✓ Any crack, sharp nick, or gouge in the surface of the fitting,
- ✓ Any modification to the fitting is cause to remove it from service. (Welding or heating, substitution of parts, and bending of the fitting are examples of modification.)
- ✓ More than one broken wire of the wire rope occurring within a length from the fitting equal to one wire rope diameter.

4.22.3 Eye Bolts and Hoist Rings:

The use of eye bolts at the load connection causes the horizontal sling angle to become smaller as the loads on each leg and each eye bolt

increase. As the eyebolt becomes side loaded, the eyebolt loses strength.

The following requirements must be followed:

- ✓ Do not exceed the working load limits (normally stamped on the eye bolt),
- ✓ Do not use regular nut eye bolts for angular lifts,
- ✓ Use properly sized swivel hoist rings that match the sling loading requirements, or shoulder nut eye bolts for angular lifts,
- ✓ Always tighten nuts securely against the load,
- ✓ Always apply the load to the eye bolt in the plane of the eye,
- ✓ When using lifting slings of two or more legs make sure the lifting forces on each leg are calculated to ensure the capacity of the slings and fittings are not exceeded.

4.22.4 Hooks and Attachments: The following requirements must be followed:

- ✓ Non-alloyed carbon-steel hooks, repair links or other attachments must not be used,
- ✓ Homemade or makeshift bolts, rods, shackles, hooks or other attachments must not be used unless approved by the Engineering Department for the expressed purpose for which the device is to be used,
- ✓ Handles and other attachments must not be welded to hooks,
- ✓ Hooks must be replaced if they have a twist of 10 degrees or more or a 15% or greater increase in the throat opening,
- ✓ Hooks equipped with safety latches must have them in place prior to use,
- ✓ Dye penetrant or equivalent testing must be conducted on crane hooks annually. Hooks purchased after September 30, 1991 require a dated record of proof testing prior to use. The individual doing the test must be competent to perform the test and interpret the results. The test may be performed by an employee designated by the manager/supervisor to perform the test or by an outside contractor who is qualified to perform the test.

(TOC)

5.0. HAND TOOLS and PORTABLE POWER TOOLS

5.1. HAND TOOLS: Employees using hand tools must be trained in the purpose of the tool and must not use it for other purposes. Training in the use of the tool must include the proper handling of the tool and the limitations of the tool.

5.1.1. Hand tools must be kept in good working condition and used only for the purpose for which they were designed.

5.1.2. Employees must inspect tools before use. Tools having worn parts, mushroom heads, broken tips, split or defective handles, dull cutting surfaces, or other defects must not be used. Electric hand tools having an improper or missing grounding system or having split insulation must be removed from service.

5.1.3. Tools must not be left on scaffolds, ladders, or overhead working spaces. Containers must be provided to hold tools and prevent them from falling.

5.1.4. Sharp-edged or pointed tools must not be carried in employees' pockets with the cutting edge exposed.

5.1.5. Containers and hand lines must be used for transporting tools from one level to another; tools must be returned in the same manner and not transported up or down by hand, carried in pockets, or dropped.

5.1.6. Tools must not be thrown into boxes or truck beds, but must be carefully placed and secured.

5.1.7. Operators must wear appropriate personal protective equipment, as specified in the job hazard analysis, when using tools.

5.2. POWER TOOLS: Employees using power tools must be trained in the purpose of the tool and must not use it for other purposes. Supervisors must conduct training on the proper use, safe operation, and limitations of the tool. This may include the tool's safety features, required PPE, hazards, start-up procedures, safe operating procedures, correct feeding or loading procedures, shut-down procedures, and maintenance procedures/schedules. The EH&S Department is available to support this training effort.

5.2.1 GFCI pigtails must be used on all portable motorized equipment.

5.2.2 Extension cords must never be plugged into an outlet when not in use. If extension cords are run temporarily across walkways, a cord runner must be applied.

5.2.3 Cord Caps: The use of electrical cord caps does not meet CAP Electrical Safety requirements because they do not seal properly, pose a risk in wet

environments and often void the manufacturer's warranty. The correct manufacturer replacement cord should be installed by an electrician. If the proper replacement cord cannot be found for certain types of applications, the EH&S Department will assist in finding an appropriate replacement cord and/or cord cap on a case by case basis.

5.2.4 Portable power tools and equipment must not be operated without required safety guards. All belts, shafts, gears, and other moving parts on machinery must be fully enclosed and guarded.

5.2.5 Electric-powered shop and hand tools must be double insulated or effectively grounded. Refer to the Electrical Safety Section of the rulebook for ground fault circuit interrupter requirements.

5.2.6 Only qualified employees are allowed to operate power tools.

5.2.7 Air connections must be secured and must not be uncoupled without first closing the air valve and relieving the pressure, unless the equipment is equipped with a quick disconnect. Whip checks or hoses equipped with check valves on both ends must be used. Wire must not be used in air or hydraulic couplings in place of clip pins.

5.2.8 Do not lay down a pneumatic, electric or other power tool with the motor running. Power tools must be placed so they will not be started accidentally. When unattended, the power source must be disconnected. Do not lay power tools on wet surfaces or in loose soil.

5.2.9 Do not use hand sockets on impact wrenches. Nails, wire or cotter pins must not be used to hold sockets in place.

5.2.10 Huck guns and all hydraulic two-piece rivet guns must be held perpendicular to the surface to which the bolt is being applied. Hands and fingers must not be placed between the huck tools and/or parts being fastened as the tool tightens the collar.

5.2.11 Keep nail/staple guns pointed away from the body and other personnel. Ensure that no one is located behind the object being nailed or stapled into.

5.2.12 All chain saws should have a chain brake. Those saws not equipped with a chain brake must have a tip protector. Be alert to the conditions, which may adversely affect footing and safe operation of the saw. Avoid cutting directly overhead. Where there is a fire hazard, a fire extinguisher and shovel must be immediately available when using a chain saw.

5.2.13 Before operating grass weed or brush cutting devices make sure guards are in place.

5.2.14 Tools must not be thrown into boxes or truck beds, but must be carefully placed and secured.

5.2.15 Operators must wear appropriate personal protective equipment as specified in the job hazard analysis

5.2.16 Tools used in a potentially explosive atmosphere must be approved and listed by a recognized testing laboratory (e.g. Underwriters Laboratory, NSF, etc.) as Class I Division 1 approved.

5.3 POWDER-ACTUATED TOOLS

5.3.1 Only employees designated by their manager/supervisor are permitted to use powder-actuated tools (e.g. Hilti gun or Ramset gun). Employees must be trained in the operation of the particular tool in use and must follow manufacturer's instructions for its use.

5.3.2 The tool must be tested each day before loading to see that safety devices are in proper working condition. The method of testing must be in accordance with the manufacturer's recommended procedure.

5.3.3 Any tool found not in proper working order, or that develops a defect during use, must be immediately removed from service, tagged "out of service", and not be used until properly repaired.

5.3.4 Personal protective equipment in accordance with the manufacturer's instructions must be used.

5.3.5 Tools must not be loaded until just prior to the intended firing time. Neither loaded nor empty tools are to be pointed at any person. Hands must be kept clear of the open barrel end.

5.3.6 Loaded tools must not be left unattended.

(TOC)

6.0. COMPRESSED GAS CYLINDERS USE AND STORAGE

6.1. **General**: Compressed gas cylinders are found throughout the CAP. Their storage and use pose a serious potential hazard for all employees who may be in the vicinity of or who may handle gas cylinders.

Storage of Compressed Gas Cylinders: CAP personnel are required to follow CAP Policy titled, "Compressed Gas Procedures for Maintaining OSHA Compliance in CAP Facilities 2006."

6.2. **Manager's/Supervisor's Responsibility**: It is the responsibility of supervisory personnel where gas cylinders are used to see that the following safety rules are observed. They are also responsible to see that all employees under their supervision who use gas cylinders have been trained in the safe methods for storage, handling, and use of compressed gas cylinders.

6.3. Handling and Use of Compressed Gas Cylinders

6.3.1. All compressed gas cylinders (regardless of size) must be secured to racks, walls, work benches, or hand trucks by a strong chain or strap, or secured by any other approved method capable of preventing the cylinder from falling or being knocked over.

6.3.2. Oxygen/Acetylene welding carts must be equipped with fire resistant barriers. The removal of regulators and the capping of cylinders must occur if not used in 24 hours. When removing cylinders from a cart, ensure that the other cylinder is secure to prevent tipping and injury.

6.3.3. All questionable gas cylinders or equipment must be reported immediately to the supplier for correction or replacement.

6.3.4. All cylinders must be clearly labeled to identify the contents.

6.3.5. Only personnel trained in the proper transportation and safe use of gas cylinders should handle cylinders.

6.3.6. Compressed gases must be used only in areas with adequate ventilation for the gas being used.

6.3.7. Cylinders must not be intentionally dropped, struck, or permitted to violently strike each other and must be reasonably protected from violent impact of any kind.

6.3.8. All cylinders must be kept far enough away or shielded while in the work area in order to prevent contact with sparks, flame, or radiant heat.

6.3.9. Valve protection caps are required on all cylinders that are threaded to

accommodate a cap unless the cylinder valve is actually connected for use to a regulator or manifold.

6.3.10. All gas cylinders must be equipped with a functioning gas regulator while in use.

6.3.11. No one must attempt to connect a regulator and/or accessory equipment by the use of improvised hookups or adapters.

6.3.12. When personnel have finished using a compressed gas cylinder for the day, the cylinder valve must be closed and the pressure in the regulator and associated equipment released.

6.3.13. If a compressed gas is used to maintain a static pressure on a closed system, a clearly visible warning sign must be posted indicating the approximate pressure the system is under and the gas involved.

6.3.14. All empty cylinders must have their valves closed.

6.3.15. All empty cylinders must be handled with the same care as full cylinder.

6.3.16. Compressed air must not be used for cleaning purposes (to blow dust and debris away) without appropriate reduction valves (30 p.s.i. maximum).

6.3.17. Under no conditions must a person direct high pressure gas at himself or another person, regardless if a reduction valve is in use or not.

6.3.18. While in use, all cylinders of flammable gases must be protected by an approved flashback protection device.

6.3.19. Cylinders of flammable gas must not be opened more than 1-1/2 turns of the cylinder valve to allow for quick closing. If a special wrench is required, the wrench must be left in position on the stem of the valve while the cylinder is in use. This allows the gas flow to be shut off quickly in case of an emergency.

6.3.20. All oxygen cylinders and manifolds must be at least 20 feet away from or separated by a one half hour rated fire resistant partition from all flammable gases and materials (such as oil, grease, and all petroleum products in general) in the area of use.

6.3.21. All manifold enclosures for oxygen in excess of 2000 cubic feet of manifold capacity must be vented to the outside and the cylinder or manifold must be protected with check valves or alarms.

6.3.22. Due to the possibility of an explosion, all regulators and other equipment

used for oxygen must be identified as being "OXYGEN ONLY" and the equipment used for other gases must not be used for oxygen.

6.3.23. Due to the possibility of an explosion, all oxygen regulators, tubing, etc. must be kept clean and free of all organic materials such as oil and lint.

6.3.24. In the event a particularly hazardous gas (e.g., phosgene, hydrogen chloride, hydrogen cyanide) is used, a procedure must be established for evacuating, sealing, and isolating the area of use. The EH&S Department must be notified prior to procuring such hazardous gases.

6.3.25. Only personnel properly instructed in the chemical and biological hazards of a corrosive and/or toxic gas are to release or use the gas or operate any equipment using the particular gas.

6.3.26. The necessary first aid supplies must be available and personnel adequately trained in their use in case of the release of a hazardous gas being used. The EH&S Department must be advised of the use of any non-stock hazardous gas prior to its use.

6.3.27. All compressed gas cylinders must be sent in for hydrostatic testing every 5 years. (with the exception of acetylene)

6.4. Transportation of Compressed Gas Cylinders: When cylinders are moved, they must be disconnected from any regulators or manifolds, and where threaded to accept protective valve caps, the valve caps must be secured in place before the cylinders are released from their securing device.

6.4.1. Cylinders must be moved only on a hand truck or other cart designed for handling gas cylinders.

6.4.2. No more than one cylinder must be handled at a time except on carts designed to transport more than one cylinder.

6.4.3. Compressed Gas Cylinders must be secured during transportation and storage. Anything over 100 lbs. in transport must be labeled and placarded according to DOT requirements.

6.5. Storage of Compressed Gas Cylinders: Compressed gas cylinder storage areas must be located away from emergency exits and must be kept well drained, well ventilated, cool, and protected from the weather. Regardless of size, all cylinders must be provided with supports (straps, chains, or other similar devices) capable of preventing the cylinders from falling.

6.5.1. Under no condition must the temperature of gas cylinders exceed 125°F. When Type E gas cylinders are being used the temperature must not exceed 93°F since the relief valves of Type E cylinders are set to release above 93°F.

6.5.2. Excessive storage time must be prevented by the use of the smallest practical size cylinder for a particular gas application. The vendor should be consulted if there is a question as to the appropriate length of time a cylinder of gas should be stored.

6.5.3. Corrosive gases must not be stored for more than six (6) months. Usually after this period of time there is a deterioration of the gas purity, which increases the possibility of cylinder valve malfunction.

6.5.4. Oxygen must not be stored in the same area with flammable gases unless separated by at least 20 feet or by a fire resistant barrier having a one-half hour rating. Cylinders stored in an area outside a building must be a minimum distance of 20 feet from flammable gases or combustible material.

6.5.5. All storage rooms that contain in excess of 2000 cubic feet of oxygen and/or nitrous oxide must be vented to the outside.

6.6. **Fire Extinguisher Cylinders**: High pressure cylinders used in fire extinguishing systems must not be recharged without a hydrostatic test (and re-marking) if more than 6-years have elapsed from the date of the last test.

Cylinders continuously in service without discharging are permitted to be retained in service for a maximum of 12 years from the date of the last hydrostatic test. At the end of 12 years, compressed gas cylinders must be discharged and retested before being returned to service. (Reference NFPA 12, 1-9.5.1)

(TOC)

7.0 WELDING, CUTTING and HEATING

7.1. General: These rules are applicable to all welding, cutting, and heating work procedures and it is the responsibility of the Supervisor and the employee performing the work to comply.

7.2. Usage: Only employees authorized by their manager or supervisor are permitted to use welding, cutting and brazing equipment. Employees performing welding, cutting, and heating must be trained prior to performing these activities.

7.3 Respiratory Protection: Due to the low exposure limits, CAP's EH&S Department requires employees to wear respiratory protection whenever welding is conducted on stainless steel.

7.4 Eye Precautions: All persons performing or observing cutting, welding or heating operations must wear proper eye protection and other personal protective equipment. They must not look at electric arc or oxy/fuel flame unless properly protected and must warn others against looking at the arc or flame.

7.5. Minimum Shade Requirements: The following chart defines minimum shade requirements during cutting and welding.

Welding Operation	**Shade No.**
Shielded Metal arc Welding- Electrodes up to and including 5/32 inch diameter	10
Gas-Tungsten Arc Welding (non-ferrous) and Gas shielded Arc Welding (non-ferrous) – Electrodes up to and including 5/32 inch diameter	11
Gas Tungsten Arc Welding (ferrous) and Gas shielded Arc Welding (ferrous) – Electrodes up to and including 5/32 inch diameter	12
Shielded Metal Arc Welding Electrodes: 3/16 through 1/4 inch diameter 5/16 through 3/8 inch diameter	 12 14
Carbon Arc Gouging – Most applications - Large diameter electrodes	12 14
Soldering	2
Torch Brazing	5
Light cutting up to 1 inch	4
Medium cutting, 1 inch to 6 inches	5

Heavy cutting, 6 inches and over	5 or 6
Gas welding (light) up to 1/9 inch	5
Gas welding (medium) 1/8 inch to 1/2 inch	5 or 6
Gas welding (heavy) 1/2 inch and over	6 or 8

7.6 **Shields**: Welders must shield the welding arc from the view of others whenever possible or must warn others of the hazard prior to starting welding. Use shields or other protective devices to prevent setting fire to or damaging structures or other material.

7.7 **Welding Clothing**: When cutting, heating or welding wear high top boots, leather welding gloves or leather welding mittens and flame resistant clothing. When performing arc or oxy/fuel operations wear at minimum, an approved full welding jacket. Flame resistant clothing should protect the skin from infrared and ultraviolet radiation.

Protective outerwear such as leather aprons, leather jackets, spats or sleeves must be worn for overhead welding or an application where the body is in danger of being exposed to sparks or slag. All buttons on jackets must be buttoned. Sleeves and pockets must be secured against hot slag. Clothing must be free of oil or grease and trousers or coveralls must be without cuffs. Do not carry cigarette lighters or matches where they may be exposed to excess heat.

7.8 **Brushing Slag**: Do not use your hands, whether gloved or not, to brush slag or metal from material being welded or cut.

7.9 **Defective Welding Equipment**: Do not make repairs or alterations to cylinders, valves, or torches. Defective cutting and welding equipment must be repaired or replaced.

7.10 **Fire Extinguisher**: Fire extinguishers, or other suitable fire extinguishing equipment must be on hand during welding, cutting and other open flame torch operations.

7.11 **Fire Watch**: Before leaving the work site, the person in charge must check to see that no fire or fire hazard exists. If a potential fire hazard exists, the worker in charge must assign a watchman equipped with a fire extinguisher or ample water supply to stay in the area for a minimum of 30 minutes after the last weld is completed.

7.12 **Confined Space Welding**: Welding in confined spaces must be conducted in accordance with CAP's Confined Space Program.

7.12.1 **Welding Ventilation**: Welding and cutting in confined spaces must be conducted with mechanical or local exhaust ventilation during the welding operation.

7.12.2 Gas Cylinders in Confined Spaces: Employees must not place gas cylinders inside the confined space.

7.12.3 Equipment in Confined Spaces: All welding and cutting equipment must be removed from the confined space when not in use.

7.13 Welding on Drums, Barrels and Tanks: Do not weld or cut on containers such as drums, barrels, or tanks until the following conditions have been met:

7.13.1 Determine what the container last held. Thoroughly wash out and steam out any container that held volatile or flammable materials.

7.13.2 After cleaning, remove plugs or caps and further safeguard the container by filling it with water (if chemical readily dissolves in water) or inert gas before cutting, welding, soldering, or open flame work. Ensure that the container has a vent or opening to allow hot gas to escape.

7.14 Cleaning with Oxygen: Oxygen must not be used for compressed air as a source of pressure or to "dust" clothing.

7.15 Oil/ Grease Contact with Oxygen: Do not allow oil and grease to come in contact with oxygen. Keep welding equipment, gloves, hands and clothing free of oil and grease. Do not allow oil and grease to touch regulators, valves or connections.

7.16 Ventilation: Welding must be done in well-ventilated areas.

7.17 Sparks, Hot Slag and Open Flames: Do not allow cylinders to be exposed to sparks, hot slag, open flame and other sources of excessive heat.

7.18 Welding Work Surface: Do not lay an object to be heated, cut or welded across a cylinder or on concrete.

7.19 Cutting Steel Sections: When cutting damaged steel sections, take precautions to prevent personnel from being struck by severed sections.

7.20 Cutting and Torch Work: The following precautions for cutting and torch work are specific to that type of work activity and must be complied with:

7.20.1 Select the proper welding head or mixer and tip or cutting nozzle (according to charts supplied by the manufacturer), and screw it firmly into the torch.

7.20.2 Before changing torches shut off the gas at the pressure-reducing regulators and not by crimping the hose.

7.20.3 To discontinue welding or cutting for a few minutes, closing only the torch valve is permissible. If the welding or cutting is to be stopped for a longer period (e.g. during lunch or overnight) proceed as follows:

1. Close oxygen and acetylene cylinder valves.

2. Open torch valves to relieve all gas pressure from hose and regulator.

3. Close torch valves and release regulator pressure- adjusting screws.

7.20.4 Do not use matches to light torches. Use a friction lighter, stationary pilot flame, or other suitable source of ignition. When lighting, point the tip so that no one will be burned when the gas ignites.

7.20.5 Never put down a torch until the gases have been completely shut off. Do not hang torches from a regulator or other equipment so that they come in contact with the sides of gas cylinders. If the flame has not been completely extinguished or if a leaking torch ignites, it might heat the cylinder or burn a hole into it.

7.20.6 When extinguishing the flame, close the acetylene and oxygen valves in the order recommended by the torch manufacturer. If oxygen is closed first, carbon soot will be deposited in the air. However, this ensures that the acetylene valve is closed tight when the flame is extinguished. If the acetylene valve is turned off first, no soot is formed, but there is no assurance that the fuel gas valve is closed and that it is not leaking.

7.21 Hoses and Hose Connections: The following rules and instructions pertain to the hoses used for welding and cutting operations and must be followed:

7.21.1 Do not use an unnecessarily long hose, it takes too long to purge. When a long hose must be used, see that it does not become kinked or tangles and that it is protected from being run over by trucks or otherwise damaged. When a long hose must be used in areas exposed to traffic (pedestrian or vehicle) suspend it high enough overhead to permit unobstructed passage.

7.21.2 Repair leaks at once. Repair hoses by cutting the hose and inserting a splice. Don't repair a leaky hose by taping.

7.21.3 Examine hoses and connections frequently for leaks and worn places. Test for leaks by immersing the hose in water under normal working pressure.

7.21.4 Protect hoses from flying sparks, hot slag, other hot objects, and grease and oil. Store hoses in cool place.

7.21.5 A single hose having more than one gas passage must not be used. When oxygen and acetylene hoses are taped together to prevent tangling, not more than 4 in. of each 12 in. of hose must be taped.

7.21.6 The use of hoses with an external metallic covering is not recommended. In some machine process and in certain types of operations, hoses with an inner metallic reinforcement that is exposed to neither gas passage nor outside atmosphere are acceptable.

7.21.7 Flashback arrestor devices are required between the torch and hose and between the hoses and regulator. Torches in which the manufacturer has built a flashback arrestor inside the torch are considered in compliance.

7.21.8 Hoses that show signs of severe wear must be replaced or tested at twice-normal pressure or at least 300 psi and discarded if found leaking.

7.21.9 Hoses for gases must be different colors or otherwise distinguished from each other. The following colors should be used:

- ✓ Red for fuel gases,
- ✓ Green for oxygen, and
- ✓ Black for inert gases and air hoses.

7.22 Regulators/Hoses: The following rules are applicable to the regulators and hoses used in welding operations that use pressurized gases and must be complied with to insure a safe operation:

7.22.1 Pressure regulators must be used on all oxygen and fuel gas cylinders

7.22.2 Oxygen regulators must be equipped with a safety relief device or designed to prevent broken parts from being projected in the event of diaphragm rupture.

7.22.3 Workers must stand to one side and away from regulator gauge faces when opening cylinder valves.

7.22.4 Only regulators listed by OSHA approved testing laboratory such as Underwriters Laboratories Inc. or Factory Mutual will be used with compressed gas. Each regulator must have a high-pressure and low-pressure gauge.

7.22.5 High-pressure oxygen dial gauges must have safety vent covers to prevent parts from flying in case of internal explosion.

7.22.6 Regulators must be handled with extreme care. Damaged regulators must be sent back to the manufacturer for repair.

7.22.7 Leaky or creeping regulators must be withdrawn from service at once for repairs.

7.22.8 If the regulator pressure gauge does not read correctly, it must be withdrawn from service and repaired.

7.22.9 The following procedures must be followed when regulators or reducing valves are attached to a gas cylinder:

1. To blow dust or dirt out; crack the discharge valve of the cylinder by opening it slightly for an instant and then closing it. (Check on fuel gas cylinders that no source of ignition is nearby).

2. Connect the regulator to the outlet valve on the cylinder. Be sure the regulator inlet threads match the cylinder valve outlet threads. Never connect oxygen regulator to a fuel-gas cylinder or vice versa. Do not force connections that do not fit easily. Be sure that connections between the regulators and cylinder are gas tight.

3. Release the pressure-adjusting screw on the regulator to its limit – turn it counter clockwise until it is loose. Engage the adjusting screw and open the downstream line to the air to drain regulator gas.

4. Open the cylinder valve slowly to let the hand on the high- pressure gauge move up slowly. On an oxygen cylinder, gradually open the cylinder valve to its full limit. On an acetylene cylinder, make no more than 1 ½ turns of valve spindle.

5. Attach oxygen hose to outlet of oxygen regulator and to oxygen inlet valve on torch.

6. Test oxygen connection for leaks. Be sure the torch valve is closed; then turn oxygen regulator pressure adjusting screw clockwise to give about normal working pressure. Using soapy water or approved leak test solution check the connections for leaks. At the same time, check regulator for creeping, indicated by an increase in the reading on the low- pressure (delivery) gauge.

7. Attach and check acetylene hose for leaks as outlined in step 6 above, except that pressure should be set to no more than 10 psig.

8. If torch is to be used immediately, proceed to step 9. If not, close cylinder valves, open torch valves to relieve pressure, close torch valves and release the pressure adjusting screw on regulators.

9. To adjust pressures of oxygen and fuel gas prior to using torch, proceed as follows: with all torch valves closed, slowly open oxygen cylinder valve, open torch oxygen valve and turn pressure adjusting

screw on oxygen valve on regulator to desired pressure, then close torch valve. Open acetylene cylinder valve (1 ½ turns maximum), and with torch acetylene valve closed, turn pressure-adjusting screw to desired pressure.

10. Purge each line individually. Open oxygen torch valve and release oxygen to the atmosphere for a few seconds before closing valve; then open acetylene torch valve and release acetylene to atmosphere for a few seconds before closing valve.

11. Open torch acetylene valve, light flame, and readjust regulator. Then close torch acetylene valve.

12. Open torch valves and light torch according to procedure described in instructions provided with the equipment. The procedure for operating one torch may not be satisfactory for another.

7.23 Electrical Arc Welding: The following rules apply to the use of electrical arc welding equipment and their operation and must be complied with to insure a safe operation:

7.23.1 Alterations, modifications, and repairs to welding equipment must be done in a manner that prevents electrical hazards. Manufacturer's instructions must be followed.

7.23.2 All exposed conductive parts of arc welding equipment should be properly grounded. Prior to welding the employee must inspect the welding lead sand welder for visible damage. Welding equipment with visible damage must not be used.

7.23.3 The primary welding (input) terminals should be properly insulated and protected to prevent electrical hazards.

7.23.4 The secondary welder (output) terminals should be shrouded with insulating sleeves of sound construction and design.

7.23.5 Maintenance that includes insulation testing for the arc welding and cutting equipment should be performed on a regular basis. Only a qualified mechanic or electrician may make repairs to welding equipment

7.23.6 A proper welding return should be provided and its cross-section should not be less than that of the welding lead. The return lead should be securely bonded to the work piece

7.23.7 Bare conductors should not be used as welding leads or welding returns.

7.23.8 The work piece should be effectively grounded and the conductor forming the earth for the work piece should be of sufficient low

impedance. It should also be protected from mechanical damage and inadvertent disconnection and be as close as possible to the work piece.

7.23.9 All cable connections should be clean and tight. Cable connectors should be used.

7.23.10 All cables should be of the correct type and current- carrying capacity. They should be routinely examined for defective insulation prior to use.

7.23.11 Trailing welding cables should be kept clear of walkways and be protected against mechanical damage using coverings or by securing to overhead fixture. They should be properly laid to prevent tripping hazards.

7.23.12 A fully insulated electrode holder of correct rating should always be used.

7.23.13 When not in use, the holder should not be placed on metal objects, but should be hung up so that it is clear of any nearby metal objects, or placed on a wooden or non- conducting surface.

7.23.14 The welding cable should be properly connected to the holder.

7.23.15 The electrode holder should be properly maintained to prevent damage to the insulating material.

7.23.16 Cables must be in continuous lengths without splices or taps.

7.23.17 Do not allow cables to contact or be pulled through pools of water. Do not allow electrode to contact water.

7.23.18 Power supply cables, to portable welding machines, must include a conductor for grounding protection. One end of this conductor must be connected to the machine frame. The supply end must be connected to a suitable grounding connection.

7.23.19 Insulating gloves should be worn when an electrode is inserted into or removed from a holder.

7.23.20 Welders should avoid allowing any part of their body to complete an electric circuit; this includes touching any electrically live parts with wet or damaged clothing, gloves or boots.

7.23.21 The welding equipment should not be left unattended with the current switched on.

7.23.22 When welding is finished, the electrode should be removed from the holder and the power supply should be switched off.

7.23.23 When welding is performed in a damp place, an insulated mat should be used, or rubber boots should be worn.

7.23.24 The appropriate welding current should be chosen for the correct type of welding electrode. The supplier's instructions should be followed in making the choice.

7.23.25 Electric arc welding generates very strong UV light. The welding operation must be properly enclosed by appropriate screening to protect people in the vicinity from being harmed by the strong UV light emission.

7.23.26 When welding above floor level, provision for protection from a fall should be made in case of electrical shock.

7.23.27 Welders must not loop or coil the electrode around their body.

7.23.28 Protect welding equipment from moisture. Welding machines that have become wet must be dried and tested prior to reuse.

7.23.29 Do not change the polarity when the welding machine is operating under welding current load.

(TOC)

8.0 LADDERS

8.1. **General**: Ladders are very common and convenient pieces of equipment for reaching heights. However, serious accidents may result when ladders are used improperly. All ladders including stepladders must be constructed per applicable ANSI requirements. The following are essential safety guidelines that are to be followed when using ladders:

8.2. **Wooden Ladders**: Wooden ladders must not be used. (Note: exception is made to this rule to allow for the use of those ladders commonly referred to as "chicken ladders" to access the canal slope during repairs to the concrete panels.)

8.3. **Metal Ladders**: Metal ladders must be constructed per applicable ANSI requirements and commercially manufactured if possible. Special attention to the following is required.

8.3.1. Uprights and rungs should have a cross-section adequate to prevent dangerous deflection.

8.3.2. The intervals between rungs should be12 inches.

8.3.3. The rungs of metal ladders should be corrugated or treated to prevent slipping.

8.4. **Fiberglass Ladders**: Fiberglass ladders must be constructed per applicable ANSI requirements and commercially manufactured.

8.5. **Non-slip Foot Wear**: If necessary to prevent slipping, ladder users should wear non-slip shoes.

8.6. **Single Ladder Length**: The length of single ladders or individual sections of ladders must not exceed 30 feet.

8.7. **Two Section Ladder Lengths**: Two section ladders must not exceed 48 feet in length and ladders with more than two sections must not exceed 60 feet in length.

8.8. **Stepladder Length**: Stepladders must not exceed 20 feet in length.

8.9. **Chain or Rope Ladders**: The use of chain or rope ladders is restricted to those uses that are specifically approved by both the Department Manager and the EH&S Manager.

8.10. **Ladder Use**: Careful consideration as to the type of ladder and its intended use is critical to the safety of the work. The following rules apply when using ladders.

8.10.1. The ladder being used should be of a type suitable for the purpose and

capable of supporting the weight to be supported.

8.10.2. Prior to use, ladders should be visually inspected for splits, cracks, missing parts and other defects.

8.10.3. Defective ladders must not be used.

8.10.4. The rails should be set on a firm base with both rails securely supported. A ladder should not be placed against a window frame.

8.10.5. The ladder should rest on a firm base. Bricks, boxes or other loose objects must not be used to level up rails or to gain additional height for ladders.

8.10.6. Adequate means should be provided to prevent the tipping of a ladder set up in a public thoroughfare or in any other place where persons, vehicles, etc. may accidentally collide with it.

8.10.7. A ladder should not be placed in front of a door, especially one that opens towards it, unless the door is fastened open, locked or guarded.

8.10.8. Ladders should be secured at the top-using lashing to rails, and/or at ground level using suitable stakes lashed to rails.

8.10.9. An attendant should be stationed at the base of the ladder in locations where movement is frequent or when securing of top or bottom is not possible.

8.10.10. A ladder should be set at an angle of approximately 75 degrees (1 out to 4 up) to avoid slipping or tipping backward.

8.10.11. When portable ladders are used for access to an upper landing surface, the ladder side rails must extend at least 3-feet above the upper landing surface to which the ladder is used to gain access; or when such an extension is not possible because of the ladder's length, then the ladder must be secured at its top to a rigid support that will not deflect, and a grasping device, such as a grab rail, must be provided to assist employees in mounting and dismounting the ladder. In no case must the extension be such that ladder deflection under a load would, by itself, cause the ladder to slip off its support.

8.10.12. The working position on a ladder should always be no less than 3 feet from the top of the ladder. This portion of the ladder is meant for use as a handhold.

8.10.13. When working on a ladder, the thighs of the person must be kept between the rails. Over-reaching from a ladder is very dangerous and must be avoided.

8.10.14. Only one person is allowed on a ladder at any one time.

8.10.15. Always face the ladder when climbing or descending.

8.10.16. When climbing or descending a ladder, the hands of the person should be free of any tools or objects. If objects have to be carried on ladders, suitable means such as tool bags carried with a shoulder strap or waist belt should be used for the purpose.

8.10.17. The rungs of a ladder should be free from grease and mud to prevent slippage. For the same reason, the shoes of a person should be cleaned of any grease or mud before climbing up the ladder.

8.10.18. When using trestle ladders, ensure that the spread between the front and back legs are restrained by effective means in such a way that the trestles are manner. As with straight ladders, the highest working position should be at least 3 rungs below the top of the ladder.

8.10.19. Metal ladders must never be used in the vicinity of exposed live electrical equipment.

8.10.20. A sufficient number of persons should be assigned in erecting or moving ladders, particularly long or heavy ladders.

8.10.21. Ladders should never be left unattended when in use. Ladders should be securely stored when not in use to prevent unauthorized use and to eliminate being blown over or struck. Ladders must be barricaded if personnel walk away for a moment.

8.10.22. Ladders must not be tied together to provide longer sections.

8.10.23. Neither the ladder standard (29 CFR 1926, subpart X) nor the fall protection standard (29 CFR 1926, subpart M) requires fall protection for workers while working on portable ladders of any height, or on fixed ladders that are less than 24’ in height. Existing fixed ladders 24’ or greater in height shall have fall protection in the form of a cage, well, ladder safety system or personal fall arrest system.

Note: Effective November 18, 2018, all newly installed fixed ladders 24’ or greater in height must have a ladder safety system or personal fall arrest system. Effective November 18, 2036, all existing fixed ladders 24’ or greater in height must be retrofitted with a ladder safety system or a personal fall arrest system.

8.11. Inspection, Maintenance and Storage: The following rules are applicable to the care of ladders and must be complied with at all times.

8.11.1. Ladders must be inspected at least quarterly and a record of the inspection and any necessary repairs should be maintained at the facility. At a minimum check for:

- Loose steps or rungs
- Loose nails, screws, bolts or other metal parts
- Cracked, split, or broken uprights, braces or rungs
- Slivers on uprights, rungs or steps
- Damaged or worn non-slip bases Step Ladders
- Wobbly (from side strain)
- Loose or bent hinge spreaders
- Loose hinges
- Broken, split, or worn steps Extension Ladders
- Loose, broken, or missing extension locks
- Defective locks that do not seat properly while extended
- Worn or rotted rope

8.11.2. Ladders that are involved with an accident or near miss must be immediately inspected for damage.

8.11.3. Defective ladders should be clearly labeled "OUT OF SERVICE" pending repair and must not be stored with ladders in good condition. Defective ladders that cannot be satisfactorily repaired should be destroyed.

8.11.4. Wooden ladders should never be coated with paints or other products that could hide defects.

8.11.5. Ladders should be properly stored in dry and well- ventilated areas. Ladders should be stored in a horizontal position properly supported clear of the ground. For long ladders over 20 feet, at least 3 points of support should be provided. Ladders that are stored in an upright position should be secured to prevent falling if struck.

(TOC)

9.0 HOUSEKEEPING and WORK AREA CONTROL

9.1. **General**: Good housekeeping is the best method of controlling the risks of injury and fire within a facility. Operating experience clearly indicates a significant increase in mishaps related directly to poor housekeeping practices. It is well established that good housekeeping significantly enhances the quality and quantity of work. Employees must expend the necessary effort to achieve and maintain a neat and orderly work environment.

9.2. **Storage Space**: Storage space must be physically adequate for the volume of materials being stored. If storage space is inadequate proper alternatives should be addressed (example: disposal of non- usable, obsolete items).

9.3. **Stored Materials**: Stored materials must be in a stable configuration in order to permit safe access, avoid clutter, and minimize the hazard of falling materials. Store materials out of aisles and out of doorways. Bags, containers, bundles, etc. stored in tiers must be stacked, blocked, interlocked and limited in height so that they are stable and secure against sliding or collapse.

Storage areas must be free from accumulation of materials that constitute hazards from tripping, fire, explosion, or pest harborage.

9.4. **Racks, Shelves, and Cabinets**: Storage of materials on racks, shelves, and in cabinets must be in a stable manner. Storage on top shelving should be avoided, unless the shelving has a toe board (3 1/2 " nominal) to prevent material from rolling off.

9.5. **Compatibility of Stored Materials**: Materials stored together must be compatible. Dissimilar materials must not contribute to, or cause ignition of, other materials, nor enhance their rate of combustion once ignited. Safety Data Sheets and manufacturer's information must be consulted to ensure compliance.

9.6 **Self-dumping hoppers:** Use of self-dumping hoppers for the recycling of metal is required. Do not overfill or allow metal to protrude from the top of the hopper. Cut material so that it can safely be stacked.

9.7 **Working and Walking Surfaces**: Working and walking surfaces should be dry, smooth, and free of general clutter and provide good traction for walking.

9.8 **Storage of Equipment and Tools**: Equipment and tools, especially those with sharp surfaces, must be kept in their designated storage location when not being used.

9.9 **Storage of Flammables and Combustibles**: Flammables and combustibles must be in the proper storage cabinet and/or stored in compliance with the applicable OSHA and NFPA codes as required by the type and quantity of product.

Fire rated doors, including the door to pumping plant oil rooms and emergency fire exits, must be closed at all times, with the exception of temporary work tasks.

9.10 Safety Lanes: Safety lanes and safe-access lanes are typically floor markings that identify safe passage through or out of shops, warehouses, and similar locations. They also identify access lanes to control panels and emergency equipment, which must be kept clear and unobstructed. They must be clearly marked with either clear yellow or yellow- and-black striped lines, or by plastic tape affixed to the floor.

9.11 Minimum clearances: Minimum clearances for walkways and safety lanes are:

Walkways	44 inches
Driveways (i.e. forklift traffic)	10 feet or at least 1.5 times width of forklift
Emergency devices (i.e. fire extinguishers & alarms)	36 inches
Dead Front Electrical Cabinets and Panels	36 inches (<600 volts)

9.11.1 Barricades are used to identify and deny access to hazardous areas. The following precautions are to be taken:

9.11.2 Excavations, breaks in roads or floors, and similar conditions must be barricaded to prevent injury and damage to equipment and vehicles.

9.11.3 Posting and barricading of outside locations should be established in such a manner to adequately notify personnel, both during daytime and nighttime, of work locations and hazards. Materials used to protect these locations must be capable of withstanding the effects of weather.

9.11.4 Barricades must be provided with appropriate flashing lights at night hours and periods of reduced visibility.

9.11.5 Barricades must be placed far enough in advance of the actual working area to prevent traffic congestion.

9.11.6 Adequate signs (such as "Road Closed," "Aisle Blocked," "Detour," etc.) must be used in conjunction with barricades.

9.11.7 Breakaway links must be used in all chains that barricade an area in order to permit ready access by fire- fighting equipment. Such chains must be identified by the "international orange" color.

9.11.8 Work performed at heights can jeopardize persons at floor level as a result of falling objects. Such floor-level areas must be barricaded. Areas where ladders, scaffolding, or staging are being used must also be barricaded as a protection against falling objects.

9.11.9 Adequate warning signs and barricades must be provided for work areas where the use of lasers can pose serious eye injury from viewing a direct laser beam or reflection.

9.12 General Labeling and Posting Barricades Postings are used to identify safety hazards and provide instructions. The letter, color, format, and word requirements of ANSI Z535.2- 1991 will be used to convey safety-related information on signs. All employees must comply with posted warnings and instructions. In general, the following color codes are used:

9.12.1 Red Sign - With white and black, communicates a DANGER statement where an imminent hazard would cause serious personal injury or death.

9.12.2 Orange Sign - With black, communicates a WARNING statement where a potentially hazardous situation could result in serious injury or death.

9.12.3 Yellow sign - With black, communicates a CAUTION statement where a hazard could cause minor or moderate personal injury, or alert against an unsafe practice.

9.12.4 Blue Sign - With white, communicates a NOTICE statement pertaining to a company safety policy.

9.12.5 Green Sign - With white, communicates a general safety message.

9.12.6 Signs restricting access for safety reasons must be obeyed. Instructions such as "Do Not Enter" or "Authorized Personnel Only" must be observed.

9.12.7 Black and yellow “No Storage” tape must be used to prevent storage within 36 inches of electrical equipment, fire extinguishers, and eye wash stations. This tape should also be used to designate emergency egress routes.

9.12.8 Black and white "Storage" tape must be used to indicate a storage or staging area.

9.13 Barrier Tape: The use of barrier tape in establishing a barricade is acceptable and the following types are available for use as indicated.

9.13.1 DANGER TAPE – Red barrier tape with the word(s) “DANGER” OR

"DANGER DO NOT ENTER" should be used to communicate a DANGER statement where an imminent hazard would cause serious personal injury or death.

9.13.2 CAUTION TAPE - Yellow Barrier tape with the word(s) "CAUTION" or "CAUTION DO NOT ENTER". To be used to communicate a CAUTION statement where a hazard could cause minor or moderate personal injury, or alert against an unsafe practice.

9.13.3 Posting and barricading of outside locations should be established in such a manner to adequately notify personnel of work locations and hazards. Materials used to protect these locations must be capable of withstanding the effects of weather.

9.13.4 Unattended barricades should be posted indicating the applicable hazard and the contact person if entry is required.

9.13.5 Authorization for entry to such posted areas must be received from the responsible Manager. A written access authorization listing is suggested for areas containing ill-defined or intermittent personal hazards. Contact the EH&S Office for assistance with hazard posting.

9.14 Pipe Labeling: Because of the potential hazards associated with pipe transfer systems, piping must be labeled accurately as to the contents and intended direction of flow. Examples of hazards include:

Chemical reactivity (e.g., chlorine gas)
Chemical toxicity (e.g., acids)
Pressurization hazards (e.g., air, other compressed gas)
Thermal hazards (e.g., steam, hot fluids, and cryogenic materials)

9.15 Floor Loading: The approved floor loading for balconies, decks, and overhead walkways must be permanently posted in a conspicuous location. These signs must not be removed, obscured, altered, or modified by anyone without authorization of the Engineering Department.

9.16 Electrical Signage: Electrical circuit panel and breaker boxes should be marked so as to be easily identified and must have a minimum of three (3) feet clearance to the front so as to allow for inspection, maintenance, and servicing.

9.17 Markings must be as follows:

9.17.1 Electrical panels and boxes, 600 volts or more must be marked on the cover of the box with the appropriate voltage.

9.17.2 Each disconnecting means for motors, appliances, and equipment must be legibly marked so as to indicate its purpose.

9.17.3 Each service, feeder, and branch circuit must be legibly marked as to its purpose at its disconnecting means or over- current device.

(TOC)

10.0 ELEVATED WORK LOCATIONS and FALL PROTECTION

10.1. General: It is CAP's policy to ensure that employees working at height are protected from falling and that walking/working surfaces are structurally sound. Equipment used to elevate employees must only be used when it is in a safe condition, and then only according to manufacturer's instructions.

10.2. Fall Protection: Protection from falls must be provided in all circumstances where employees are exposed to a fall hazard of four feet or more (six feet in construction work). This protection may be provided by the use of a personal fall arrest system (PFAS), guardrails, or other approved method of protection.

See CAP's Fall Protection Program for fall protection requirements applicable to specific exposures.

10.3. Elevating Work Platforms: Elevating work platforms can be vertically adjusted by manual or powered means and may be self-propelled, towed, or manually moved. These include such equipment as scissor lifts, E-Z lifts, and others. Elevating work platforms are operated only under the following conditions:

10.3.1. Employees using any elevating work platform must be trained in the proper and safe use of the equipment. A trained operator must be stationed on the ground to operate the lower level controls of the work platform if necessary to lower the work platform. (This individual may perform other work activities but must be able to make visual observations of the elevated work platform when it is occupied).

10.3.2. Unless recommended for such use by the manufacturer, no elevating work platform is to be used on an inclined surface. No elevating work platform may be used on an incline over 5% or in winds that exceed 25 mph.

10.3.3. When directed by the manufacturer, all personnel on the mobile work platform must be provided and wear an approved safety harness and lanyard properly attached to the equipment.

10.3.4. All powered elevating work platforms must have working upper and lower control devices.

10.3.5. Outriggers, if provided, must be used as recommended by the manufacturer.

10.3.6. Wheel chocks must be used when the work platform is elevated with the vehicle on an incline.

10.3.7. Travel of units while employees, materials, tools, or equipment occupy the platform in an elevated position is not permitted unless allowed by the

manufacturer's operating instructions.

10.3.8. All elevating work platforms must be inspected prior to each shift's use and if found unsafe must be tagged out of service and not operated. The operator must sign and date the logbook and note any discrepancies. "Before use" inspections must be conducted according to the manufacturer's Operation and Maintenance Manual.

10.3.9. All units must receive preventive maintenance at intervals no longer than recommended in the manufacturer's manual.

10.3.10. Copies of all inspections, preventive maintenance, and work reports must be retained for 2 years following a subsequent inspection or maintenance activity.

10.4. Extension Boom Aerial Lifts: An extension boom aerial lift has a telescoping or extensible boom with a personnel platform attached. Examples include the JLG, bucket truck, and similar units. Extension boom aerial lifts must be operated under the following conditions:

10.4.1. Employees using any aerial lift must be trained in the proper and safe use of the equipment. One trained operator must be present on the aerial boom or bucket and another trained operator must be stationed on the ground to operate the lower level controls of the aerial boom if necessary to lower the work platform or bucket. (This individual may perform other work activities but must be able to make visual observations of the elevated work platform when it is occupied).

10.4.2. All units must be inspected prior to each shift's use and must not be operated if found to be unsafe.

10.4.3. All personnel occupying the aerial lift must wear a body harness equipped with a side D-Ring along with a 3 foot straight lanyard (not a shock absorbing or deceleration device) attached to the lift's designated lanyard attachment point. If an operator finds that a 3 foot lanyard does not provide enough length to allow for mobility while working in the aerial lift, the EH&S Department will be contacted for discussion of an alternative fall protection system.

10.4.4. Outriggers, if provided, must be used as recommended by the manufacturer.

10.4.5. Unless recommended for such use by the manufacturer, no extensible boom aerial lift or bucket is to be used with the wheels located on an inclined surface. No unit may be used on an incline over 5% or in winds over 25 mph.

10.4.6. All units must have upper and lower control devices.

10.4.7. Units equipped with outriggers must not be relocated while personnel are on the work platform or in the bucket in an elevated position. Personnel must not be elevated on the work platform or in the bucket without the stability of outriggers.

10.4.8. All units must be inspected prior to each shift's use. The inspector must sign and date the logbook and note any discrepancies. Inspections must include all items recommended by the manufacturer's manual.

10.4.9. All units must receive preventive maintenance at intervals no longer than recommended in the manufacturer's manual. Copies of all inspections, preventive maintenance, and work reports must be retained for two years following a subsequent inspection or maintenance activity.

10.4.10. Travel of units while employees, materials, tools, or equipment occupy the platform or bucket in an elevated position is not permitted.

(Exception: Employees may ride in the platform for short moves at the work location if the platform is lowered to the cradle position and the employees face the direction of movement; if the travel surface is substantially level; and if there are no significant holes or obstacles in the path of travel.)

(TOC)

11.0 BUILDING and OFFICE SAFETY

11.1. General Guidelines: The following rules apply to all buildings including offices, shops, warehouses, or similar structures.

11.2. Filing Cabinets: The contents of filing cabinets must be arranged and distributed so as not to make the cabinet top heavy.

11.3. Drawers: The drawers on file cabinets, desks, and toolboxes, etc. must be closed when not in use or when unattended. Do not have more than one drawer open at one time.

11.4. Paper Cutters, etc.: Exercise caution when operating paper cutters, trimmers, scissors, paper punches, and staplers. Keep fingers clear of the cutting blades and make sure blade guards are in place. Cutting edges should be maintained in good condition.

11.5. Defects: Report any sharp edges, splinters or defective parts on office equipment so repairs can be made. If unsafe conditions occur, appropriate action must be taken.

11.6. Cords: Permanent installations of telephone, computer network, and electrical cords must be encased in walking areas and secured out of the way under desks. Temporary cord installations must be protected to prevent trips and falls. All phone, electronic, computer, conference calling intercoms, and electrical cords must be neatly tied and stored to prevent damage, entanglement, and tripping.

11.7. Chairs and Benches: Do not stand on chairs and benches. Unsafe chairs or benches must not be used. Chairs must not be repaired or altered in any manner except by an authorized repair service. While seated in a chair, all chair legs must remain in contact with the floor. Tilting or leaning back while seated in a chair is prohibited.

11.8. Criminal Activity: Immediately contact CAP Protective Services or local law enforcement to report any criminal activity or suspected criminal activity on CAP property. This includes but is not limited to, trespassing, theft, burglary, assault, vandalism and arson to buildings, offices and employees.

11.9. Protruding Nails: Protruding nails or screws must be removed. Particular care must be used to remove protruding nails and screws in walkways and areas where others may not observe them. Care should be taken to use the appropriate tools to remove protruding nails and screws. Assistance should be requested if proper tools are not available.

11.10. Turning on Lights/Power: Lights must be turned on immediately upon entering a dark area or room. If fixed lighting is not available temporary lighting must be used. If unusual odors are noticed when entering a building or structure, do not turn on lights or power and leave the area. Report the condition to a Supervisor or Manager.

(Example would be the rotten egg odor in natural gas).

11.11. Warning Signs: Damaged signs and labels on machines, equipment, electrical boxes, or other apparatus should be replaced. Danger signs must be placed at locations where there are exposed energized circuits. Do not operate machinery, equipment, switches, valves, or other apparatus with attached danger signs, tags, or banners.

11.12. Emergency Exits, Fire Extinguishers, First Aid Supplies: All emergency exits, fire extinguishers, first aid kits and other emergency items must be kept clear of obstructions. (Reference to safety rule 9.9.1)

11.13. Signage: All emergency exits, fire extinguishers, first aid kits, emergency response information, and other emergency items should be properly marked as to location. Non-exit doorways must be mark "Not an Exit".

11.14. Cleaning and Mopping Floors: Employees mopping or waxing floors must put warning signs in place to warn co-workers of the potential for slippery floors. All liquid spills must be cleaned up immediately.

11.15 Office Equipment: Keep flammables and combustible material away from all heat producing equipment such as copiers, scanners, printers, faxes, laminators, portable heaters, coffee makers, hot plates, microwaves, and toaster ovens. Do not store flammable and combustible material on top of or near heat producing equipment. Be sure to turn off/unplug kitchen appliances after use.

All appliances used at CAP must be UL approved.

(TOC)

12.0 MATERIAL HANDLING and STORAGE

12.1. General: Materials must be stored in a planned and orderly manner, so as not to endanger the safety of employees. Use caution when transporting or storing pressurized spray cans in CAP vehicles. Temperature extremes can cause the can to explode.

All containers must be properly labeled in accordance with Hazard Communication requirements. This includes fuel cans that store gasoline and diesel fuels. Solvents and lube oils may not be stored in gas cans.

12.1.1. Storage of material is strictly prohibited in pumping plant elevator chases with the exception of metal scaffold material.

12.1.2. When storing hazardous materials consideration must be given to the chemical characteristics to prevent the mixing of incompatible products. Hazardous Material Storage must comply with the applicable regulatory standards for the product. This includes maximum quantities to be stored in cabinets, rooms, and containers.

12.1.3. Hazardous materials such as sodium hypochlorite and muriatic acid are required to be stored in separate corrosive cabinets to prevent the mixing of incompatible chemicals. The maximum storage of hazardous materials in a corrosive cabinet is 60 gallons. Unopened 5-gallon buckets of sodium hypochlorite may be staged in chlorinator rooms outside of a corrosive cabinet.

12.1.4. Above ground and below ground storage tanks must be marked according to CFC Standard 79-3.

12.2. Open Yard Storage: Outside storage of materials must comply with the following:

12.2.1. Combustible materials must be stacked securely, and stacks or piles must not exceed 16 feet in height.

12.2.2. Driveways between and around combustible storage piles must be at least15 feet wide and must be maintained free from accumulations of material or rubbish. Large stockpiles of material must be planned with a maximum grid system unit of 50 by 150 feet.

12.2.3. Materials must not be stored under overhead power lines.

12.3. Indoor Storage: Inside storage of materials must comply with the following:

12.3.1. Stacks, tiers, and piles must be stable, and stacked to facilitate safe handling and loading. Storage of hazardous materials must be in accordance with the requirements contained in the SDS for the product(s).

12.3.2. Materials must not be placed or stored so as to interfere with access ways, doorways, or hoist ways. Accumulations of scrap or materials must not be permitted to obstruct access ways and exits. Aisle width must be adequate to accommodate firefighting equipment.

12.3.3. Materials must be stored, handled, and piled with consideration for their fire characteristics. Non-compatible materials which may create a fire hazard must be separated by a distance of at least 25 feet or isolated by a barrier having at least a 1-hour fire rating. Material must be stored to minimize the spread of fire internally and to provide convenient access for firefighting.

12.3.4. A clearance of 24 inches must be maintained around the path of travel of fire doors.

12.3.5. Clearance of at least 18 inches must be maintained between stored materials and sprinkler heads.

12.3.6. Fire protection must be furnished in compliance with National Fire Protection Association (NFPA) standards and as specified in other parts of this section.

12.3.7. Except for floors or slabs on grade, the maximum safe load limits in pounds per square foot must be conspicuously posted in all indoor storage areas and must not be exceeded.

12.3.8. Materials stored inside buildings under construction must not be placed within 6 feet of any hoist way or inside floor openings, nor within 10 feet of an exterior wall, which does not extend above the top of the material stored.

12.4. Bagged Material: Bagged materials must be stacked by stepping back the layers and cross-keying the bags at least every 10 bags high, except when restrained by walls or partitions of adequate strength.

12.5. Bulk Storage: Silos, hoppers, tanks, bins, and similar bulk storage containers are considered confined spaces. No employee will enter such spaces until the appropriate requirements in the CAWCD Permit Required Confined Space Entry Program are implemented.

12.6. Lumber: Lumber must be handled and stacked per the following:

12.6.1. Lumber must be stacked on level and solidly supported sills so that the stacks are stable.

12.6.2. Lumber piles must not exceed 12 feet in height.

12.7. Bricks and Masonry Blocks: Bricks and masonry blocks must be handled and stacked per the following:

12.7.1. Brick and masonry blocks must be stacked on level and solid surfaces.

12.7.2. Brick stacks must not exceed 7 feet in height. When a loose brick stack reaches a height of 4 feet, it must be stepped back at least 2 inches in every foot of height above the 4-foot level. Unitized brick must not be stacked more than three units in height.

12.7.3. Masonry blocks stacked higher than 6 feet must be stepped back one-half block per tier above the 6-foot level.

12.8. Cement and Lime: Cement and lime must be handled per Safety Rule 12.3 if applicable and the following:

12.8.1. Employees handling cement or lime must participate in a Job Safety Analysis (JSA) including exposure determination. In addition proper hand washing facilities must be provided to minimize potential exposure to items contained in residual dusts such as Hexavalent Chromium as outlined in OSHA Hazard Bulletins.

12.8.2. Employees must wear appropriate personal protective equipment as specified in section 8 and identified in the (JSA). Washing facilities, hand-cream, petroleum jelly, or similar preparations for protection from dermatitis must be provided.

12.8.3. Un-slaked lime must be stored in a dry area, and due to fire hazard, must be separated from other materials.

12.9. Reinforcing, Sheet, and Structural Steel Reinforcing, sheet and structural steel must be handled and stored per the following:

12.9.1. Steel must be safely stacked to prevent sliding, rolling, spreading, or falling.

12.9.2. When steel is handled by a crane or forklift, lagging must be used to facilitate safe rigging.

12.10. Pipe, Conduit, and Cylindrical Material: Pipe, conduit and cylindrical material must be handled per the following:

12.10.1. Pipe, conduit bar stock, and other cylindrical materials must be placed in racks, or stacked on a firm, level surface and blocked to prevent spreading, rolling, or falling. Either a pyramided or battened stack must be used. Battened stacks must be stepped back at least one unit per tier and securely chocked on both sides of the stack.

12.10.2. Removal of pipe or conduit from a stack must be done from the ends of the pipe or conduit.

12.10.3. Unloading from a carrier must be done in such a manner that no person must be exposed to the unsecured load.

12.10.4. Storage of pipe, conduit bar stock or other materials must not impede walkways or doorways.

12.11. Wood Poles and Piling: Wood poles and piling must be handled per the following:

12.11.1. Wood poles and round piling must be stacked and handled as specified in subsection 12.9.

12.12. Sand, Gravel and Crushed Stone: Sand, gravel, and crushed stone must be handled per the following:

12.12.1. Stockpiles must be located so as to provide safe access for withdrawing material. Material must not be removed in such a manner that destabilizes the stockpile.

12.12.2. Material stored against walls or partitions must not be stored in an amount that will endanger the stability of the wall or partition.

12.13. Flammable and Combustible Liquids: Flammable chemicals must be placed in a flammable cabinet at the end of each work day. Flammable and combustible liquids must be handled per the following:

12.13.1. Unless defined herein, terms used throughout this subsection must convey the meaning specified in the flammable and combustible liquids code, NFPA 30, or 29 CFR 1910.106.

12.13.2. For the purpose of their use at CAP, flammable and combustible liquids are classified as follows:

1. Flammable liquids (Class I liquids)

- **Class I**---Liquids having a flashpoint below 100° F (38° C)
- **Class IA**---Flashpoint below 73° F (23 ° C) and boiling point below 100° F (38° C) – See 12.14 below.
- **Class IB**---Flashpoint below 73° F (23 ° C) and boiling point at or above 100° F (38° C)
- **Class IC**---Flashpoint at or above 73° F (23° C) but below 100° F (38° C)

2. Combustible liquids (Class II and III liquids)

- **Class II**---Liquids having a flashpoint at or above 100° F (38° C) and below 140° F (60° C)

- **Class III**---Flashpoint at or above 140° F (60° C)

12.14. Flammable and Combustible Liquid Storage: Flammable and combustible liquids may be stored and used in the original DOT shipping containers, as shown in table 12-1. However, the quantity in the work area must not exceed 1-day's usage, up to a maximum of 25 gallons of a Class 1A liquid or a maximum of 120 gallons of any other class of liquid. If flammable and combustible liquids are dispensed and used in smaller quantities, they must be dispensed into properly labeled approved safety containers. Exception: Liquids which are highly viscous (extremely hard to pour) may be stored and handled in any size original container.

12.14.1. Due to the extreme explosion hazard of Class IA liquids, they must not be purchased until storage, dispensing, and use procedures have been approved by the EH&S Department. Wherever practical, a less hazardous product must be used.

12.14.2. Personnel who use Class IA liquids must be trained in their storage, dispensing, and use, including design of the storage and dispensing system.

Table 12-1 - Maximum Allowable Size of Containers and Portable Tanks Combustible Flammable Liquids

Container type	Class IA	Class IB	Class IC	Class II	Class III
Glass	1 pt	1 pt	1 pt	1 pt	15 gal
Metal (other than approved Dot Drums) or approved plastic	1 gal	5 gal	5 gal	5 gal	5 gal
Safety Cans	2 gal	5 gal	5 gal	5 gal	5 gal
Metal Drums (DOT Spec)	60 gal	60 gal	60 gal	60 gal	60 gal
Approved Portable Tanks	660 gal	660 gal	660 gal	660 gal	660 gal
Polyethylene DOT spec 34, or as authorized by DOT exemption	1 gal	5 gal	5 gal	60 gal	60 gal

12.14.3. Safety Can: "Safety can" means an approved container of not more than 5-

gallon capacity having a spring- closing lid, spout cover, internal safety screen, and so designed that it will safely relieve internal pressure when subjected to fire exposure. Safety cans must be labeled in accordance with Hazard Communication requirements.

12.14.4. Drum/Barrel: The term "drum" or "barrel" means an approved container having a capacity greater than 5 gallons and no more than 60 gallons.

12.14.5. Portable Tanks: The term "portable tank" means an approved closed storage vessel having a capacity over 60 gallons and no more than 660 gallons and not intended to be a fixed installation.

12.14.6. Tanks: The term "tank" means an approved storage vessel having a capacity exceeding 660 gallons.

12.14.7. Only storage cabinets meeting NFPA and OSHA requirements may be used for the storage of flammables and combustibles. All cabinets must be labeled in conspicuous lettering "FLAMMABLE---KEEP FIRE AWAY."

1. **Approved cabinets:** Flammables and combustible must be properly stored per the following:

   - Flammable and combustible liquids will not be stored indoors except as follows:
   - No more than 25 gallons must be stored outside of approved cabinets in a room or single fire area. (refer to rule 12.13.2)
   - No more than 60 gallons of Class I or II liquids, nor more than 120 gallons of Class III liquids, may be stored in an approved cabinet. No more than three such cabinets may be located in a single fire area.
   - Larger quantities may be stored in separated indoor storage areas when a competent person certifies such storage.
   - At least one 2-A:40 B-C fire extinguisher must be located not less than 10 feet nor more than 25 feet from the stored material, cabinet or entrance to the inside storage area.

2. Flammable and combustible liquids will not be stored outdoors except as follows:

   - Above ground in approved containers not exceeding 60 gallon capacity subject to the following restrictions:

   - Any one group of containers stored together must not exceed 1,100 gallons. Each group of containers must be separated by at least 5 feet and no group must be within 25 feet of any building or other combustibles.

- Each group of containers must be located adjacent to an access way at least 12 feet wide to facilitate the use of firefighting equipment.

(a) Stored above ground in approved portable tanks not exceeding 66-gallon capacity providing:

- A five-foot clear area separates those groups of two or more tanks having a combined capacity over 2,200 gallons.
- Portable tanks are not located within 25 feet of a building or combustible material.
- Portable storage tanks are equipped with emergency venting and other devices as required in NFPA 30.
- Each tank is located adjacent to an access way at least 12 feet wide to facilitate use of firefighting equipment.

(b) Above ground in approved tanks installed in accordance with NFPA Section 2-2, "Installation of Outside Above Ground Tanks."

- Storage areas must be diked at least 12 inches high, or graded and sloped, and sealed with a 50 mil plastic or equivalent liner to permit containment of leaks and spills equal to the capacity of all tanks and/or containers located in each area.
- Further, the area is maintained free of weeds or combustible material to a distance of 10 feet out from the storage area perimeter.
- At least one portable fire extinguisher rated not less than 2-A:40-B:C unit is located not less than 25 feet nor more than 75 feet from each portable tank or group of tanks or containers located outside.

12.15. Handling and Dispensing Flammable or Combustible Liquids: The following rules must be complied with when handling and dispensing flammable or combustible liquids.

12.15.1. Areas in which flammable or combustible liquids are transferred in quantities greater than 5 gallons at a time must be separated from other operations by at least 25 feet, or by a partition having a minimum 1-hour fire rating. Drainage or an equally effective method must be used to contain spills.

12.15.2. Adequate natural or mechanical ventilation must be provided in order to maintain the concentrations of flammable vapor below 10 percent of the lower flammable limit.

12.15.3. The transfer of Class I and Class II flammable liquids from one container to another requires bonding and grounding of the containers and the transfer system. All dispensing systems must be electrically grounded and bonded.

12.15.4. Flammable and combustible liquids must be drawn from or transferred into vessels, containers, or tanks, only (1) through a closed piping system, (2)

from safety cans, (3) by means of a device drawing through the top, or (4) from containers or tanks by gravity or pump through a self-closing valve. Transferring by injecting pressurized air into a tank or container is prohibited.

12.15.5. Electrical lighting must be the only means used to provide artificial illumination in areas where Class I flammable liquids are handled or dispensed, or where flammable vapor may be present. The wiring and all electrical equipment must meet the requirements of NFPA designation: Class I, Division 2, of the National Electrical Code.

12.15.6. At least one 2-A:40-B:C fire extinguisher must be located not less than 10 feet nor more than 25 feet from the stored material, cabinet, or entrance to the inside storage area.

12.15.7. Class I and II liquids must be kept in covered containers when not in use.

12.15.8. Open flame, smoking, or other sources of ignition must not be permitted within a distance of 50 feet from areas where Class I and Class II flammable liquids are dispensed or used. Greater distance may be necessary under some conditions. Approved "No Smoking" signs must be posted in such areas.

12.15.9. Leakage or spillage of flammable or combustible liquids must be cleaned up promptly and disposed of safely.

12.15.10. Self-closing metal refuse containers must be available in all areas where flammable or combustible liquids are dispensed or used.

12.16. Refueling: The following rules must be complied with while refueling.

12.16.1. Tanks and equipment used for refueling vehicles and equipment, fueled with flammable or combustible liquids must be designed and installed in accordance with the applicable provisions of the NFPA Standards, Underwriters Laboratories, Inc., or Factory Mutual Standards, or have the approval of the Government agency having jurisdiction.

12.16.2. Tank trucks must comply with the requirements published in NFPA 385, "Standard for Flammable and Combustible Liquid Tank Vehicles."

12.16.3. Hoses used to dispense flammable and combustible liquids must be an approved-type with an automatic self-closing valve or nozzle without a latch-open device. A hanger or hose retracting system will be provided to protect the hose from traffic abuse.

12.16.4. Electrical wiring, pumps, and equipment must meet the appropriate requirements of NFPA designation: Class I of the National Electrical Code. Clearly identified and accessible switches must be provided at a location

remote from dispensing devices to shut off all power to devices in an emergency.

12.16.5. Vehicles or equipment using gasoline, LPG, or other flammable or combustible liquid fuels must be shut down during refueling. Diesel equipment is excepted when fueled in accordance with manufacturer's recommendations. Stationary refueling tanks and/or dispensing islands and pumps must be protected against vehicular damage by guardrails or posts.

12.16.6. A standard "No Smoking" sign must be posted on all mobile refueling equipment and in established refueling areas.

12.17. Paints, Varnishes, and Thinners: Paints, varnishes, and thinners must be stored and used per the following:

12.17.1. Paints, varnishes, lacquers, thinners, and other volatile paints or coatings must be stored and dispensed in accordance with their flammability characteristics. Refer to rule 12.13.

12.17.2. Containers must be tightly closed when not in use and not more than a 1-day supply must be stored in buildings under construction.

12.17.3. Ventilation adequate to prevent the accumulation of flammable vapors in hazardous concentrations must be provided in areas where paints and coatings are dispensed or applied.

12.17.4. No smoking, open flame, exposed heating elements, or other sources of ignition must be permitted in areas where flammable or combustible paints or coating are being sprayed. Spray-painting booths and equipment must be in accordance with NFPA 33, "Standard for Spray Application Using Flammable and Combustible Materials."

12.17.5. Employees exposed to paints or coatings potentially hazardous to his/her health must have exposure determinations made to document exposure and when appropriate must be provided with and must use appropriate protective equipment.

(TOC)

13. EXCAVATIONS

13.1. Competent Person: All excavation work must be performed under the direction of a competent person. This person has the knowledge to recognize existing and predictable hazards of excavations and has the knowledge and authority to take corrective actions to protect employees. The competent person is responsible for performing frequent and periodic inspections of the jobsite for hazards.

13.2. Site Preparations: Before opening any excavation, all interferences such as trees, sidewalks, and foundations must be removed or supported as necessary to protect employees and the public. A CAP dig permit will be executed prior to digging any excavation or trench.

13.3. Underground Utilities: The following rules are to protect CAWCD employees from injuries caused by underground utilities.

13.3.1. The estimated location of utility and other underground installations that may be encountered during excavation work must be determined by CAWCD engineering prior to opening an excavation.

13.3.2. When excavation operations approach the estimated location of underground installations, the exact location of the installations must be determined by safe and acceptable means, usually by hand digging with an insulated shovel and the use of suitable gloves.

13.3.3. If electric cables are damaged, the following steps must be taken:

1. If the damaged cable belongs to a utility other than CAWCD, the utility must be notified at once.

2. The area must be barricaded and unauthorized persons kept out until hazardous conditions can be eliminated.

13.3.4. If gas lines are damaged, the following steps must be taken:

1. The excavation must be left open to allow the gas to dissipate into the atmosphere. All possible sources of ignition must be removed or eliminated.

2. The local fire department must be notified immediately.

3. Residents in the immediate area must be warned and the public must be kept clear of the area.

4. The gas company must be notified at once.

5. The local police department must be notified

13.3.5. If communication cables are damaged, the Communications Company must be notified are once.

13.3.6. While the excavation is open, underground installations must be protected, supported or removed to safeguard employees.

13.4. Pedestrian Safety: Personnel working on foot in and around excavations must be aware of hazards from moving equipment, overhead loads, and spillage of loose materials.

13.4.1. Employees exposed to vehicular traffic must wear reflective vests or other suitable garments that comply with ANSI 107, Class 3.

13.4.2. No employee must be permitted under loads handled by lifting or digging equipment. Employees must stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.

13.5. Egress: A stairway, ladder, ramp or other safe means of egress must be located in trench excavations that are 4 feet or deeper. Egress must be located such that employees must not have to travel more than 25 feet to reach a means of egress.

13.6. Operating Equipment near Excavations: When mobile equipment is operated adjacent to an excavation and the operator does not have a clear and direct view of the edge of the excavation, a warning system such as barricades or a spotter must be utilized. If possible, the grade should be away from the excavation.

13.7. Accumulated Water: Employees must not work in excavations in which there is water or in excavations in which water is accumulating unless precautions have been taken to protect employees against the hazards posed by water accumulation. The precautions necessary to protect employees vary with each situation, but could include special support or shield systems to protect from cave-ins and/or water removal to control the level of accumulating water.

13.8. Drainage: If excavation work interrupts the natural drainage of surface water (e.g. streams), diversion ditches, dikes, or other suitable means must be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation.

13.9. Support of Nearby Structures: Where the stability of adjoining buildings, walls or other structures is endangered by excavation operations, the Engineering Department must approve appropriate support systems.

13.10. Loose Debris: Employees must be protected from excavated material or equipment that could fall or roll into excavations. Protection must be provided by placing and keeping such materials or equipment at least two feet from the excavations or by the

use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into the excavation.

13.11. Inspections: Daily (or as the situation warrants, more frequent) inspections of excavations, the adjacent areas, and protective systems must be made by a competent person for evidence of a situation that could result in possible cave-ins, failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection must be conducted before starting work and as needed throughout the shift. Inspections must also be made after every rainstorm. Where the competent person finds evidence of a situation that could result in a possible cave-in, failure of a protective system, or other hazardous conditions, the competent person must remove the exposed employees from the hazardous area until the necessary precautions have been taken to ensure their safety.

13.12. Crossings: Where employees are required or permitted to cross over excavations, walkways or bridges with standard guardrails must be provided.

13.13. Open Excavations: The following rules apply to excavations which are left open overnight or when employees leave the work area.

13.13.1. When excavations are left open, warning devices such as barricades or guardrails must be placed to adequately protect the public and employees.

13.13.2. At the end of each workday, as much of the excavation as practical must be closed. No more trenches must be left open than is necessary.

13.13.3. When it is necessary to leave excavating equipment unattended, the blade, bucket or scoop must be lowered to the ground and the ignition system locked.

13.14. Street Traffic: Proper warning devices must protect mechanical excavating equipment that is parked or operating on streets or highways.

13.15. Protective Systems: Each employee in an excavation 5 feet or greater in depth must be protected from cave-ins by a protective system. This system must be either sloping/benching, shoring, shield system or other engineered system. Excavations less than 5 feet in depth may require protective systems when, based on the competent person's inspection, an indication of potential collapse or cave-in is present. Protective systems must also include and protect employee access routes (either by ramp or ladder).

13.15.1. When considering a protective system, the competent person must take into consideration soil type, vibration sources, previously disturbed soil, layered soil, presence of water, heavy equipment work adjacent to the excavation, limited work area, and other hazard-increasing conditions.

13.15.2. Shoring and shield systems must be installed and removed in a manner that protects employees from cave-ins, structural collapses, or from being struck by members of the shoring or shield systems.

13.15.3. Hydraulic shoring must be installed according to the manufacturer's design data. This design data must be available on site during use of the shoring.

13.15.4. Removal of shoring systems must begin at and progress from the bottom of the excavation. Members must be released slowly as to note any indication of possible cave-ins of the side of the excavation or possible failure of remaining members.

13.15.5. Shields must be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of a sudden lateral load.

13.15.6. Employees must not be allowed in shields when shields are being installed, removed or moved vertically.

13.15.7. Excavations deeper than 20 feet deep must have their protective systems designed and approved by a registered professional engineer and must be approved by both the CAWCD Engineering and Safety & Health Departments.

13.16. Applicable Standards: Excavations and all protective systems must comply with §29 CFR 1926 Subpart P, the OSHA standard for excavations. Competent persons must review and utilize applicable sections of this subpart and its appendices. Where conflict exists between these rules and subpart P; the more stringent (protective of employees) rule must apply.

13.17. Employee Training: Employees working in an excavation must be trained to recognize hazards of excavations (e.g. moving machinery, potential cave-ins, collapse) and the protective systems and methods used to mitigate these hazards. Supervisors and competent persons will ensure that employees are appropriately trained prior to working in excavations.

(TOC)

14.0 MACHINERY AND MECHANIZED EQUIPMENT

14.1. General: Tools and materials must be secured to prevent movement

14.2. Initial Inspection: Before any machinery or mechanized equipment is placed in use, it must be inspected and tested by a competent person and certified to be in safe operating condition. Inspection and tests must be in accordance with the manufacturer's recommendations and must be documented.

The manufacture's operating manual or equivalent for the specific make and model of the equipment must be immediately available to the operator.

14.3. Daily Inspection: All machinery and equipment must be inspected daily (when in use) to ensure safe operating conditions as per manufacturer's instructions. Tests must be made to determine that the brakes and operating systems are in proper working condition and that all required safety devices are in place and functional.

14.4. Out of Service Tags: Whenever machinery or equipment is found to be unsafe, or whenever a deficiency, which affects the safe operation of equipment, is observed, the equipment must be immediately taken out of service and its use prohibited until unsafe conditions have been corrected.

14.4.1. A tag indicating that the equipment must not be operated must be placed in a conspicuous location on the equipment. Where necessary, a special condition (gold) lock can be placed on the equipment controls or energy source to prevent operation of the equipment.

14.4.2. The tag must remain in its attached location until the equipment is safe to operate and removed by the person who placed it

14.4.3. When corrections are complete, the machinery or equipment must be inspected and tested per manufacturer's recommendations prior to being returned to service.

14.5. Qualified Personnel and Safe Practices: Only designated qualified personnel must operate machinery and mechanized equipment.

14.5.1. Machinery or equipment must not be operated in a manner that will endanger persons or property nor must the safe operating speeds or loads be exceeded.

14.5.2. Getting off or on any equipment while it is in motion is prohibited.

14.5.3. Machinery and equipment must be operated in accordance with the manufacturer's instructions and recommendations.

14.5.4. Seat belts must be worn on all equipment where provided.

14.5.5. Mounting or dismounting a vehicle. Use of the 3- POINT CONTACT technique is required. This requires three of four points of contact (Two hands and one foot OR both feet and one hand.)

14.5.6. Vehicle Lifts: Operators of automotive lifts must be instructed in the safe use and operation of the lift using the manufacturer provided instructions and warning labels.

14.5.7. Vehicle Lifts: Permanent vehicle lifts must undergo an annual inspection by an automotive lift inspection company. CAP Personnel will perform daily, weekly, and monthly inspections and preventative maintenance.

14.5.8. Manufacturer provided Operations and Maintenance Manuals must be kept with each piece of machinery, aerial lift, and other heavy equipment.

14.5.9. Per the "Fleet Maintenance Vehicle Lock-out/Tag-out Procedures", all sources of hazardous energy must be isolated and secured whenever service, inspection, maintenance or modification is to be performed.

14.5.10. Compressed Air Nozzles. Compressed air nozzles must restrict pressure to 30 psi. Compressed air should not be used to clean personnel or machinery such as drill presses, lathes, or bench grinders.

14.6. Manufacturer's Recommendations: When the manufacturer's instructions and or recommendations are more stringent than the requirements of CAP's, Safety Resource Manual, the manufacturer's requirements must apply.

14.7. Road Conditions: Inspections or determinations of road conditions and structures must be made in advance to ensure that clearances and load capacities are safe for the passage or placing of any machinery or equipment.

14.8. Equipment Requirements: The following rules must be complied with at all times when operating equipment.

14.8.1. Seats or personal protection equipment must be provided for each person required to ride on equipment.

14.8.2. Equipment operated on the highway must be equipped with headlights, taillights, brake lights and backup light and turn signals visible from front and rear.

14.8.3. All equipment with windshields must be equipped with powered wipers. Vehicles that operate under conditions which cause fogging or frosting of windshields must be equipped with operable defogging or defrosting devices.

14.8.4. Mobile equipment, operating within an off-highway job site not open to public traffic, must have a service brake system and a parking brake system

capable of stopping and holding the equipment while fully loaded on the grade of operation.

14.8.5. In addition, heavy-duty hauling equipment must have an emergency brake system, which will automatically stop the equipment upon failure of the service brake system.

14.8.6. The emergency brake system must be operable from the driver's position.

14.9. Maintenance: The following rules must be complied with at all times when performing maintenance activities on machinery and mechanized equipment.

14.9.1. Maintenance, including repairs and preventative maintenance must be in accordance with the manufacturer's recommendations and must be documented. Records of maintenance and repairs must be maintained for the life of the equipment.

14.9.2. All machinery or equipment must be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done. Equipment designated to be serviced while running is exempt from this requirement.

14.9.3. All repairs on machinery or equipment must be made at a location which will protect repair personnel from traffic.

14.9.4. Heavy machinery, equipment, or parts thereof which are suspended or held apart by slings, hoist, or jacks must be substantially blocked or cribbed before personnel are permitted to work underneath or between them.

14.10. Blocking and Braking of Parked Vehicles: Bulldozer scraper blades, end loader buckets, dump bodies, and similar equipment must be either fully lowered or blocked when repaired or when not in use. All controls must be in the neutral position, with the engines stopped and brakes set, unless work being performed on the machine requires otherwise.

14.11. Chocking of Trailer Wheels: When trailers are not equipped with self-setting brakes, and are parked and detached from the towing vehicle, they must be secured by the use of chocks and the lowering of the leveling stand. Chocks must, at a minimum, be set against both sides of at least one wheel on single axle trailers and against the outside edge of at least one wheel of each axle on multiple axle trailers.

14.12. Equipment Leveling: Stationary machinery and equipment must be placed on a firm foundation and secured before being operated.

14.13. Illumination: All mobile equipment and the areas where they are operating must be adequately illuminated while work is in progress.

14.14. Enclosed Areas: Equipment powered by an internal combustion engine must not be operated in an enclosed area unless adequate control is provided to ensure that the equipment does not generate a hazardous atmosphere.

14.15. Slow Moving Vehicle Lights: All vehicles which will be parked or moving slower than normal traffic on haul roads must have a flashing yellow light or four-way flashers visible from all directions.

14.16. Cab Protection During Loading: Personnel must be allowed in truck cabs during loading only if the truck has built- in cab protection.

14.17. Towing: All towing devices used on any combination of equipment must be structurally adequate for the weight drawn and securely mounted.

Persons must not be permitted to get between a towing vehicle and the piece of towed equipment until both have been completely stopped with all brakes set and wheels chocked in both vehicle and equipment.

14.18. Parking: The following rules must be observed when parking equipment.

14.18.1. Whenever equipment is parked the parking brake must be set.

14.18.2. Equipment parked on an incline must have the wheels chocked or track mechanisms blocked and the parking brake set.

14.18.3. All equipment left unattended at night, adjacent to a highway in normal use or adjacent to construction areas where work is in progress, must have lights or reflectors or barricades equipped with lights or reflectors.

14.19. Modifications: No modifications or additions which affect the capacity or safe operation of machinery or equipment must be made without the manufacturer's written approval.

14.19.1. If such modifications or changes are made, the capacity, operation, and maintenance instruction plates, tags or decals must be changed accordingly.

14.19.2. In no case must the original safety factor of the equipment be reduced.

14.20. Steering and Spinner Knobs: Steering or spinner knobs must not be attached to the steering wheel unless the steering mechanism prevents road reactions from causing the steering hand wheel to spin. When permitted, the steering knob must be mounted within the periphery of the wheel.

14.21. Industrial Trucks: All industrial trucks must meet the requirements of design, construction, stability, inspection, testing, maintenance, and operation, defined in ANSI/ASME B56.1, Safety Standards for Low Lift and High Lift Trucks.

14.22. Rated Capacity: Lift trucks, stackers, and similar equipment must have the rated capacity posted on the vehicle so as to be clearly visible to the operator. When the manufacturer provides auxiliary removable counter weights, corresponding alternate rated capacities must also be clearly shown on the vehicle. The ratings must not be exceeded.

14.23. Operating Position: The controls of loaders, excavators, or similar equipment with folding booms or lift arms must not be operated from a ground position unless so designed.

14.24. Work Around Booms/Buckets: Pedestrian personnel must not work or pass under or ride in the buckets or booms of loaders in operation.

14.25. Fire Extinguisher: Each bulldozer, scraper, dragline, crane, motor grader, front-end loader, mechanical shovel, backhoe, and other similar equipment must be equipped with at least one dry chemical or carbon- dioxide fire extinguisher with a minimum rating of 5-B: C.

14.26. Fill Hatches; Fill hatches on water haul vehicles must be secured or the opening reduced to a maximum of 20 cm (8 in).

14.27. Reverse signal (back-up) alarm.: All self-propelled construction and industrial equipment, whether moving alone or in combination, must be equipped with a reverse signal alarm.

14.27.1. Equipment designed and operated so that the operator is always facing the direction of motion does not require a reverse signal alarm

14.27.2. Reverse signal alarms must be audible and sufficiently distinct to be heard under prevailing conditions.

14.27.3. Alarms must operate automatically upon commencement of backward motion. Alarms may be continuous or intermittent (not to exceed 3-second intervals) and must operate during the entire backward movement.

14.27.4. Reverse signal alarms are in addition to requirements for signal persons.

14.27.5. A warning device or signalperson must be provided where there is danger to persons from moving equipment, swinging loads, buckets, booms, etc.

14.28. Guarding: Guarding must be installed on machinery and mechanized equipment at all locations where there is a potential for injury.

14.28.1. All belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating or moving parts of equipment must be guarded when exposed to contact by persons or when they otherwise create a hazard.

14.28.2. All hot surfaces of equipment, including exhaust pipes or other lines, must be guarded or insulated to prevent injury and fire.

14.28.3. All equipment having a charging skip must be provided with guards on both sides and open end of the skip area to prevent persons from walking under the skip while it is elevated.

14.28.4. Platforms, foot walks, steps, handholds, guardrails, and toe boards must be designed, constructed, and installed on machinery and equipment to provide safe footing and access ways.

14.28.5. Equipment must be provided with suitable working surfaces of platforms, guard rails, and hand grabs when attendants or other employees are required to ride for operating purposes outside the operator's cab or compartment. Platforms and steps must be of nonskid material.

14.28.6. Substantial overhead protection must be provided for the operators of forklifts and similar material handling equipment.

14.29. Fuel Tanks: Fuel tanks must be located in a manner that will not allow spills or overflows to run onto the engine, exhaust, or electrical equipment.

14.30. Exhaust: Exhaust or discharges from equipment must be so directed that they do not endanger persons or obstruct the view of the operator.

14.31. Safety Cage: A safety tire rack, cage, or equivalent protection must be provided and used when inflating, mounting, or dismounting tires installed on split rims, or rims equipped with locking rings or similar devices.

14.32. Removal of Guards: No guard, safety appliance, or device should be removed from machinery or equipment, or made ineffective except for making immediate repairs, lubrications, or adjustments, and then only after the power has been shut off. All guards and devices must be replaced immediately after completion of repairs and adjustments and before power is turned on.

14.33. Seatbelts: Seat belts and anchorages meeting the requirements of 49 CFR 571 must be installed and worn in all motor vehicles. Two-piece seat belts and anchorages for construction equipment must comply with applicable federal specifications.

14.34. Overhead Guards: All high rider industrial trucks must be equipped with overhead guards which meet the structural requirements defined in paragraph 4.21 of ANSI/ASME B56.1, Safety Standards for Low Lift and High Lift Trucks.

14.35. Operator Protection: Suitable protection against the elements, falling or flying objects, swinging loads, and similar hazards must be provided for operators of all

machinery or equipment. Glass used in windshields or cabs must be safety glass.

14.36. Falling object protective structures (FOPS): All bulldozers, tractors, or similar equipment used in clearing operations must be provided with guards, canopies, or grills to protect the operator from falling and flying objects as appropriate to the nature of the clearing operations.

14.36.1. FOPS for other construction, industrial, and grounds-keeping equipment will be furnished when the operator is exposed to falling object hazards.

14.36.2. FOPS will be certified by either the manufacturer or a licensed engineer as complying with applicable Society of Automotive Engineers (SAE) recommended practices:

14.37. Rollover protective structures (ROPS): Seatbelts and rollover protective structures must be installed on:

- ✓ Crawler and rubber-tire tractors including dozers, push and pull tractors, winch tractors, and mowers;
- ✓ Off-the-highway/self-propelled/pneumatic-tire earthmovers such as trucks, pans, scrapers, bottom dumps and end dumps;
- ✓ Motor graders;
- ✓ Water tank trucks having a tank height less than the cab; and other self-propelled construction equipment such as front-end loaders, backhoes, rollers, and compactors.

ROPS are not required on:

- ✓ Trucks designed for hauling on public highways,
- ✓ Crane-mounted dragline backhoes,
- ✓ Sections of rollers and compactors of the tandem steel-wheeled and self-propelled pneumatic tired type that do not have an operator's station.
- ✓ Self-propelled rubber-tired lawn and garden tractors and side boom pipe laying tractors operated solely on flat terrain (maximum 10° slope; 20° slope permitted when off-loading from a truck) not exposed to rollover hazards, and
- ✓ Cranes, draglines, or equipment on which the operator's cab and boom rotate as a unit.

The operating authority must furnish proof from the manufacturer or certification from a licensed engineer that the ROPS complies with applicable SAE standards.

14.38. Lubrication Points: All points requiring lubrication during operation must have fittings so located or guarded to be accessible without hazardous exposure.

14.39. Load Limiting Devices: All machinery or equipment and material hoists operating on rails, tracks, or trolleys must have positive stops or limiting devices on the equipment, rails, tracks, or trolleys to prevent overrunning safe limits.

(TOC)

15.0. SAFETY NEAR, OVER and ON the WATER

Working on, over or near the water can present special hazards and challenges for CAP and contractor employees. Water in the canal often moves faster than it appears. Checks, turnouts, fore bays, tunnels and siphons can be particularly dangerous, with a high potential for drowning if an employee falls in the water in one of those areas when water is flowing. Therefore, the following safety precautions shall be adhered to when working on the canal slope or over/on the water.

15.1. Definition(s):

15.1.1 **High-hazard zone**: Any location on the canal slope within 200 yards upstream of a fore bay, tunnel inlet, siphon inlet, check, turnout or similar structure, *when water is actively flowing*.

15.1.2 **Safety line**: A 3/8 inch rope (or equivalent) sufficiently anchored on both sides of the canal such that an employee who falls into the canal can hold onto this rope and be prevented from moving further downstream. Note: In most cases, the safety chains on the upstream side of checks, siphons, etc. are not a substitute for this safety line.

15.1.3 **Tethering system**: A system utilizing rope and other needed gear to ensure an employee who has fallen into the canal does not float downstream. A tethering system is not a fall protection or fall arrest system; therefore, rope, anchors and other components need only be sufficient to keep an employee from floating downstream. The rope can be slack and long enough to allow employees to move freely on the slope.

15.2. Working on a canal slope outside of a high-hazard zone: When work is performed on the canal slope outside of a high-hazard zone, the following requirements shall be followed:

15.2.1 Each employee on the slope must wear a personal floatation device (PFD).

15.2.2 At least one other employee must be in the vicinity to assist in the event of an emergency.

15.2.3 A ring buoy with a minimum of 90’ of 3/8” line attached must be present and readily accessible. If the work area is lengthy, additional buoys should be strategically located. (Throw bags may be used in addition to, but not as a substitute for ring buoys.)

15.2.4 A safety line must be placed across the canal approximately 10 yards downstream of the work area.

15.2.5 At least one employee trained in first aid and CPR must be available at the site.

Note: Where an employee is working alone and is utilizing a restraint system adjusted such that the employee ***cannot*** end up in the water, none of the above safety measures are required.

15.3. Working on a canal slope within a high-hazard zone: When work is performed on the canal slope within a high-hazard zone, the following requirements shall be followed:

15.3.1 Each employee must utilize one of the following:
- A PFD and a tethering system, adjusted so that the employee cannot float into a siphon, turnout or similar area; *or*
- A restraint system, adjusted and utilized in such manner that it will not permit the employee to end up – full body – in the water.

15.3.2 At least one other employee must be in the vicinity to assist in the event of an emergency.

15.3.3 A ring buoy with a minimum of 90' of 3/8" line attached must be present and readily accessible. If the work area is lengthy additional buoys may be required. (Throw bags may be used in addition to, but not as a substitute for ring buoys.)

15.3.4 At least one employee trained in first aid and CPR must be available at the site.

15.4. Working over water: When working more than four feet directly above the water surface (i.e., work at a check structure where an employee must cross over the guardrails), employees must utilize fall protection (a fall restraint or fall arrest system). A ring buoy with 90' of 3/8" line attached must also be present and readily accessible.

Exception: If an employee is working over the water from the basket of a JLG or similar type of articulating boom lift where tie off is normally required, the employee may work without tying off to the basket or lift. In such cases, the employee must wear a PFD.

15.5. Working on the water (i.e., from a boat or barge): When working on the water, the following requirements shall apply:

15.5.1 Each employee on the boat/barge must wear a personal floatation device.

15.5.2 Long pants, hats, and sunglasses are required protective wear. Gloves, hard hats and safety shoes may also be required, depending upon the nature of the operations.

15.5.3 No work may occur in a high-hazard zone without first consulting with the EH&S department for assistance in safely planning work within that area.

15.6. Diving Standards: CAP's 'Diving Standards' establish the requirements for contractor diving operations. A link is available on the next page of this manual, in the Safety Programs section.

(TOC)

(Main TOC)

SECTION 3

SAFETY PROGRAMS AND POLICIES

Contractors working for CAP can find and print the specific safety and health programs applicable to their work by going to our website at www.cap-az.com.

SECTION 4

OSHA INFORMATION

The Occupational Safety and Health Act (OSHA) establishes requirements that all employers must comply with in regards to employee safety and health. Non- compliance can result in safety violations, which carry substantial fines. CAWCD must also comply with other OSHA and State statutes regarding injury and illness reporting, workers' compensation and related matters, including the following:

- **Report catastrophes and fatalities:** CAWCD is required to report to the local OSHA office any fatality within 8 hours. Additionally, we must report within 24 hours any accident that results in the hospitalization of one or more employees, an amputation, or the loss of an eye. This report can be made by telephone or fax.
- **OSHA Form 300:** A log and summary of Occupational Injuries and Illnesses. Injuries and illnesses must be recorded on this form within six days of their occurrence. An annual summary must be completed and posted in a conspicuous location from February 1 to April 30. The completed form 300 must be kept for five years.
- **Employee Exposure and Medical Records:** Records involving exposures to occupational health hazards must be kept for the term of employment plus 30 years.

OSHA INSPECTION GUIDELINES

The intent of this guideline is to ensure a uniform response and handling of any OSHA inspections at CAP facilities and to maintain effective relationships between CAP and federal and state OSHA and their Compliance Safety and Health Officers (CSHO).

Compliance inspections can occur due to a workplace accident, referral, complaint, or planned inspection. As a current VPP site and under the current guidelines of the Voluntary Protection Program, ADOSH should not schedule a planned inspection at CAP facilities.

To ensure a uniform and coordinated response, the following procedures should be followed in the event of an OSHA compliance inspection at CAP:

1. **Notification of Inspection:** Whenever a CSHO arrives on CAP property for the purpose of conducting an inspection, notification shall be made to the Director of Employee Services, the Environmental Health & Safety (EH&S) Manager and the Legal department. Receptionists and other employees who may have first contact with a CSHO **DO NOT have the authority to allow an inspection to proceed**. Instead, they should greet the CSHO politely, ask the CSHO to identify the purpose of the visit, and advise the CSHO that notification will be made to an appropriate CAP representative.

2. **CAP Representation During an Inspection:** A CAP representative shall accompany the CSHO at all times. In no case shall an inspection proceed until the proper notifications have been made, and a CAP representative is available to accompany the inspector. A "representative" is defined as:

a. The EH&S Manager or his/her designee.
b. The Director of Employee Services
c. Another department manager, as directed by the Director of Employee Services

3. **CAP Representative is Unavailable:** When a CAP representative is not available, the following will apply:

   a. The CAP employee(s) contacted by the CSHO will advise the CSHO **that they are not authorized to permit the inspection process to proceed**, but will immediately contact a CAP representative about the inspection.
   b. When contacted by a CAP employee, the CAP representative will talk to the CSHO, determine the nature of his/her visit, and see if the CSHO can delay the inspection until the arrival of the CAP representative. (Current OSHA guidelines allow for the inspector to wait a reasonable amount of time for such a representative.)
   c. If the CSHO is unwilling to delay the inspection until the arrival of CAP's authorized representative, the CAP representative may:

      - Designate a CAP employee to act as a temporary CAP representative until the authorized representative can arrive, or;

      - Advise the CSHO that CAP procedures require that a CAP representative attend the inspection and, because the CAP representative is presently unavailable, CAP must refuse permission for the inspection to proceed at this time.

4. **Inspection Documentation:** The CAP representative assigned to accompany the CSHO should be prepared to take notes and pictures pertaining to any inspection activity. If the CSHO intends to conduct personal exposure monitoring on any employee, CAP should attempt to conduct simultaneous exposure monitoring on the same employee(s). (This may not be possible due to calibration and or sampling media requirements.)

5. **Review of and Request for Documents:** As part of any inspection a CSHO may request to review a wide variety of CAP documents related to safety and health activities. These records are generally maintained at CAP Headquarters. Requests for such documents will be directed to the EH&S Department.

   A CSHO can review any pertinent documents upon request (i.e., SDSs, exposure monitoring records, etc.). However, CAP will provide copies of documents only after OSHA has provided CAP with a written request for such documents and after the request has been reviewed by the Legal Department. Note: For certain medical records a completed "Medical Access Order" (MAO), may be warranted.

The CAP representative will advise the CSHO that copies of requested documents will generally be provided within two or three working days. A log of all documents provided to the CSHO will be maintained in the EH&S Department

6. **Beginning the Inspection – Opening Conference**: The CAP representative should invite the CSHO to any office or similar place where the inspection can be discussed and the proper documents reviewed and/or completed.

   a. Identify the CSHO: Look at the CSHO's credentials and obtain a business card. Get the name and telephone number of the CSHO's supervisor.

   b. The CSHO must, as part of the opening conference, explain the purpose and scope of the inspection, particularly if he/she is there to investigate an accident or a complaint.

   c. The CSHO should also identify whether this is a safety inspection or health inspection. Health inspections are conducted by an Industrial Hygienist and may include air sampling to determine compliance with applicable exposure limits set by OSHA.

   d. If the inspection is to investigate an accident, complaint or referral, the CSHO should provide a written copy of the complaint or referral form, or define the accident to be investigated. They are initially limited to the scope of the accident, complaint or referral, and should not be allowed into other areas or activities. They do however, have the authority to expand the scope of the inspection as long as they have compelling reasons for doing so. In the event that the CSHO opts to expand the inspection they must inform the CAP representative that they are doing so and the reasons why.

   e. The CAP representative is to observe and note the behavior and actions of the CSHO and attempt to document questions posed by the CSHO as well as CAP's responses.

   f. Other employers/employees: The CSHO may ask if there are other people working on the premises who are not employed by CAP (i.e., contracted employees). If so, the CSHO will want to know who they are, what they do, and for whom they work. The CSHO may want to include these employers/employees in the opening conference.

7. **Ground Rules for the Inspection**: Treat the CSHO with respect. However, remember that this is your facility or operation and the CSHO is your guest. You must maintain control of the inspection.

   a. Whenever you are unsure about a question or a request made by the CSHO, ask for clarification. If necessary, **STOP THE INSPECTION** from proceeding any further until you can contact a member of the EH&S or Legal department for clarification or assistance.

b. Photographs / Videotapes: The CSHO will likely take photos or video of conditions found during the inspection. The CAP representative should take photos or video of the same conditions. If you believe the CSHO is taking a particular photograph which does not reflect the entire condition under investigation, take the same picture if possible, and then take a picture showing the entire condition. When photographs are taken, request concurrence from the CSHO that the photographs will be treated as confidential business information.

c. Demonstrations and Testing: The CSHO may ask to monitor employee exposures in the workplace. To do so, the CSHO will not only want to attach measuring devices to employee's clothing but may also observe and monitor the employee's actions during this time to ensure the integrity of the sampling. Always ensure the EH&S manager and industrial hygienist are aware of any request to conduct personal monitoring.

A CAP employee that the CSHO wishes to monitor can refuse to participate in the monitoring. However, such refusal could be considered obstruction of the inspection process, resulting in the CSHO obtaining an inspection warrant. Unless there are safety or other compelling reasons for an employee to refuse to be monitored, cooperation with the monitoring is usually best.

d. Alleged violations. The CSHO may point out things he/she believes are OSHA violations. The CAP representative should simply make note of the alleged violation and have the CSHO explain what he/she believes is the basis for the suspected violation. Do not agree with, argue, or express any opinions regarding alleged violations identified by the CSHO. Simply state the known facts. Do not guess or give opinions.

e. Interviews:

(1) Interviews with supervisors and managers: If possible, schedule the interview for some time after the facility walk around inspection is complete. Contact EH&S and Legal regarding the interview **BEFORE** agreeing to the interview. A CAP representative (preferably from the Legal Department) can and should be present during interviews with management employees.

(2) Interviews with CAP employees: The CAP representative should inform the employee that he/she is under no obligation to talk to the CSHO. Employee interviews are permitted under the OSHA Act, but if an employee does not want to talk with the CSHO, the employee may refuse without consequence. A CAP representative does not have the right to be present during an employee (non-management) interview unless the employee requests such presence.

(3) The CAP representative should not allow any employee interviews to

unnecessarily obstruct the work schedule. The CSHO may ask employees to sign statements taken during the interview process. Employees should be informed that they are not obligated to sign any statements provided to OSHA.

f. Debriefing after Interviews**:** Immediately after an OSHA interview, all employees should be asked to write down the information provided to OSHA during the interview. If that is not possible, the CAP Representative should interview the employee and identify and record any information or documents provided to OSHA by the employee. *Caution needs to be taken here to ensure that the CAP representative does not do or say anything which may make the employee feel harassed or intimidated for speaking to the CSHO, thus triggering a discrimination complaint from the employee for participating in a protected activity under the OSHA act.*

g. Closing Conference: When the inspection has been completed, OSHA procedures call for a "closing conference" with the employer.

(1) The CSHO will use the closing conference to advise of "apparent violations" that he/she has observed during the inspection. If the CSHO uses the word "violation" DO NOT agree with him/her. Ask the CSHO why he/she thinks there is a violation and try to find out what, in his/her opinion, would constitute a feasible means of abatement (fixing the conditions). The CSHO should also indicate whether the "alleged violation" constitutes a serious or non-serious threat to the employees. This will give the CAP representative more direction on the seriousness of the issue and potential for monetary fines.

(2) Tactfully try to correct incorrect assumptions, rationale, or facts the CSHO may have developed during the inspection and may have used to develop the apparent violations. Get as many details on this point as you can, but do not argue or agree with the CSHO.

If the CSHO asked for an estimate on the amount of time it will take to correct a particular condition, politely state that you will consult with appropriate staff and get back to him/her with that information.

(3) Immediately after the closing conference, the CAP representative should schedule a conference call or meeting with CAP management to discuss the inspection findings. This call/meeting should include EH&S and Legal.

8. **Post Inspection Contacts**: Once the inspection is concluded, either with or without a closing conference, the CSHO will generate an inspection report. Prior to completing the report, the CSHO may telephone with a request for additional information and documents.

Only the CAP representative should speak with the CSHO**.** The CAP representative

should keep in mind that the CSHO is still seeking information that may result in violations. Therefore, the same rules apply as during the actual inspection. Document requests must be made in writing. Notify EH&S and Legal of these additional requests by the CSHO.

9. **OSHA Citations**: The OSHA citations and proposed penalties will be sent by certified mail a few weeks or months after the inspection ends. Be sure the CSHO has the proper complete mailing address of where to send the proposed citations or other paperwork related to the inspection.

   Upon receipt of any OSHA citations and proposed penalties, immediately notify the EH&S and Legal departments. Remember that CAWCD only has 15 working days from the receipt of citations to schedule an informal conference and/or submit a notice of contest. Once the 15 working day period has expired, CAWCD loses any right to contest the citations.

   EH&S and Legal will work with CAP representatives to prepare a response to the OSHA citations and proposed penalties.

10. **Complaint investigations via letter, telephone, email, and similar methods**: OSHA sometimes receives complaints from employees, past employees, and others alleging hazards in the workplace. OSHA can respond to these complaints in several ways, including sending a certified letter to the employer; telephoning the employer; or emailing the employer. In each case, the employer is advised of the complaint items and asked to respond, in writing, generally within ten (10) working days.

    CAP employees who receive such letters, telephone calls, or emails from OSHA must immediately notify their Manager and the EH&S Manager. Failure to respond properly to these complaint notifications will most likely cause an OSHA workplace inspection. EH&S and Legal will work with appropriate CAP Managers to prepare the response.

(Main TOC)

SECTION 6

GLOSSARY OF SAFETY TERMS

GLOSSARY

Absorption. The condensation of gases, liquids, or dissolved substances on the surfaces of solids.

Acceptable Entry Conditions. The conditions that must exist in a permit space to allow entry. In addition, *acceptable entry conditions* ensure employees involved with a permit-required confined space entry can safely enter into and work within the space.

ACGIH. American Conference of Governmental Industrial Hygienists, which develops and publishes recommended occupational exposure limits for hundreds of chemical substances and physical agents. See TLV.

Acid. Any chemical with a low pH that in water solution can burn the skin or eyes. Acids turn litmus paper red and have pH values of 0 to 6.

Action Level. Term used by OSHA and NIOSH to express the level of toxicant, which requires medical surveillance, usually one half of the PEL.

Activated Charcoal. Charcoal is an amorphous form of carbon formed by burning wood, nutshells, animal bones, and other carbonaceous materials. Charcoal becomes activated by heating it with steam to 800-900°C. During this treatment, a porous, submicroscopic internal structure is formed which gives it an extensive internal surface area. Activated charcoal is commonly used as a gas or vapor adsorbent in air-purifying respirators and as a solid sorbent in air sampling.

Acute Effect. Adverse effect on a human or animal which has severe symptoms developing rapidly and coming quickly to a crisis. Also see "chronic effect."

Affected Employee. An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is performed.

AIHA. American Industrial Hygiene Association.

Air. The mixture of gases that surrounds the earth its major components are as follows: 78.08% nitrogen, 20.95% oxygen, 0.03% carbon dioxide, and 0.93% argon. Water vapor (humidity) varies.

Air-line respirator. A respirator that is connected to a compressed breathing air source by a hose of small inside diameter. The air is delivered continuously or intermittently in a sufficient volume to meet the wearer's breathing requirements.

Attendant. An individual stationed outside one or more permit spaces who monitors the authorized entrants. This individual also performs all *attendant's* duties assigned in the CAWCD Confined Space Entry Program.

Authorized Employee. A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this program.

Authorized Entrant. An employee who is authorized by the CAWCD to enter a permit space.

Back Up O & M Supervisor. The backup O & M Supervisor will perform the duties of the O & M Supervisor during his absence.

Benign. Not malignant. A benign tumor is one which does not metastasize or invade tissue. Benign tumors may still be lethal, due to pressure on vital organs.

Biohazard. A combination of the words biological and hazard. Organisms or products of organisms that present a risk to humans.

Blanking or Blinding The absolute closing of a pipe, line, or duct by the fastening of a solid plate (i.e., a spectacle blind or a skillet blind) completely covering the bore and capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Blue Lock. Is an individually keyed lock used for personal protection while an employee is working under a Clearance, Group Lockout or Single Lockout.

Boiling point. The temperature at which the vapor pressure of a liquid equals atmospheric pressure.

Capable of Being Locked Out. An energy isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy-isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy-isolating device or permanently alter its energy control capability.

Carbon monoxide. A colorless, odorless toxic gas produced by any process that involves the incomplete combustion of carbon-containing substances. It is emitted through the exhaust of gasoline-powered vehicles.

Carcinogen. A chemical is considered to be a carcinogen if:

a. It has been evaluated by the International Agency for Research on Cancer (IARC), and found to be a carcinogen or potential carcinogen.

b. It is listed as a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition).

c. It is regulated by OSHA as a carcinogen.

CAS. Chemical Abstracts Service is an organization under the American Chemical Society. CAS abstracts and indexes chemical literature from all over the world in "Chemical Abstracts." "CAS Numbers" are used to identify specific chemicals or mixtures.

Ceiling Limit (C). An airborne concentration of a toxic substance in the work environment, which should never be exceeded.

CERCLA. Comprehensive Environmental Response, Compensation and Liability Act of 1980. Commonly known as "Superfund." (U.S.EPA)

CFR. Code of Federal Regulations. A collection of the regulations that have been promulgated under United States law.

Chemical Cartridge Respirator. A respirator that uses various chemical substances to purify inhaled air of certain gases and vapors. This type respirator is effective for concentrations no more than ten times the TLV of the contaminant, if the contaminant has warning properties (odor or irritation) below the TLV.

CHEMTREC. Chemical Transportation Emergency Center. Public service of the Chemical Manufacturers Association that provides immediate advice for those at the scene of hazardous material emergencies. CHEMTREC has a 24-hour toll- free telephone number (800-424-9300) to help respond to chemical transportation emergencies. **Only the Safety Department or ECD should contact CHEMTREC.**

Chronic Effect. An adverse effect on a human or animal body, with symptoms which develop slowly over a long period of time or which recur frequently. Also see “acute.”

Clearance. A Clearance is a statement with documentation from the O & M Supervisor, Clearance Coordinator or the Clearance Coordinator’s authorized representative to the Clearance Holder stating that the equipment to be worked on has been de-energized and isolated from all listed hazardous energy sources and effectively places the equipment out of service.

Clearance Coordinator. The Clearance Coordinator is the CAWCD employee who has been designated to administer the CAWCD Hazardous Energy Control Program.

Clearance Holder. Is a person authorized to request, receive and release Clearances and who assumes responsibility and/or a lead role on a job.

Combustible Liquid. Combustible liquids are those having a flash point at or above 37.8C (100F).

Commerce. The term "commerce" means trade, traffic, commerce, or transportation within the jurisdiction of the United States.

Commercial Drivers' License Regulation Applicability. The rules in this part apply to every person who operates a commercial motor vehicle in interstate, foreign, or intrastate commerce and to all employees of such persons.

Commercial Motor Vehicle. A commercial motor vehicle means a motor vehicle or combination of motor vehicles used in commerce to transport persons or property if that motor vehicle:
Has a gross combination weight rating of 26,001 or more pounds including a towed unit with a gross vehicle weight rating of more than 10,000 pounds.
Has a gross vehicle weight rating of 26,001 or more pounds.
Is designed to transport 16 or more passengers including the driver.
Is of any size and is used to transport any quantity of hazardous material which require **placarding**.

Concentration. The amount of a given substance in a stated unit of measure. Common methods of stating concentration are percent by weight or by volume, weight per unit volume, normality, etc.

Contractor Definition. "Contractor" refers to Non-CAWCD construction forces.

Corrosive. A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the point of contact.

Cutaneous. Pertaining to or affecting the skin.

Degrees Celsius (Centigrade). The temperature on a scale in which the freezing point of water is 0 °C and the boiling point is 100 °C. To convert to degrees Fahrenheit, use the following formula: °F = (°C x 1.8) + 32.

Degree Fahrenheit. The temperature on a scale in which the boiling point of water is 212° F and the freezing point is 32° F.

Density. The mass per unit volume of a substance. For example, lead is much more dense than aluminum.

Dermatosis. A broader term than dermatitis; it includes any cutaneous abnormality,

thus encompassing folliculitis, acne, pigmentary changes, and nodules and tumors.

DOL. U.S. Department of Labor. OSHA and MSHA are part of the DOL.

DOT. U.S. Department of Transportation.

Dose-response relationship. Correlation between the amount of exposure to an agent or toxic chemical and the resulting effect on the body.

Double Block and Bleed The closure of a line, duct, or pipe by closing and locking or tagging two in-line valves, and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

Dusts. Solid particles generated by handling, crushing, grinding, rapid impact, detonation, and decrepitation of organic or inorganic materials, such as rock, ore, metal, coal, wood and grain. Dusts do not tend to flocculate, except under electrostatic forces; they do not diffuse in air but settle under the influence of gravity.

Dyspnea. Shortness of breath, difficult or labored breathing.

Emergency. Any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants.

Employee in Charge. Is an individual responsible for a job. He/She is also the site representative for a group of employees performing similar work on the same job. The person is normally the on site contact person.

Energized. Connected to an energy source or containing residual or stored energy.

Energy Isolating Device. A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded supply conductors. No poles can be operated independently on a multi-phase disconnect.

Energy isolating device may also be a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not to used as energy isolating devices.

Energy Source. Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

Engulfment. The surrounding and effective capture of a person by a liquid or finely

divided (flowable) solid substance. This substance can be aspirated to cause death by filling or plugging the respiratory system, or can exert enough force on the body to cause death by strangulation, constriction, or crushing.

Entry Permit. The written or printed document provided by CAWCD to allow and control entry into a permit space.

EPA. U.S. Environmental Protection Agency.

Evaporation. The process by which a liquid is changed into the vapor state.

Evaporation Rate. The ratio of the time required to evaporate a measured volume of a liquid to the time required to evaporate the same volume of a reference liquid (butyl acetate, ethyl ether) under ideal test conditions. The higher the ratio, the slower the evaporation rate. The evaporation rate can be useful in evaluating the health and fire hazards of a material.

Federal Register. Publication of U.S. government documents officially promulgated under the law, documents whose validity depends upon such publication. It is published on each day following a government working day. It is, in effect, the daily supplement to the Code of Federal Regulations, CFR.

Fire point. The temperature at which a substance such as lubricating oil, will give off a vapor that will burn continuously after ignition.

First Aid. Emergency measures administered to person before regular medical help can be obtained.

Flammable limits. Flammables have a minimum concentration below which propagation of flame does not occur on contact with a source of ignition. This is known as the lower flammable explosive limit (LEL). There is also a maximum concentration of vapor or gas in air above which propagation of flame does not occur. This is known as the upper flammable explosive limit (UEL). These units are expressed in percent of gas or vapor in air by volume.

Flammable Liquid. Any liquid having a flash point below 37.8°C (100°F), except any mixture having components with flashpoints of 100°F or higher, the total of which make up 99 percent or more of the total volume of the mixture.

Flammable Range. The difference between the lower and upper flammable limits, expressed in terms of percentage of vapor or gas in air by volume, and is also often referred to as the "explosive range."

Flash Point. The minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface

of the liquid. Two tests are used - open cup and closed cup.

Fume. Airborne particulate formed by the evaporation of solid materials, e.g., metal fumes emitted during welding. Usually less than one micron in diameter.

Gage pressure. Pressure measured with respect to atmospheric pressure.

Gas. A state of matter in which the material has very low density and viscosity; can expand and contract greatly in response to changes in temperature and pressure; easily diffuses into other gases; readily and uniformly distributes itself throughout any container. A gas can be changed to the liquid or solid state only by the combined effect of increased pressure and decreased temperature. Examples include sulfur dioxide, ozone, and carbon monoxide.

Gram (g). A metric unit of weight. One ounce equals 28.4 grams.

Gold Lock. A Gold Lock is used for an Out of Service or Special Condition to protect equipment. The lock is used to provide a physical restraint to an energy control device. The lock must be accompanied by an Out of Service or Special Condition Tag that states the reason for the Out of Service or Special Condition. **Gold Locks will not under any circumstances be used to protect employees!**

Group Lock Box. Is a Lockbox that contains all the keys for Red locks used to provide control of energy isolating devices under a Group Lockout or a Clearance.

Group Lockout . Is a procedure used to control energy isolating devices having multiple lockout points. Energy isolating devices are locked out with a Red Lock.

Hazardous Atmosphere An atmosphere that may expose an employee to the following:

1. Risk of death

2. Incapacitation

3. Impairment or ability to self-rescue (that is an unaided escape from a permit space)

4. Acute illness from one or more of the following causes:

    a. Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL)

    b. Airborne combustible dust at a concentration that meets or exceeds its lower flammable limit (LFL)

c. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent

d. Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in OSHA 29 CFR 1910 sub-part G, Occupational Health and Environmental Control, or in OSHA 29 CFR 1910 Sub-part Z, Toxic and Hazardous Substances, which could result in employee exposure in excess of its dose or permissible exposure limit

e. Any other atmospheric condition immediately dangerous to life or health

NOTE: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, OSHA 29 C.F.R. §1910.1200, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

HAZMAT Employee. A person who is employed by a HAZMAT employer and who, in the course of employment, directly affects hazardous material transportation safety. This term includes an individual, including a self-employed individual, employed by a HAZMAT employer who, in the course of employment:

a. Loads, unloads, or handles hazardous material.

b. Manufactures, tests, reconditions, or repairs, modifies, marks, or otherwise represents containers, drums, or packages as qualified for use in the transportation of hazardous material.

c. Prepares hazardous material for transportation.

d. Is responsible for safety of transporting hazardous material.

e. Operates a vehicle used to transport hazardous material.

HAZMAT Employer. A company that uses one or more of its employees in connection with:

a. Transporting hazardous material in commerce.

b. Causing hazardous material to be transported or shipped in commerce.

c. Representing, marking, certifying, selling, offering, manufacturing, reconditioning, testing, repairing, or modifying containers, drums.

d. Packaging as qualified in the transportation of hazardous material.

HECP. Central Arizona Water Conservation District Hazardous Energy Control Program

HEPA filter. (High Efficiency Particulate Air Filter) A disposable, extended medium, dry type filter with a particle removal efficiency of not less than 99.97 percent for 0.3pm particles.

Highly Toxic. A chemical falling within any of the following categories:

a. A chemical that has a median lethal dose (LD50) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

b. A chemical that has a median lethal dose (LD50) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits between 2 and 3 kilograms each.

c. A chemical that has a median lethal concentration (LC50) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams ea.

Hot Work Permit. CAWCD's written authorization to perform operations (i.e., brazing, drilling, grinding, welding, cutting, burning, and heating) capable of providing a source of ignition.

IARC. International Agency for Research on Cancer.

IDLH. Immediately Dangerous to Life and Health. An atmospheric concentration of any toxic, corrosive or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with an individual's ability to escape from a dangerous atmosphere.

Ignition Source. Anything that provides heat, spark or flame sufficient to cause combustion/explosion.

Ignition Temperature. The minimum temperature to initiate or cause self- sustained combustion in the absence of any source of ignition.

Impervious. A material that does not allow another substance to pass through or penetrate it. Frequently used to describe gloves.

Inches of Mercury Column. A unit used in measuring pressures. One inch of mercury column equals a pressure of 1.66 kPa (0.491 psi).

Inches of Water Column. A unit used in measuring pressures. One inch of water column equals a pressure of 0.25 kPa (0.036 psi).

Incompatible. Material which could cause dangerous reactions from direct contact with one another.

Ingestion. Taking in by the mouth.

Inhalation. Breathing of a substance in the form of a gas, vapor, fume, mist, or dust.

Insoluble. Incapable of being dissolved in a liquid.

Irritant. A chemical which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact. A chemical is a skin irritant if, when tested on the intact skin of albino rabbits by the methods of 16 CFR 1500.41 for four hours exposure or by other appropriate techniques, it results in an empirical score of five or more. A chemical is an eye irritant if so determined under the procedure listed in 16 CFR 1500.42 or other appropriate techniques.

Lockout. The placement of a lock on an energy-isolating device, in accordance with an established procedure. This ensures that the energy-isolating device and the equipment being controlled cannot be operated.

Lockout Device. A device that utilizes a positive means such as a lock, to hold an energy-isolating device in a safe position and prevent the energizing of a machine or equipment. Included are valve pins, blank flanges and bolted slip blinds.

LO/TO. Is an acronym for lockout/tag-out.

Latent Period. The time that elapses between exposure and the first manifestation of damage.

LC50. Lethal concentration that will kill 50 percent of the test animals within a specified time. See LD50.

LD50. The dose required to produce the death in 50 percent of the exposed species

within a specified time.

Liter (L). A measure of capacity - one quart equals O.9L.

Lower explosive limit (LEL). The lower limit of flammability of a gas or a vapor at ordinary ambient temperatures expressed in percent of the gas or vapor in air by volume. This limit is assumed constant for temperatures up to 120°C (250°F). Above this, it should be decreased by a factor of 0.7 because explosiveness increases with higher temperatures.

Malignant. As applied to a tumor. Cancerous and capable of undergoing metastasis, or invasion of surrounding tissue.

Materials of Trade. Materials of Trade means a hazardous material, other than a hazardous waste, that is carried on a motor vehicle:

a. For the purpose of protecting the health and safety of the motor vehicle operator or passengers.

b. For the purpose of supporting the operation of a motor vehicle (including its auxiliary equipment).

c. By a private motor carrier (including vehicles operated by a rail carrier) in direct support of a principal business other than transportation by a motor vehicle.

Metastasis. Transfer of the causal agent (cell or microorganism) of a disease from a primary focus to a distant one through the blood or lymphatic vessels. Also, spread of malignancy from site of primary cancer to secondary sites.

Meter. A metric unit of length, equal to about 39 inches.

Micron (micrometer, 1lm). A unit of length equal to one millionth of a meter, approximately 1/25,000 of an inch.

Milligram (mg). A unit of weight in the metric system. One thousand milligrams equals one gram.

Milligrams per cubic meter (MgM^3). Unit used to measure air concentrations of dusts, gases, mists, and fumes.

Milliliter (mL). A metric unit used to measure volume. One milliliter equals one cubic centimeter.

Millimeter of mercury (mmHg). The unit of pressure equal to the pressure exerted by a column of liquid mercury one millimeter high at a standard temperature.

Mists. Suspended liquid droplets generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersed state, such as by splashing, foaming, or atomizing. Mist is formed when a finely divided liquid is suspended in air.

MSDS. Material Safety Data Sheet.

MSHA. Mine Safety and Health Administration, U.S. Department of Labor.

Mucous Membranes. Lining of the hollow organs of the body, notably the nose, mouth, stomach, intestines, bronchial tubes, and urinary tract.

NFPA. The National Fire Protection Association is a voluntary membership organization whose aim is to promote and improve fire protection and prevention. The NFPA publishes 16 volumes of codes known as the National Fire Codes.

NIOSH. The National Institute for Occupational Safety and Health is a federal agency. It conducts research on health and safety concerns, tests and certifies respirators, and trains occupational health and safety professionals.

NTP. National Toxicology Program. The NTP publishes an annual report on carcinogens.

Non-Resident Definition. "Non-Resident CAWCD Personnel" referred to in this section means personnel who are centralized and perform work at several CAWCD facilities. In the normal course of their duties they do not report to one facility on a routine basis.

Normal Production Operations . The utilization of a machine or equipment to perform its intended production function.

O&M Supervisor. The O & M Supervisors are responsible for preparing or approving a correct Clearance Switching Procedure Form and directing switching and related operations.
Each O & M Supervisor may delegate the responsibility for preparation and placement of Clearances to the Backup O & M Supervisor.
The O&M Supervisor may be authorized to direct the switching and other operations required in placing and removing the protection for Clearances, Out of Service, Special Conditions.

Out of Service. The Out-of-Service is a documented isolation that may be placed on a system or piece of equipment when the task that workers are to perform on or near that equipment would not adversely affect its availability and no hazardous condition is created by working on or near the equipment. **Gold Locks will not under**

any circumstances be used to protect employees!

PPM. Parts per million, parts of air by volume of vapor or gas or other contaminant used to measure air concentrations of vapors and gases.

PSI. Pounds per square inch (for MSDS purposes) is the pressure a material exerts on the walls of a confining vessel or enclosure. For technical accuracy, pressure must be expressed as psig (pounds per square inch gauge) or psia (pounds per square absolute; that is, gauge pressure plus sea level atmospheric pressure, or psig plus approximately 14.7 pounds per square inch).

RCRA. Resource Conservation and Recovery Act of 1976. (U.S.EPA)

Reactivity (chemical). A substance's susceptibility to undergo a chemical reaction or change that may result in dangerous side effects, such as an explosion, burning, and corrosive or toxic emissions.

Red Lock. Is a lock in keyed-alike sets used to secure multiple energy isolating devices used on a Group Lockout or Clearance.

Respirable Size Particulates. Particulates in the size range that permits them to penetrate deep into the lungs upon inhalation.

Respirator (approved). A device which has met the requirements of 29 CFR and is designed to protect the wearer from inhalation of harmful atmospheres and has been approved by the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA).

Respiratory System. Consists of (in descending order) - the nose, mouth, nasal passages, nasal pharynx, pharynx, larynx, trachea, bronchi, bronchioles, air sacs (alveoli) of the lungs, and muscles of respiration.

Route of Entry. The path by which chemicals can enter the body. There are three main routes of entry: inhalation, ingestion, and skin absorption.

SARA. Superfund Amendments and Reauthorization Act of 1986. (U.S.EPA)

SCBA. Self-contained breathing apparatus.

Safety Sensitive. A position designated as where 25% or more of the positions normal work hours require the use of appropriate PPP and/or requiring specialized safety training to prevent injury or illness. These positions normally work in close proximity to the pumping plants, aqueduct, checks and related structures, siphons, or with any industrial machinery / vehicles and /or tools required to maintain the Central Arizona Project (The current listing of "safety sensitive" positions is available in

Appendix B of the Return to work policy).

Sensitizer. A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

Stability. An expression of the ability of a material to remain unchanged. For MSDS purposes, a material is stable if it remains in the same form under expected and reasonable conditions of storage or use. Conditions which may cause instability (dangerous change) are stated. Examples are temperatures above 150°F, and shock from dropping.

Synergism. Cooperative action of substances whose total effect is greater than the sum of their separate effects.

Systemic. Spread throughout the body, affecting all body systems and organs, not localized in one spot or area.

Servicing and/or Maintenance. Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or un-jamming of machines or equipment, and making adjustments or tool changes, where the employee may be exposed to the unexpected energizing or startup of the equipment or release of hazardous energy.

Setting Up. Any work performed to prepare a machine or equipment to perform its normal production operation.

Special Work Permit. A Special Work Permit is a statement that formalizes and documents the preparation and coordination between CAWCD and Non- Resident CAWCD or Outside Contractor personnel to authorize work by these entities on or near CAWCD facilities.

Special Condition. The Special Condition procedure is to provide temporary special operating or limiting instructions for power or auxiliary equipment. Although a Special Condition may serve as temporary protection for equipment, **IT SHALL NEVER BE USED FOR PROTECTION OF PERSONNEL.**

Switchman. A Switchman as defined in this section means a CAWCD electrician who has been certified and authorized to perform Electrical Power System switching on energized systems or devices operating above 480 volts AC.

Tag-out. The placement of a tag on an energy-isolating device, in accordance with an established procedure, to indicate that the energy-isolating device and the equipment being controlled may not be operated until the tag is removed.

Threshold. The lowest dose or exposure to a chemical at which a specific effect is observed.

Time-weighted average concentration (TWA). Refers to concentrations of airborne toxic material which have been weighted for a certain time duration, usually 8 hours.

TLV. Threshold Limit Value. A time-weighted average concentration under which most people can work consistently for 8 hours a day, day after day, with no harmful effects. The American Conference of Governmental Industrial Hygienists publishes a table of these values and accompanying precautions annually.

Toxic. A chemical falling within any of the following categories:

a. Chemical that has a median lethal dose (LD50) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

b. A chemical that has a median lethal dose (LD50) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.

c. A chemical that has a median lethal concentration (LC50) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 100 grams each.

Toxicity. A relative property of a chemical agent and refers to a harmful effect on some biologic mechanism and the conditions under which this effect occurs.

Target organ effects. The following is a target organ categorization of effects which may occur, including examples of signs and symptoms of chemicals which have been found to cause such effects. These examples are presented to illustrate the range and diversity of effects and hazards found in the workplace, and the broad scope employers must consider in this area, but are not intended to be all-inclusive:

a. **Hatotoxins** Chemicals which produce liver damage Signs & Symptoms: Jaundice; liver enlargement Chemicals: Carbon tetrachloride; nitrosamines

b. **Nephrotoxins:** Chemicals which produce kidney damage Signs & Symptoms: Edems; proteinuria
Chemicals: Halogenated hydrocarbons; uranium

c. **Neurotoxins:** Chemicals which produce their primary toxic effects on the

nervous system
Symptoms: Narcosis; behavioral changes; decrease in motor functions
Chemicals: Mercury; carbon disulfide

d. **Agents which act on the blood or hematopoietic system:** Decrease hemoglobin function; deprive the body tissues of oxygen Signs & Symptoms: Cyanosis; loss of consciousness
Chemicals: Carbon monoxide; cyanides

e. **Agents which damage the lung:** Chemicals which irritate or damage the pulmonary tissue
Signs & Symptoms: Cough; tightness in chest; shortness of breath
Chemicals: Silica; asbestos

f. **Reproductive toxins:** Chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis)
Signs & Symptoms: Birth defects; sterility Chemicals: Lead; DBCP

g. **Cutaneous hazards:** Chemicals which affect the dermal layer of the body, Signs & Symptoms: Defatting of the skin; rashes; irritation Chemicals: Ketones; chlorinated compounds

h. **Eye hazards:** Chemicals which affect the eye or visual capacity Signs & Symptoms: Conjunctivitis; corneal damage
Chemicals: Organic solvents; acids

TCA. Trichloroethane, used extensively in solvents. Can cause central nervous system and cardiovascular depression.

TCE. Trichloroethylene, an industrial solvent. Can lead to cardiotoxicity and neurological impairment with exposure to high concentration.

Upper explosive limit (UEL). The highest concentration (expressed in percent vapor or gas in the air by volume) of a substance that will burn or explode when an ignition source is present.

Vapor pressure. Pressure (measured in pounds per square inch absolute - psia) exerted by a vapor. If a vapor is kept in confinement over its liquid so that the vapor can accumulate above the liquid (the temperature being held constant), the vapor pressure approaches a fixed limit called the maximum (or saturated) vapor pressure, dependent only on the temperature and the liquid.

Vapors. The gaseous form of substances that are normally in the solid or liquid state (at room temperature and pressure). The vapor can be changed back to the solid or liquid state either by increasing the pressure or decreasing the temperature alone.

Vapors also diffuse. Evaporation is the process by which a liquid is changed into the vapor state and mixed with the surrounding air.

Solvents with low boiling points will volatilize readily. Examples include benzene, methyl alcohol, mercury, and toluene.

Viscosity. The property of a fluid that resists internal flow by releasing counteracting forces.

Volatility. The tendency or ability of a liquid to vaporize. Such liquids as alcohol and gasoline, because of their well-known tendency to evaporate rapidly, are called volatile liquids.

Water Column. A unit used in measuring pressure. See also inches of water column.

WATER SYSTEMS OPERATOR. On Major equipment the Water Systems Operator (WSO) is responsible for ISSUING and accepting the RELEASE of Clearances using pre-approved Clearance Switching procedure forms on Major equipment. The WSO issuing the Clearance is responsible for correctness of the documentation of the switching activities.

ZERO-ENERGY STATE. A condition that is reached when all energy sources to or within equipment are isolated, blocked, or otherwise relieved, with no possibility of re-accumulation. Equipment is not safe to work on until it is in a zero-energy state.

(Main TOC)